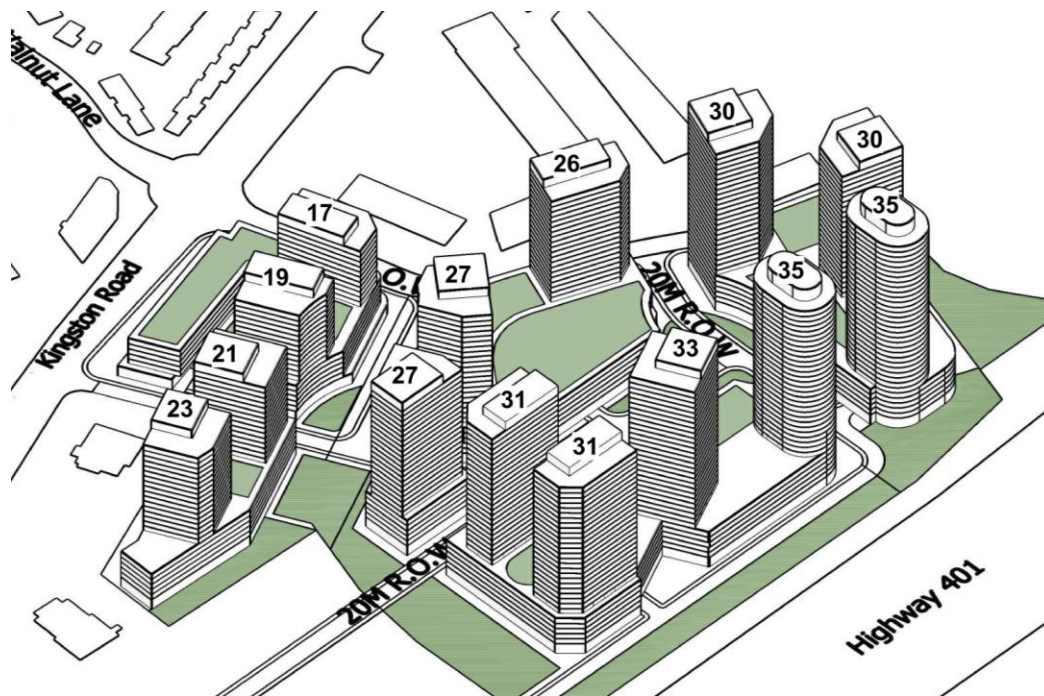


TRIBUTE (BROOKDALE) LIMITED

1101A/1105/1163 KINGSTON ROAD, CITY OF PICKERING TRAFFIC IMPACT STUDY

October 30, 2023





**1101A/1105/1163
KINGSTON ROAD,
CITY OF PICKERING
TRAFFIC IMPACT STUDY**

TRIBUTE (BROOKDALE) LIMITED

REPORT

DATE: OCTOBER 30, 2023

**WSP
100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON
CANADA L3T 0A1**

**T: +1 905 882-1100
F: +1 905 882-0055
WSP.COM**



October 30, 2023

TRIBUTE (BROOKDALE) LIMITED
c/o Stephen Deveaux
Executive Vice President, Land Development
1815 Ironstone Manner, Unit 1
Pickering, Ontario L1W 3W9

Dear Mr. Deveaux,

Subject: **Traffic Impact Study for Proposed Development at 1101A/1105/1163
Kingston Road, Pickering**

WSP Canada Inc. (WSP) is pleased to submit this traffic impact study to support the Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) applications for the proposed mixed-use development located at 1101A/1105/1163 Kingston Road in the City of Pickering.

Based on the enclosed study findings of this report, it is expected that the proposed development can be readily accommodated by the study area transportation network with some signal timing adjustments.

We thank you for the opportunity to undertake this study. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,

Ismet Medic, B.A.Sc.
Senior Project Manager
Transportation Planning and Science

Peter Yu, P.Eng., PMP
Project Manager,
Transportation Planning and
Science



100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON
CANADA L3T 0A1

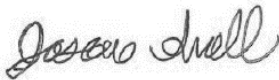
T: +1 905 882-1100
F: +1 905 882-0055
wsp.com

SIGNATURES

PREPARED BY



Sangave Gunajothy, EIT
Transportation Planner



Jason Small, EIT
Transportation Planner

APPROVED¹ BY *(must be reviewed for technical accuracy prior to approval)*



Ismet Medic, BAsC
Senior Project Manager

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1 INTRODUCTION

WSP was retained by Tribute Communities to prepare a Transportation Impact Study (TIS) for the proposed mixed-use development located at 1101A/1105/1163 Kingston Road in the City of Pickering. The site location and study area are shown in **Figure 1-1**.

The site is currently occupied by a shopping centre with various retail tenants including Home Depot, Food Basics, and others. The proposed development will, upon the completion of all four phases, fully replace the existing shopping centre with multi-use blocks containing a total of 5,238 residential units and 7,149 m² of retail space, and 716 m² of daycare space. The site plan is shown in **Figure 1-2**.

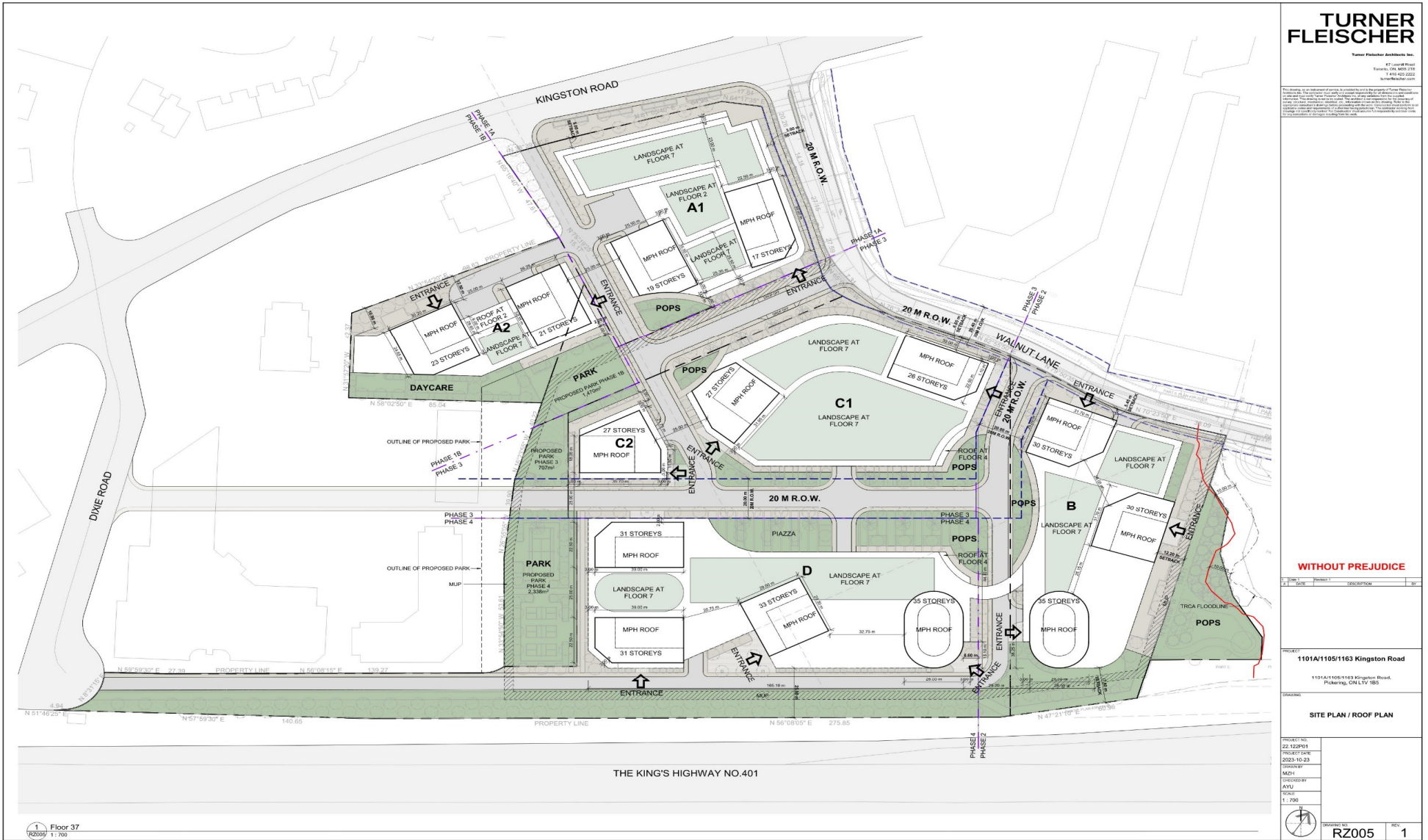
The subject site is proposed to utilize existing connections to Kingston Road (both via Walnut Lane and a direct right-in/right-out access) and Dixie Road, as well as the City's proposed extension of Walnut Lane to Liverpool Road.

The main objective of this study is to evaluate if there are any adverse impacts on the local transportation network related to the proposed development and to evaluate the proposed parking and loading arrangements. Our study approach and findings are documented herein.



Figure 1-1

Site Location and Study Area



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Turner Fleischer Architects Inc.
 47 Lamb Road
 Toronto, ON M6J 2R8
 T 416 462 2222
 turnerfleischer.com

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WITHOUT PREJUDICE

PROJECT: 1101A/1105/1163 Kingston Road
 1101A/1105/1163 Kingston Road,
 Pickering, ON L1V 1B5

SITE PLAN / ROOF PLAN

PROJECT NO:	22-152P01
PROJECT DATE:	2023-10-23
DESIGNER:	MEH
CHECKED BY:	AYU
SCALE:	1:700

DATE:	2023-10-23
DRAWN BY:	MEH
CHECKED BY:	AYU
SCALE:	1:700
REVISION:	RZ005
REV:	1

2023-10-23 11:38:46 AM

1 Floor 37
 RZ005 1:700



Figure 1-2
 Site Plan

2 EXISTING CONDITIONS

This section of our assessment describes the existing road network and traffic conditions within the study area.

2.1 BOUNDARY ROADWAYS

The following roadways make up the boundary road network that surrounds the subject site:

Liverpool Road is a north-south type B arterial road under the jurisdiction of the Region Municipality of Durham with a speed limit of 50 km/h within the study area.

Pickering Parkway is an east-west type C arterial road under the jurisdiction of the City of Pickering with a speed limit of 50 km/h within the study area.

Kingston Road, which directly borders the site to the north, is an east-west type B arterial road under the jurisdiction of the Region Municipality of Durham with a speed limit of 60 km/h within the study area. Dedicated bus and bicycle lanes are provided within the portions of the study area west of Delta Boulevard and near Liverpool Road.

Walnut Lane, which directly borders the site to the northeast, is a north-south collector road under the jurisdiction of the City of Pickering with a speed limit of 40 km/h within the study area.

Dixie Road is a north-south type C arterial road under the jurisdiction of the City of Pickering with a speed limit of 60 km/h north of Kingston Road and 40 km/h south of Kingston Road.

Fairport Road is a north-south type C arterial road under the jurisdiction of the City of Pickering with a speed limit of 40 km/h within the study area.

Delta Boulevard is a north-south local road under the jurisdiction of the City of Pickering with a speed limit of 40 km/h within the study area.

Whites Road is a north-south type A arterial road under the jurisdiction of the Region Municipality of Durham with a speed limit of 60 km/h within the study area.

Highway 401 is an east-west freeway under the jurisdiction of the Ontario Ministry of Transportation with a speed limit of 100 km/h. It has eastbound on and off-ramps and westbound on-ramps at Whites Road, westbound on and off-ramps at Kingston Road (approximately 250 metres east of Delta Boulevard), and westbound on and off-ramps at Liverpool Road.

The study area includes the following signalized intersections:

- Liverpool Road & Highway 401 Westbound Off-Ramp;
- Liverpool Road & Pickering Parkway;
- Liverpool Road & Kingston Road;
- Kingston Road & Walnut Lane;
- Kingston Road & Dixie Road;

- Kingston Road & Fairport Road;
- Kingston Road & Highway 401 WB Ramps;
- Kingston Road & Delta Boulevard;
- Kingston Road & Whites Road; and
- Whites Road and Highway 401 Eastbound Off-Ramp.

The lane configurations at the study intersections are illustrated in **Figure 2-1**.

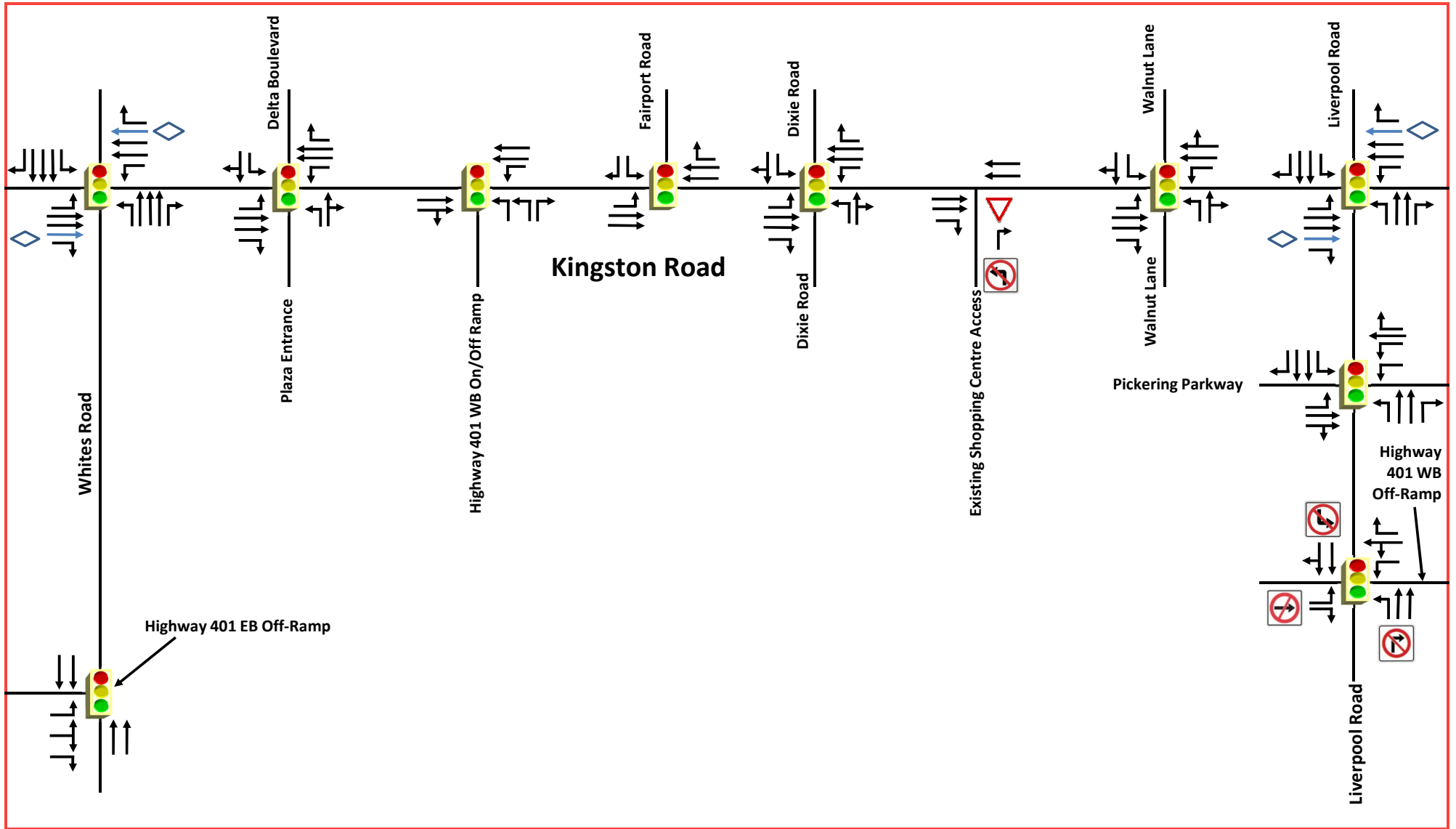


Figure 2-1
Existing Lane Configuration

2.2 TRANSIT SERVICES

The site is situated in an area that is very well-served by transit, with stops and stations connecting to various parts of the City and the region within 500 metres or less of the proposed development. Weekday and weekend minimum service levels range depending on bus type and location, with PULSE bus routes having 15-minute headways, base bus routes having 30-minute headways, and rural bus routes having 90-minute headways during weekday and weekend a.m. and p.m. peak periods. The site is serviced by the following Durham Region Transit (DRT) bus routes:

- The **900 PULSE** operates in an east-west direction along Kingston Road between Centennial College and Bond Street East and Ritson Road North. The route connects to several important destinations, such as the Oshawa Centre Terminal, Centennial College, and University of Toronto Scarborough. This bus route stops adjacent to the site at the intersection of Kingston Road & Walnut Lane. Overnight service along this corridor is provided by the **N1 Route**.
- The **920 Route** operates in an east-west direction along Kingston Road between Scarborough Town Center and Harmony Terminal. This bus route stops adjacent to the site at the intersection of Kingston Road & Walnut Lane.
- The **916 PULSE** operates in an east-west direction mostly along Rossland Road East between Pickering Parkway Terminal and Harmony Terminal. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.
- The **917 Route** operates in an east-west direction mostly along Bayly Street between Pickering Parkway Terminal and Oshawa Centre Terminal. The route connects to several important destinations, such as Pickering Parkway Terminal, Pickering Station, Ajax Station, Whitby Station, Durham College, and Oshawa Centre Terminal. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.
- The **110 Route** operates in an east-west direction mostly on Finch Avenue between Pickering Parkway Terminal and Sunbird Trail. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.
- The **291 Route** operates in an east-west direction mostly along Kingston Road, then in a north-south direction mostly along Harwood Avenue South between Pickering Station and the intersection of Westney Road South & Harwood Avenue South. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.
- The **103 Route** operates in an east-west direction between Pickering Parkway Terminal and the intersection of Altona Road & Pine Grove Avenue. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.
- The **112 Route** operates in a north-south direction between Pickering Parkway Terminal and the intersection of Burkholder Drive & Belcourt Street. The bus route's nearest stop to the site is at the intersection of Kingston Road & Liverpool Road.

The site is also serviced by the following GO Transit regional bus routes:

















- The **41 Hamilton/Pickering** bus route operates primarily east-west between Hamilton and the Pickering GO Station. This bus route stops adjacent to the site at the intersection of Kingston Road & Walnut Lane.
- The **92 Oshawa/Yorkdale** bus route operates primarily east-west between the Oshawa GO station and the Yorkdale Bus Terminal. This bus route stops adjacent to the site at the intersection of Kingston Road & Walnut Lane.

The site is also located approximately 1 km away from the Pickering GO station, at which the Lakeshore East GO Train line provides all-day service between Union Station and Durham College Oshawa GO Station.

A map of the DRT transit routes and bus stops in the area is shown in **Figure 2-2**.

Figure 2-2: Existing Transit Routes

Legend

-  Operates at least every 20 minutes, weekdays, from AM peak through PM peak. Operates at least every 30 minutes at other times.
-  Operates at least every 30 minutes
-  Operates at least every 15 minutes during certain times, operates at least every 30 minute at other times.
-  Operates at least every 30 minutes
-  Operates at least every two hours
-  On Demand available to nearby bus routes at all times. Peak-period connections to local GO Transit rail stations available.
-  On Demand available to nearby bus routes when bus route is not operating.
-  Pedestrian bridge or tunnel
-  Route number
-  Branch
-  Direction of travel
-  Service Frequency
-  Hospital
-  Train station
-  Terminal
-  College / University



2.3 ACTIVE TRANSPORTATION NETWORK

Along Kingston Road, sidewalks are provided along at least one side of the roadway within the portions of the study area west of Delta Boulevard and east of Dixie Road (including along the frontage of the site). Additionally, dedicated bicycle lanes are provided within the portions of the study area west of Delta Boulevard and near Liverpool Road.

All other boundary roadways have sidewalks on at least one side of the roadway.

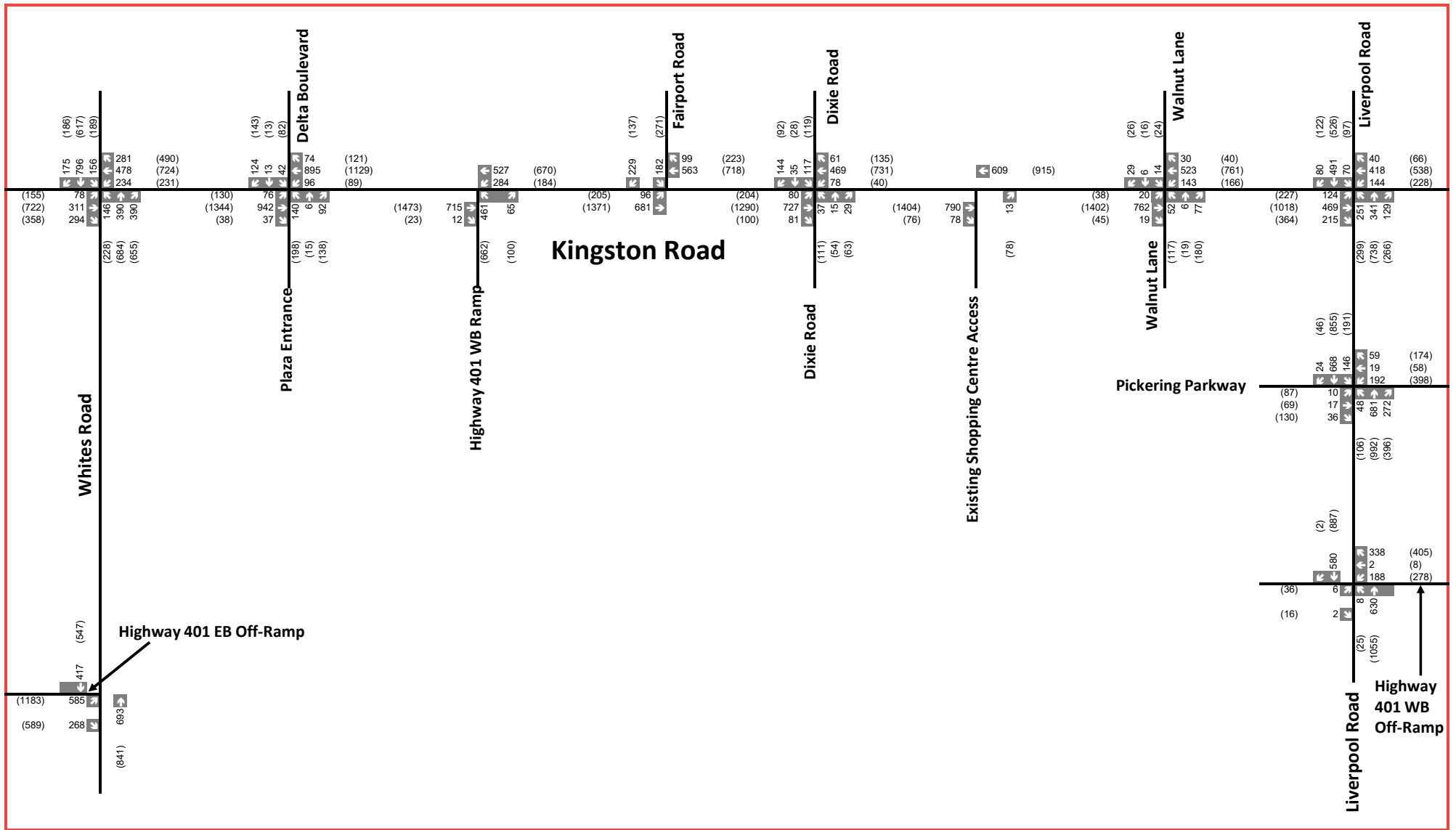
2.4 TRAFFIC DATA

Table 2-1 summarizes the list of turning movement counts collected for this study, as well as the source and date of the counts. Traffic data was collected during typical weekday a.m. and p.m. peak periods. The turning movement counts used are included in **Appendix A**.

Table 2-1: Traffic Data Information

Intersection	Count Date	Source
Liverpool Road & Highway 401 WB Off-Ramp	June 8, 2022	Spectrum Traffic Data Inc; Retrieved from 1786-1790 Liverpool Road TIS (BA Group)
Liverpool Road & Pickering Parkway	June 8, 2022	
Liverpool Road & Kingston Road	June 8, 2022	
Kingston Road & Walnut Lane	January 10, 2023	Horizon Data Services Limited
Kingston Road & Dixie Road	January 10, 2023	
Kingston Road & Fairport Road	December 6, 2022	Durham Region
Kingston Road & Highway 401 WB Ramps	December 6, 2022	
Kingston Road & Delta Boulevard	December 13, 2022	
Kingston Road & Whites Road	December 6, 2022	
Whites Road & Highway 401 EB Off-Ramp	December 6, 2022	

The weekday a.m. and p.m. peak hour volumes at the study intersections are illustrated in **Figure 2-3**.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-3

Existing Traffic Volumes

2.5 EXISTING TRAFFIC CONDITIONS

To analyze existing traffic conditions in the study area, capacity analyses were undertaken using the Synchro 11 traffic analysis software. This software incorporates the methodology outlined in the Highway Capacity Manual (HCM), Transportation Research Board, 2000 and 2010. The signal timing plans for the study intersections were acquired from the Region and are provided in **Appendix A**.

The Synchro model has been established based on the Regional Municipality of Durham *Design Specifications for Traffic Control Devices, Pavement Markings, Signage and Roadside Protection* (Durham Region guidelines), dated April 2023. The bus blockage parameter has been applied on lane segments with a near-side bus stop to account for the presence of regular DRT and GO Transit bus services.

Per the Durham Region guidelines, the width of all lanes were coded as the actual lane widths, determined by measurements taken using Google satellite imagery.

For existing conditions, intersection peak hour factors were calculated from the 15-minute peak hour traffic counts. However, a PHF of 0.92 was assumed for all intersections in all future condition models in order to be consistent with the Durham Region guidelines.

The conflicting pedestrian, conflicting bicycles, and heavy vehicle percentages were also based on the traffic counts.

A lost time of zero was initially applied at all of the signalized intersections. However, as the westbound left movement at the intersection of Liverpool Road & Kingston Road in the p.m. peak hour had a v/c ratio above 1.00 (implying that the movement is operating over-capacity), a lost time adjustment of -2.0 seconds was applied to this movement in order to bring it within capacity to reflect its observed traffic volume. Existing conditions at this intersection both with and without this adjustment are shown in the tables below. This adjustment is then carried forward to all future models.

The existing “bus-only” lanes on Kingston Road were not counted as traffic lanes in the model.

All of the evaluation parameters are maintained from existing to future evaluations to allow “apples to apples” comparisons.

An intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity (v/c) and delays for individual movements at an intersection. Level of Service (LOS). **Appendix B** provides the LOS definitions according to the HCM 2000 methodology.

Traffic operations were analyzed at the study intersections to determine the existing LOS during the weekday a.m. and p.m. peak hours. The results of the intersection capacity analysis under existing conditions with the above calibration are summarized in **Table 2-2**. Detailed intersection capacity analysis sheets are included in **Appendix C**.

Table 2-2: Existing Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Highway 401 WB Off-Ramp	B (13)	--	C (23)	WB-R (0.99)
Liverpool Road & Pickering Parkway	B (15)	--	C (25)	SB-L (0.91)
Liverpool Road & Kingston Road (unadjusted)	C (31)	NB-L (0.90)	D (39)	EB-T (0.97) WB-L (1.10)
Liverpool Road & Kingston Road (-2 s lost time adjustment in the P.M. peak hour)	N/A	N/A	D (37)	WB-L (0.97)
Kingston Road & Walnut Lane	A (7)	--	B (12)	--
Kingston Road & Dixie Road	B (16)	--	B (18)	--
Kingston Road & Fairport Road	B (15)	--	B (14)	--
Kingston Road & Highway 401 WB Ramps	C (21)	--	C (25)	NB-L (0.87)
Kingston Road & Delta Boulevard	C (22)	--	B (15)	NB-L (0.87)
Kingston Road & Whites Road	B (20)	--	C (28)	NB-R (0.90)
Whites Road & Highway 401 EB Off-Ramp	C (20)	--	C (26)	--

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values over 0.90.

The results presented above indicate that, with the lost time adjustment applied, all study intersections operate within capacity. As shown in **Table 2-2**, this minor adjustment in timing managed to get all movements at the intersection to operate within capacity. All intersections operate at an acceptable LOS of 'D' or better.

A queueing analysis for the study intersections was completed under existing conditions and is presented in **Table 2-3**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix C**.

Table 2-3: Existing Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Highway 401 WB Off-Ramp	EBL	N/A	5	17
	EBR	N/A	0	0
	WBL	203	32	47
	WBT	203	33	48
	WBR	125	29	119
	NBL	27	3	7
	NBT	348	47	98
	SBT	138	54	46
Liverpool Road & Pickering Parkway	EBL	59	7	31
	EBT	59	8	17
	WBL	57	30	48
	WBT	305	10	19
	WBR	62	0	15
	NBL	54	7	13
	NBT	138	44	130
	NBR	76	5	6
	SBL	133	22	66
	SBT	234	62	107
Liverpool Road & Kingston Road (unadjusted)	EBL	189	30	59
	EBT	671	82	171
	EBR	98	43	88
	WBL	171	34	96
	WBT	372	60	70
	WBR	117	0	6
	NBL	186	64	70
	NBT	234	44	93
	NBR	52	10	26
	SBL	49	17	22
	SBT	327	64	65
	SBR	61	10	12

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Kingston Road (-2 s lost time adjustment in the P.M. peak hour)	EBL	189	N/A	59
	EBT	671	N/A	171
	EBR	98	N/A	88
	WBL	171	N/A	89
	WBT	372	N/A	70
	WBR	117	N/A	6
	NBL	186	N/A	70
	NBT	234	N/A	93
	NBR	52	N/A	26
	SBL	49	N/A	22
	SBT	327	N/A	65
	SBR	61	N/A	12
Kingston Road & Walnut Lane	EBL	26	3	8
	EBT	105	25	100
	EBR	26	1	2
	WBL	37	11	35
	WBT	671	18	39
	NBL	63	21	42
	NBT	101	14	29
	SBL	19	8	12
Kingston Road & Dixie Road	EBL	145	22	33
	EBT	872	116	188
	EBR	65	25	14
	WBL	51	8	5
	WBT	167	28	61
	WBR	80	3	3
	NBL	13	17	39 [27]
	NBT	100	12	28
	SBL	16	41 [28]	41 [28]
Kingston Road & Fairport Road	EBL	75	27	20
	EBT	400	113	203
	WBT	872	23	25
	WBR	19	5	9
	SBL	16	66 [46]	86 [63]
	SBR	261	21	15
Kingston Road & Highway 401 WB Ramps	EBT	245	60	140
	WBL	48	10	60 [26]
	WBT	400	12	74
	NBL	193	72	99
	NBR	52	12	16

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Delta Boulevard	EBL	52	13	12
	EBT	199	87	107
	EBR	149	4	0
	WBL	100	27	5
	WBT	245	136	116
	WBR	18	17	8
	NBL	107	54	74
	NBT	107	15	19
	SBL	146	19	30
Kingston Road & Whites Road	EBL	127	21	33
	EBT	262	44	101
	EBR	123	44	59
	WBL	87	21	54
	WBT	199	28	51
	WBR	35	1	38 [8]
	NBL	72	33	53
	NBT	135	33	58
	NBR	35	40 [17]	194 [115]
	SBL	89	34	44
	SBT	361	71	53
Whites Road & Highway 401 EB Off-Ramp	EBL	272	79	125
	EBR	225	19	114
	NBT	162	54	96
	SBT	293	31	58

The queueing analysis for existing conditions indicates that the 95th and 50th percentile queues are expected to be accommodated within the available storage lengths with the exception of the northbound left-turn and southbound left-turn movements at the intersection of Kingston Road & Dixie Road, the southbound left-turn movement at Kingston Road & Fairport Road, the westbound left-turn movement at Kingston Road & Highway 401 WB Ramps, and the northbound right-turn and westbound right-turn movements at Kingston Road & Whites Road.

For Kingston Road & Dixie Road, the northbound left-turn lane storage length is restricted by the close proximity of the existing site access located 20 metres south of the intersection. However, the south leg of Dixie Road primarily operates as a private local driveway servicing the retail developments south of Kingston Road and therefore, these queues do not impact traffic on Kingston Road.. Moreover, there is an additional site access on Dixie Road and the driveway blockage is not a concern. The southbound left-turn movement at Kingston Road & Dixie Road experiences relatively high volumes for its short storage length (approximately 120 vehicles in both the a.m. and p.m. peak

hours). The 50th and 95th percentile queues are expected to exceed the painted lane markings for the southbound left-turn lane; however, the queues are not expected to reach the adjacent upstream intersection (i.e. stop-controlled intersection at Dunbar Road & Dixie Road) which is approximately 80 metres north of Kingston Road.

At the intersection of Kingston Road & Highway 401 Westbound Ramps, the westbound left-turn movement in the p.m. peak hour exceeds the storage length for 95th percentile queues. The 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues is limited as the 50th percentile (average) queue lengths are within the available storage lengths. Therefore, it is expected that these queues can be accommodated by the available storage length.

Similarly, at the intersection of Kingston Road & Whites Road, the westbound right-turn movement in the p.m. peak hour and the northbound right-turn movement in the a.m. peak hour exceed the storage length in the 95th percentile but remain within the storage length in the 50th percentile. Therefore, it is expected that these queues can be accommodated by the available storage length. For the northbound right-turn movement in the p.m. peak hour, it is expected that queues will exceed the storage length in the 50th percentile. This is mainly due to the short existing storage length, which is approximately 35 metres. Considering the high volume of vehicles turning northbound right, the existing storage length is insufficient. However, since the intersection has three northbound through lanes, spillover from the right turn lane is not expected to cause significant delays for the through movement.

At the intersection of Kingston Road & Fairport Road, the 50th percentile queues for the southbound left-turn movement exceeds the storage length in both the a.m. and p.m. peak hour. This is due to a short existing storage length of 16 metres. Spillover from the left turn queues could cause delays for vehicles in the adjacent lane trying to turn right.

3 FUTURE CONDITION ASSUMPTIONS

3.1 HORIZON YEARS

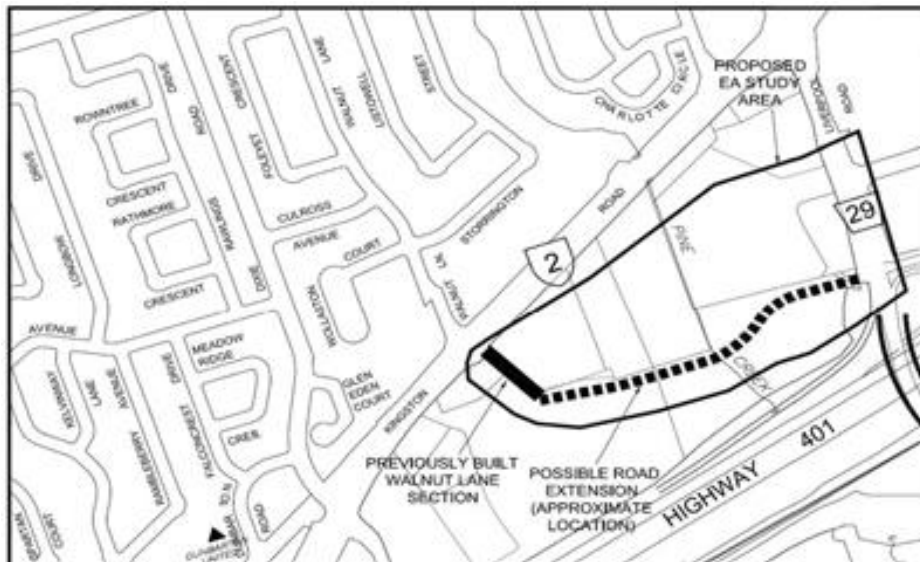
The traffic conditions for the following horizon years were assessed in this study per Durham Region TIS requirements:

- **2028:** Anticipated phase 1 build-out complete;
- **2033:** Anticipated full build-out of development;
- **2038:** 5-years after full build-out, and
- **2043:** 10-years after full build-out.

3.2 WALNUT LANE EXTENSION CLASS EA

The Walnut Lane Extension Class EA study dated October 2022 outlines the proposed extension of Walnut Lane from Kingston Road eastward to Liverpool Road, as shown in **Figure 3-1**. Walnut Lane is a two-lane road, and the extension is proposed to accommodate all road users (i.e. vehicles, public transit, cyclists, and pedestrians) as per the “Complete Streets” guidelines. The extension is anticipated to be built by the 2028 horizon year.

Figure 3-1: Walnut EA Lane Extension Class EA Study Area

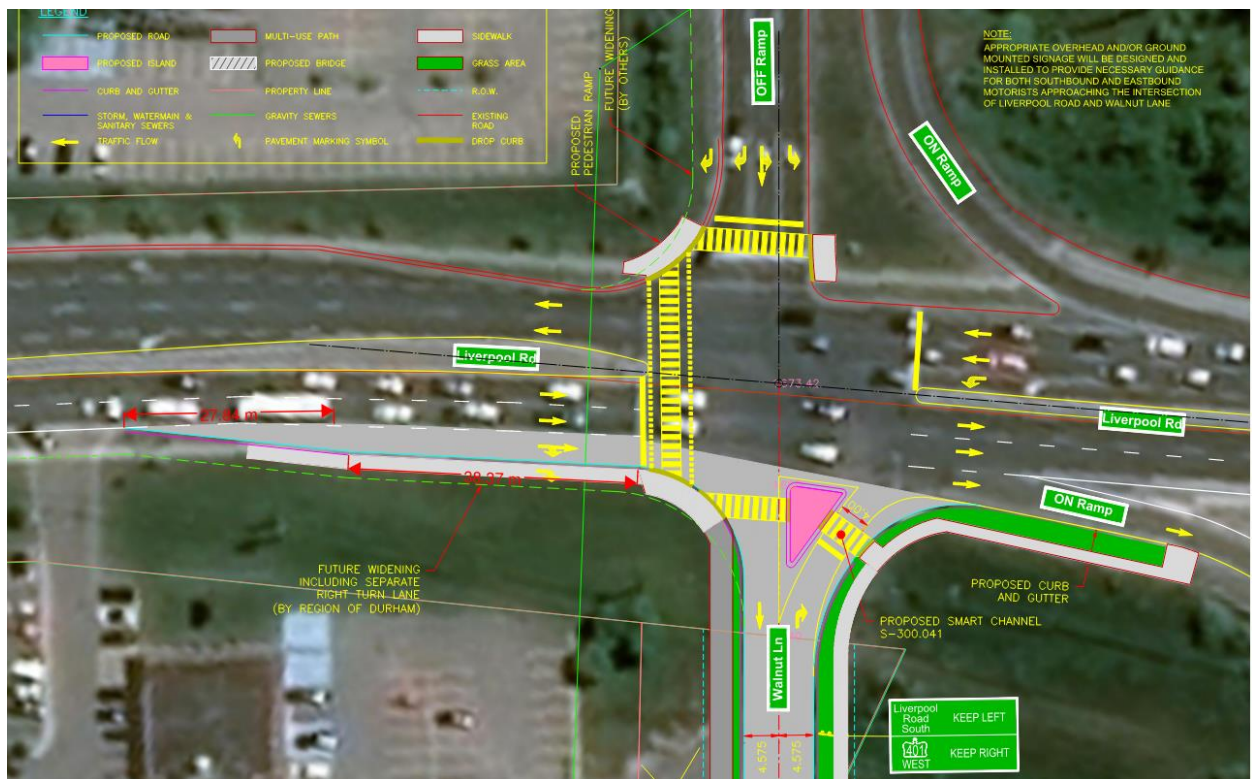
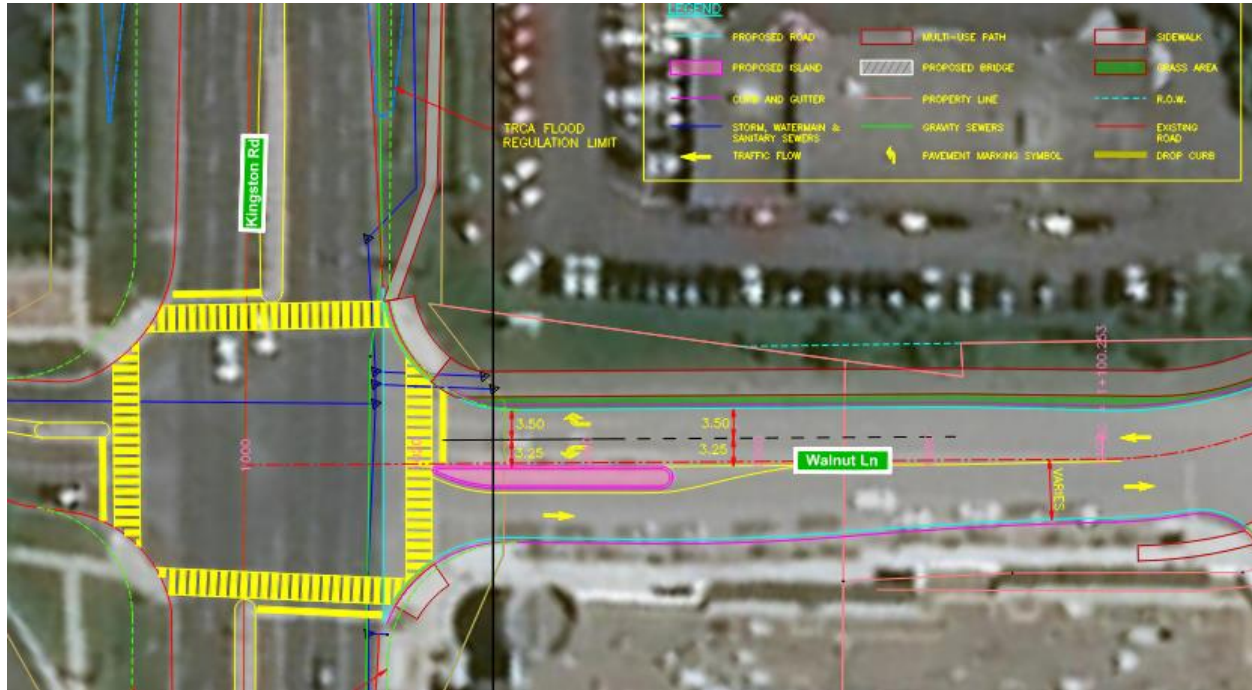


One of the concerns investigated in the Class EA study is that the extension could result in increased traffic infiltration through the existing Walnut Lane north of Kingston Road. The Class EA explored traffic calming measures to address current and anticipated future traffic infiltration concerns in the area. It was recommended that the northbound through movement be prohibited at the intersection of Walnut Lane & Kingston Road, as illustrated in **Figure 3-2**. However, in the traffic analysis, the northbound through movement was not prohibited as the traffic redistributed from the Walnut Lane extension

utilized the northbound through movement, as shown in **Figure 3-6**. To ensure that concerns of increased traffic infiltration through Walnut Lane are addressed, no future site traffic was assigned to the northbound through movement.

The Class EA study explored three lane configurations at the intersection of Liverpool Road & Walnut Lane / Highway 401 Westbound Off-Ramp. The preferred design identified in the study suggests all movements would be permitted except for the eastbound through and eastbound-left turn movements, as illustrated in **Figure 3-2**.

Figure 3-2: Proposed Future Configuration of Walnut Lane Connections



3.3 PLANNED ROAD NETWORK IMPROVEMENTS

In addition to the extension of Walnut Lane (detailed in the prior section), the following future road improvements were included in this study:

- The Region is planning to widen Liverpool Road between Kingston Road and Highway 401 to a six-lane cross section. The future lane configuration of the intersections along this section of Liverpool Road is to be determined by a Liverpool Road Environmental Assessment, currently scheduled to commence in 2023. For the purpose of this study, the Region has provided the following lane configuration to be assumed for all future scenarios:
 - Liverpool Road & Kingston Road
 - Southbound: 1 right; 2 through; 1 left
 - Northbound: 1 right; 2 through; 1 left
 - Eastbound: 1 right; 2 through; 1 left/U-turn; 1 median bus through
 - Westbound: 1 right; 2 through; 1 left/U-turn; 1 median bus through
 - Liverpool Road & Pickering Parkway / Private Access
 - Southbound: 1 right; 3 through; 1 left
 - Northbound: 1 right; 3 through; 1 left
 - Eastbound: 1 through/right; 1 through; 1 left
 - Westbound: 1 right; 1 through; 2 left
 - Liverpool Road & Highway 401 WB Ramp / Walnut Lane Extension
 - Southbound: 1 right; 3 through
 - Northbound: 3 through; 1 left
 - Eastbound: 1 right
 - Westbound: 1 right; 1 through/left; 1 left
- As part of the future Durham-Scarborough Bus Rapid Transit (BRT), Kingston Road from Altona Road to Notion Road is planned to be widened to allow for two-dedicated centre-median transit lanes. The project includes converting the existing curbside bus lanes to centre-median lanes. Metrolinx is currently in the preliminary design stage. The preliminary designs for Kingston Road are provided in **Appendix E** and were used in this study. The preliminary design drawings reveal that many of the existing exclusive right turn lanes along Kingston Road would need to be removed to accommodate the BRT. Shared through-right lanes along Kingston Road will likely take away auto traffic capacity on the corridor. According to the Region’s TOR response, construction of sections from Dixie Road to Bainbridge Drive and Steeple Hill to Merriton Road, which encompass all of the study intersections along Kingston Road evaluated in this report, is expected to be complete by 2025. Therefore, the road network changes occurring due to the BRT are implemented in all future scenarios in all horizon years.

The future lane configuration for horizon years 2028, 2033, 2038 and 2043, which includes all the road improvements listed above, is illustrated in **Figure 3-3**.

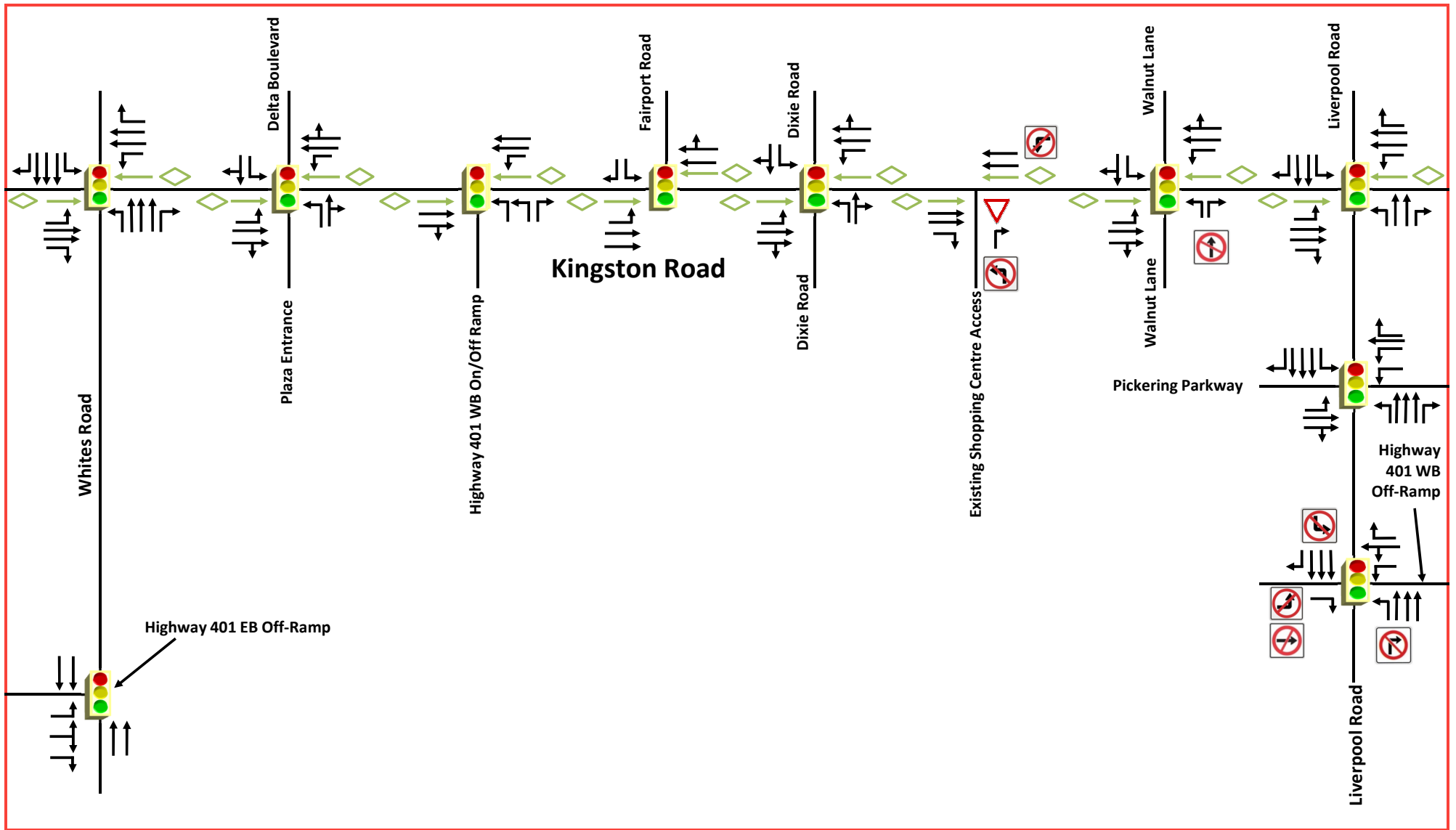


Figure 3-3

Future Lane Configuration

3.4 PLANNED TRANSIT NETWORK IMPROVEMENTS

Kingston Road was identified as a future rapid transit corridor in the *Durham Region Long Term Transit Strategy (LTTS) Final Report*, dated March 2010. As previously mentioned, Metrolinx is currently in the preliminary design stage of a future bus rapid transit (BRT) corridor along Kingston Road between Altona Road and Notion Road as part of their Durham-Scarborough BRT project. Upon completion, Kingston Road will be widened to accommodate two centre-median transit lanes and raised transit platforms on the far-side of signalized intersections.

The project aims to bring more frequent and reliable transit service to Durham Region and the City of Toronto and improve connections on both sides of the regional boundary. It is anticipated that two-way transit service will be provided every five minutes.

As previously discussed, the site is located in proximity to the Pickering GO station which is part of the Lakeshore East GO Line. Metrolinx announced improvements for the Lakeshore East GO Line to support future 15-minute two-way service between Union Station and Oshawa.

The future planned transit improvements are illustrated in **Figure 3-4**, which is taken from the 2017 Durham Region Transportation Master Plan – 2031 Transportation Networks.

Figure 3-4: Future Transit



3.5 PLANNED ACTIVE TRANSPORTATION NETWORK IMPROVEMENTS

Durham Region’s Transportation Master Plan (2017) details the proposed widening of the Liverpool Road bridge over Highway 401 to accommodate cycling facilities beyond the year 2031. Liverpool Road has been identified as a future primary cycling network route by the Region.

The cycling network along Kingston Road is proposed to be expanded and is also planned as a primary cycling route. Upon completion of the median BRT on Kingston Road, cycle tracks and sidewalks will be constructed along both sides of the corridor from Altona Road to Notion Road. The preliminary design drawings in **Appendix E** show the proposed cycle tracks at all study intersections along Kingston Road.

Figure 3-5: Proposed Future Cycling and Trail Network



3.6 TRAFFIC ASSUMPTIONS

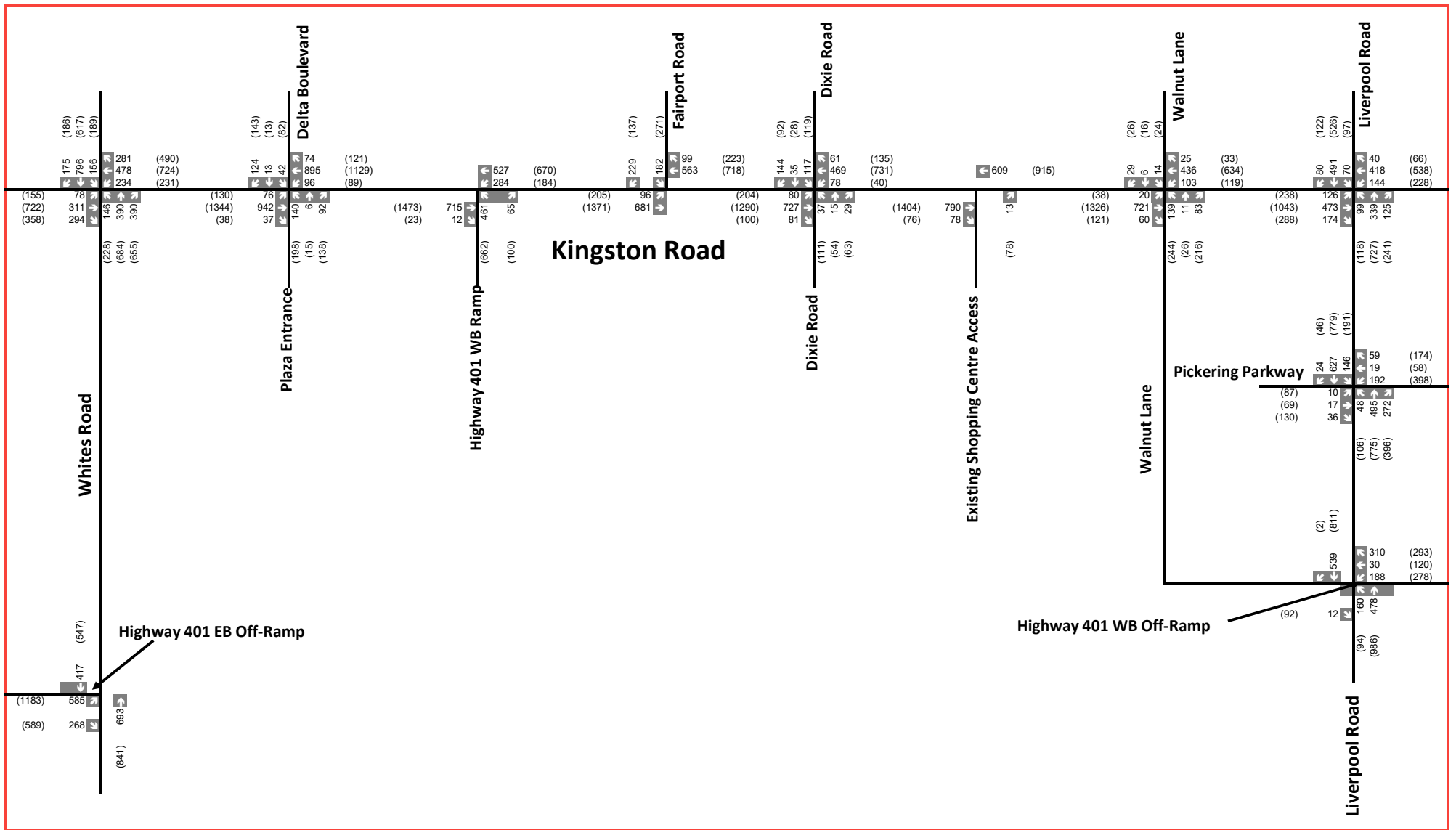
3.6.1 SITE ACCESSES

As shown in the ground level site plan in **Figure 1-2**, the site will be serviced by six driveways. Three driveways will connect with Walnut Lane to the northeast, two driveways will connect with Dixie Road to the west, and one driveway will connect with Kingston Road using the existing right-in/right-out access (RIRO) to the north. For the traffic analysis in this report, the site accesses are assumed to be at the south leg of Kingston Road & Walnut Lane, the west leg of Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp, the existing RIRO access at Kingston Road, and the south leg of Kingston Road & Dixie Road.

3.6.2 TRAFFIC DIVERSION WITH THE WALNUT LANE EXTENSION

The extension of Walnut Lane would provide motorists within the area with alternative routes and, therefore, it is expected that some of existing traffic in the area would redistribute with the extension in place. The Walnut Lane Extension EA study estimated redistributions in the p.m. peak hour turning movement volumes associated with the preferred option (found in Figures 16, 17, and 20 of Appendix A of the EA report).

To maintain consistency with the EA study, the same traffic volume redistributions were also applied in this study in the p.m. peak hour. The a.m. peak hour traffic redistributions were estimated by applying the ratio between the p.m. peak hour diversion volumes and the existing volumes to the a.m. peak hour counts. The redistributed traffic is presented in **Figure 3-6**.



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes

Figure 3-6

Redistributed Traffic (before growth)

3.6.3 FUTURE MODE SHARES

As assumed in the study for the Tribute Liverpool & Highway 401 development, non-auto mode shares in the study area are assumed to increase by 5% by the 2028 horizon year and 10% by the 2033, 2038, and 2043 horizon years. This assumption was based on existing and future mode share information from the Region's TMP. These increases are applied to the existing non-auto travel mode shares for the study area from the 2016 TTS data to develop non-auto mode share reductions to the site trip generation. The 2016 TTS mode shares are discussed in further detail in **Section 5.1**.

3.6.4 CORRIDOR TRAFFIC GROWTH

As stated in the TOR, a 0.5% annual growth rate was applied to the through movement volumes along Liverpool Road. It should be noted that, in some of the approved background TIS studies, no traffic growth along Liverpool Road was assumed. Hence, the application of the 0.5% growth rate represents a conservative approach.

No growth rate was applied on Kingston Road. Given the expected 10% increase in transit mode split due to the BRT, a reduction in existing traffic volumes along this corridor would be expected. Therefore, even applying a 0% growth rate represents a conservative assumption.

3.6.5 BACKGROUND DEVELOPMENTS

There are several proposed developments in the vicinity of the project site that will contribute additional traffic to the roads in the study area. The following background developments were included in this study:

- **1294 Kingston Road, 1848 Liverpool Road & 1852 Liverpool Road:** Proposed mixed-use development consisting of two buildings having heights of 25-storeys and 13-storeys.
- **1854 & 1858 Liverpool Road Ward 2:** Proposed 13-storey mixed-use apartment building containing 98 dwelling units with approximately 460 square metres of commercial space on the ground floor.
- **Expansion of the Development at 1355 Kingston Road:** Proposed retail expansion of 45,449 square feet GLA (expansion of the current Cineplex). Background traffic to be only included in the PM peak conditions.
- **Home Life Care Services at 1234 Kingston Road:** Proposed two-storey office building of 4,648 square feet in GFA.
- **Tribute Liverpool & Highway 401:** Proposed mixed-use development consisting of three buildings with 1,779 residential units, 6,265 ft² retail, and 6,168 ft² childcare centre
- **1786-1790 Liverpool Road:** Proposed mixed-use development consisting of 594 residential units and 190 m² GFA of ground-floor retail use

The traffic volumes generated by the background developments were taken from their corresponding traffic impact studies. However, a.m. peak hour site traffic volumes for

1234 Kingston Road were not available, therefore they were estimated using ITE trip rates. The background development volumes are provided in **Appendix D**.

It is assumed that all of these background developments would be constructed and operational by the 2028 horizon year.

3.6.6 FUTURE HEAVY VEHICLE PERCENTAGES

The Walnut Lane extension is planned to replace the existing west leg of the intersection of Liverpool Road & Highway 401 WB Off-Ramp, which currently experiences high heavy vehicle percentages on some movements in the a.m. peak hour. With the Walnut Lane extension expected to carry substantially higher volumes of vehicles than the current west leg (which serves a restaurant and a bank), it is expected that heavy vehicle percentages will lower to a level comparable with the other study intersections. Therefore, during the a.m. peak hour, the heavy vehicle percentages for some movements at this intersection were reduced to 5%, which is conservative relative to the existing percentages at other nearby intersections.

3.6.7 FUTURE SIGNAL TIMINGS

Given the future centre-median transit lanes along Kingston Road, all eastbound and westbound left-turns will need to be fully protected. Therefore, in the future models, protected eastbound and westbound left-turn phases were added for all study intersections along Kingston Road. **Table 3-1** shows the changes made to the left-turn phases to accommodate the future BRT.

Table 3-1: Existing and Future Left-Turn Types Along Kingston Rd

Intersection	Direction	Existing Left-Turn Type (Without BRT)		Future Left-Turn Type (With BRT)
		AM	PM	AM & PM
Liverpool Road & Kingston Road	EB	Protected-Permissive	Protected-Permissive	Protected
	WB	Protected-Permissive	Protected-Permissive	Protected
Kingston Road & Walnut Lane	EB	Permissive	Permissive	Protected
	WB	Permissive	Protected-Permissive	Protected
Kingston Road & Dixie Road	EB	Protected-Permissive	Protected-Permissive	Protected
	WB	Protected-Permissive	Protected-Permissive	Protected
Kingston Road & Fairport Road	EB	Protected-Permissive	Protected-Permissive	Protected
	WB (U-Turn)	N/A	N/A	Protected
Kingston Road & Highway 401 Westbound Ramps	WB	Protected-Permissive	Protected-Permissive	Protected
Kingston Road & Delta Boulevard	EB	Protected-Permissive	Protected-Permissive	Protected
	WB	Protected-Permissive	Protected-Permissive	Protected
Kingston Road & Whites Road	EB	Protected-Permissive	Protected-Permissive	Protected
	WB	Protected-Permissive	Protected-Permissive	Protected

With the future lane configuration at the intersection of Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp, it is assumed that split phasing will be provided for the eastbound and westbound movements, with the eastbound right-turn occurring in an

overlap phase with a northbound left-turn phase. In addition, it was assumed that the northbound left-turn phase be a protected-permissive phase.

All-red clearance times and pedestrian clearance times crossing Kingston Road were updated to reflect the preliminary drawings for the BRT (in **Appendix E**). Both calculations were based on the equations found in the Durham Region guidelines. All-red clearance times are determined by using a function of the width of the intersection (from the stopbar to the farthest edge of the crosswalk on the opposing side), the length of a standard vehicle, and the posted speed. The pedestrian clearance (i.e. Flashing Don't Walk – FDW) was calculated as the duration needed to cross the longest pedestrian crossing at a 1.0 m/s walk speed and was allowed to extend into the amber and all-red intervals.

Additionally, the following signal timing improvements were applied in the future models:

- In order to accommodate the combination of background traffic growth, lane configuration changes due to the BRT, and the addition of protected left-turn phases, the cycle length was increased to 130 seconds at all study intersections along Kingston Road during the p.m. peak hour and at the intersections along Kingston Road between Whites Road and Fairport Road during the a.m. peak hour;
- A northbound left-turn phase was added during the p.m. peak hour at the intersection of Kingston Road & Walnut Lane;
- An eastbound right-turn phase (overlapping with the existing northbound left-turn phase) was added during the p.m. peak hour at the intersection of Kingston Road & Liverpool Road; and
- Various signal phase splits optimizations were made throughout the study network.

4 FUTURE BACKGROUND TRAFFIC CONDITIONS

The projected future background traffic volumes were developed by superimposing the traffic redistributions resulting from the Walnut Lane extension, general corridor growth along Liverpool Road, and the background development volumes onto the existing traffic volumes.

This section of the report documents the future background traffic assessments for each of the horizon years.

4.1 2028 FUTURE BACKGROUND

The background traffic operations were analyzed based on the resulting 2028 future background traffic forecasts shown **Figure 4-1**. The resulting levels of service are outlined in **Table 4-1** and the details related to intersection operations provided in **Appendix F-1**.

The Synchro results indicate that all of the intersections continue to operate at an acceptable LOS. Even with the implementation of signal timing improvements, the westbound left-turn movement at Kingston Road & Walnut Lane is projected to operate over-capacity. This is most likely due to the implementation of the BRT, which necessitated the conversion of the originally protected-permissive left-turn into a fully protected left-turn. A fully protected left-turn restricts vehicles from turning without an advanced left-turn arrow, creating additional delay that was not present in the existing conditions. In addition, this movement currently acts as an access for the existing shopping centre, which generates high volumes for this movement. Therefore, this movement is not anticipated to cause issues in the future total scenarios as the high volumes entering the existing site using the westbound left-turn movement would not be present with the proposed development.

Table 4-1: 2028 Future Background Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	B (16)	--	C (24)	--
Liverpool Road & Pickering Parkway	B (15)	--	C (24)	--
Liverpool Road & Kingston Road	C (33)	--	D (41)	EB-T (0.97) WB-L (0.87)
Kingston Road & Walnut Lane	C (23)	--	D (36)	WB-L (1.60) NB-L (0.91)
Kingston Road & Dixie Road	C (22)	--	C (21)	EB-L (0.85)
Kingston Road & Fairport Road	B (18)	--	B (18)	EB-L (0.85)
Kingston Road & Highway 401 WB Ramps	C (29)	WB-L (0.85)	C (33)	EB-T (0.93) WB-L (0.97) NB-L (0.87)
Kingston Road & Delta Boulevard	C (21)	--	C (20)	NB-L (0.89)
Kingston Road & Whites Road	C (30)	--	D (37)	EB-L (0.86) EB-T (0.90)
Whites Road & Highway 401 EB Off-Ramp	C (20)	--	C (26)	--

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.



Figure 4-1

2028 Future Background Volumes



The queues at the study intersections were assessed under 2028 future background conditions. A queueing analysis for the study intersections is presented in **Table 4-2**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix F-1**.

Table 4-2: 2028 Future Background Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-ramp	EBR	N/A	50	67
	WBL	203	44	62
	WBT	203	44	64
	WBR	125	23	65
	NBL	50	16	18
	NBT	348	16	50
	SBT	138	24	73
	SBR	38	2	10
Liverpool Road & Pickering Parkway	EBL	59	7	31
	EBT	59	8	17
	WBL	57	30	50
	WBT	305	10	19
	WBR	62	0	15
	NBL	54	6	30
	NBT	138	35	67
	NBR	76	20	51
	SBL	133	22	52
	SBT	234	46	78
SBR	36	0	0	
Liverpool Road & Kingston Road	EBL	221	52	80
	EBT	671	82	192
	EBR	98	54	60
	WBL	237	73	104
	WBT	372	66	86
	WBR	117	0	1
	NBL	186	28	35
	NBT	234	47	115
	NBR	52	14	30
	SBL	49	20	28
	SBT	325	84	91
SBR	61	8	14	

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	13	15
	EBT	105	102	281 [135]
	WBL	159	47	81
	WBT	671	18	92
	NBL	63	78 [56]	79 [66]
	NBT	101	18	71
	SBL	19	8	13
Kingston Road & Dixie Road	EBL	184	39	84
	EBT	872	88	155
	WBL	129	48	24
	WBT	167	48	65
	NBL	13	17 [9]	44 [28]
	NBT	100	12	34
	SBL	16	47 [32]	56 [37]
Kingston Road & Fairport Road	EBL	238	30	53
	EBT	400	2	6
	WBT	872	86	82
	SBL	16	69 [49]	97 [70]
	SBR	256	21	16
Kingston Road & Highway 401 WB Ramps	EBT	245	97	275 [138]
	WBL	135	104	97
	WBT	400	73	110
	NBL	193	77	106
	NBR	52	12	18
Kingston Road & Delta Boulevard	EBL	39	37	13
	EBT	199	107	111
	WBL	121	39	13
	WBT	245	165	188
	NBL	107	57	89
	NBT	107	16	32
	SBL	146	21	34
	SBT	146	21	21

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	77
	EBT	274	55	175
	EBR	123	64	75
	WBL	87	80	79
	WBT	199	51	66
	WBR	35	9	75 [13]
	NBL	72	52	73 [40]
	NBT	135	40	65
	NBR	35	51 [31]	159 [116]
	SBL	89	45	57
	SBT	361	81	59
Whites Road & Highway 401 EB Off-Ramp	EBL	272	81	125
	EBR	225	19	114
	NBT	162	56	96
	SBT	293	32	58

As a result of background growth, changes in lane configurations, and changes in signal timings, some of the queues under 2028 future background conditions have increased in comparison to existing conditions, some of which have exceeded their available storage. However, many of the exceeding queues were already present in the existing conditions, including those movements at Kingston Road & Dixie Road, Kingston Road & Fairport Road, Kingston Road & Highway 401 WB Ramps, and Kingston Road & Whites Road.

There are some new queueing issues present, most notably at Kingston Road & Walnut Lane, where the eastbound through and northbound left-turn queues exceed the storage length. For the eastbound through movement, the storage length is considered to be the distance from the intersection to the nearest adjacent intersection. In this case, it was assumed to be the RIRO intersection for the existing site. This intersection is unsignalized with right turning vehicles yielding to the eastbound through movements. Considering this, the storage length for the eastbound through movement would be much larger in reality as it would go all the way to Dixie Road, which is nearly 300 metres away, more than enough to accommodate the expected eastbound queues. The northbound left-turn movement exceeds the storage length in both the a.m. and p.m. peak hours, but it is only in the p.m. peak hour that the 50th percentile queues exceed the storage length. These queueing issues are most likely due to the short storage length available and the changes in signal timing caused by the new BRT.

As discussed previously, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

4.2 2033 FUTURE BACKGROUND

The background traffic operations were analyzed based on the resulting 2033 future background traffic forecasts shown **Figure 4-2**. The resulting levels of service are outlined in **Table 4-3** and the details related to the intersection operations provided in **Appendix F-2**.

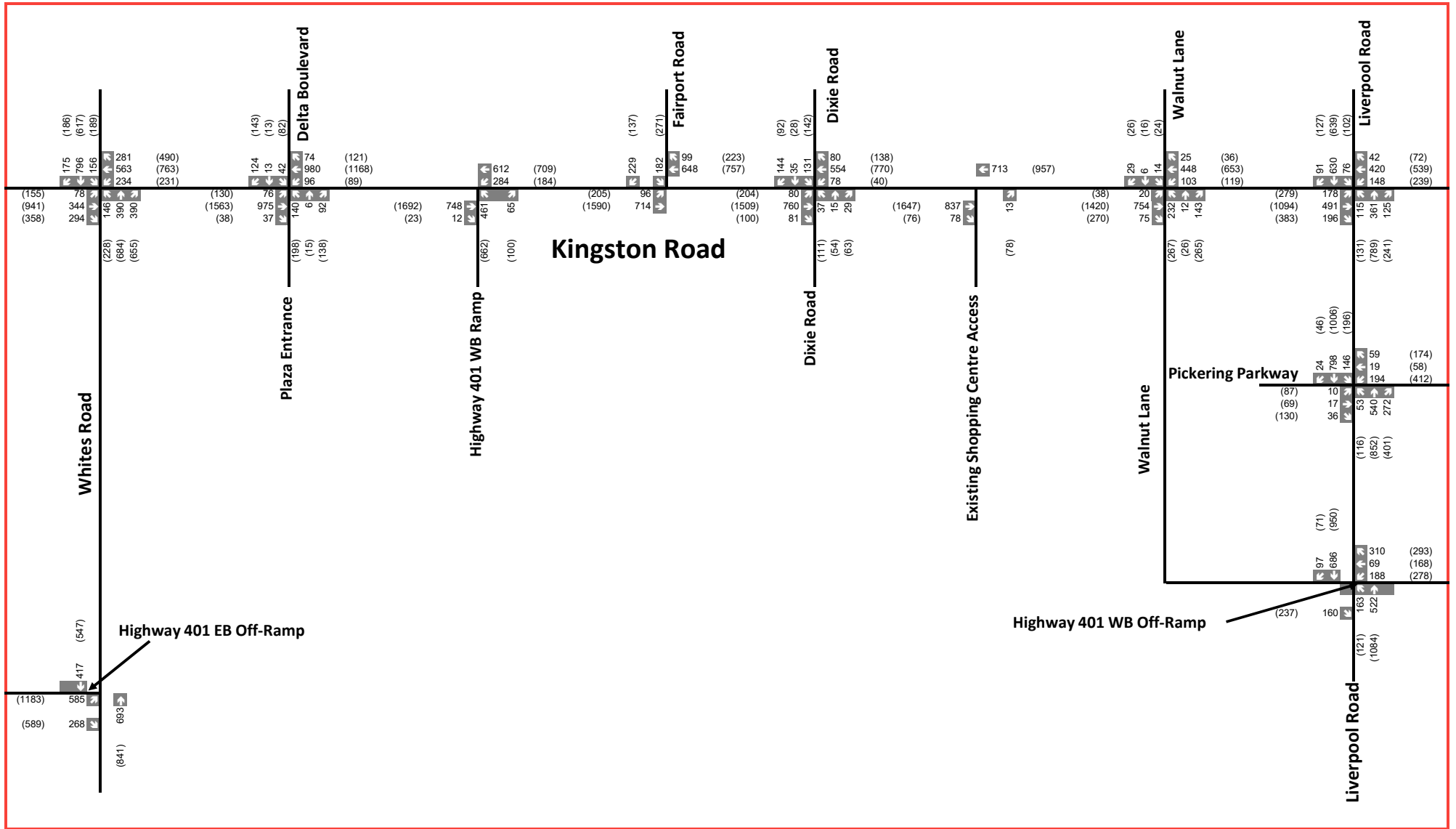
The Synchro results indicate that all of the intersections continue to operate at an acceptable LOS. All movements operate within capacity with the exception of the westbound left-turn movement at Kingston Road & Walnut Lane, which was identified in the 2028 Future Background scenario as well.

The 2033 future background results are nearly the same as the 2028 future background results since no background growth was applied to Kingston Road.

Table 4-3: 2033 Future Background Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	B (15)	--	C (24)	--
Liverpool Road & Pickering Parkway	B (15)	--	C (24)	--
Liverpool Road & Kingston Road	C (33)	--	D (41)	EB-T (0.97) WB-L (0.87)
Kingston Road & Walnut Lane	C (23)	--	D (36)	WB-L (1.60) NB-L (0.91)
Kingston Road & Dixie Road	C (22)	--	C (21)	EB-L (0.85)
Kingston Road & Fairport Road	B (18)	--	B (18)	EB-L (0.85)
Kingston Road & Highway 401 WB Ramps	C (29)	WB-L (0.85)	C (33)	EB-T (0.93) WB-L (0.97) NB-L (0.87)
Kingston Road & Delta Boulevard	C (21)	--	C (20)	NB-L (0.89)
Kingston Road & Whites Road	C (30)	--	D (37)	EB-L (0.86) EB-T (0.90)
Whites Road & Highway 401 EB Off-Ramp	C (20)	--	C (26)	--

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-2

2033 Future Background Volumes

A queueing analysis for the study intersections is presented in **Table 4-4**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix F-2**.

Table 4-4: 2033 Future Background Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-ramp	EBR	N/A	50	67
	WBL	203	44	62
	WBT	203	44	64
	WBR	125	23	65
	NBL	50	16	18
	NBT	348	17	52
	SBT	138	24	75
	SBR	38	2	10
Liverpool Road & Pickering Parkway	EBL	59	7	31
	EBT	59	8	17
	WBL	57	30	50
	WBT	305	10	19
	WBR	62	0	15
	NBL	54	6	30
	NBT	138	36	69
	NBR	76	20	51
	SBL	133	22	53
	SBT	234	47	79
	SBR	36	0	0
Liverpool Road & Kingston Road	EBL	189	52	80
	EBT	671	82	192
	EBR	98	54	60
	WBL	171	73	104
	WBT	372	66	86
	WBR	117	0	1
	NBL	186	28	35
	NBT	234	48	118
	NBR	52	14	31
	SBL	49	20	28
	SBT	325	86	93
	SBR	61	8	14

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	26	13	15
	EBT	105	102	281 [135]
	WBL	37	47 [28]	81 [46]
	WBT	671	18	92
	NBL	63	78 [56]	79 [66]
	NBT	101	18	71
	SBL	19	8	13
Kingston Road & Dixie Road	EBL	145	39	84
	EBT	872	88	155
	WBL	51	48	24
	WBT	167	48	65
	NBL	13	17 [9]	44 [28]
	NBT	100	12	34
	SBL	16	47 [32]	56 [37]
Kingston Road & Fairport Road	EBL	75	30	53
	EBT	400	2	6
	WBT	872	86	82
	SBL	16	69 [49]	97 [70]
	SBR	256	21	16
Kingston Road & Highway 401 WB Ramps	EBT	245	97	275 [138]
	WBL	48	104 [76]	97 [48]
	WBT	400	73	110
	NBL	193	77	106
	NBR	52	12	18
Kingston Road & Delta Boulevard	EBL	52	37	13
	EBT	199	107	111
	WBL	100	39	13
	WBT	245	165	188
	NBL	107	57	89
	NBT	107	16	32
	SBL	146	21	34
	SBT	146	21	21

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	127	38	77
	EBT	274	55	175
	EBR	123	64	75
	WBL	87	80	79
	WBT	199	51	66
	WBR	35	9	75 [13]
	NBL	72	52	73 [40]
	NBT	135	39	65
	NBR	35	51 [31]	159 [116]
	SBL	89	45	57
	SBT	361	82	59
Whites Road & Highway 401 EB Off-Ramp	SBR	47	20	17
	EBL	272	81	125
	EBR	225	19	114
	NBT	162	56	96
	SBT	293	32	58

The queueing analysis indicates that the queues do not change significantly between the 2033 future background scenario and 2028 future background scenario. The same queues exceeding their storage length in the 2028 future background scenario is present in the 2033 future background scenario.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

4.3 2038 FUTURE BACKGROUND

The background traffic operations were analyzed based on the resulting 2038 future background traffic forecasts shown **Figure 4-3**. The resulting levels of service are outlined in **Table 4-5** and the details related to the intersection operations provided in **Appendix F-3**.

Synchro results indicate that all intersections continue to operate at an acceptable LOS. All movements operate within capacity with the exception of the westbound left-turn movement at Kingston Road & Walnut Lane, which was identified in the 2028 and 2033 Future Background scenarios as well.

The 2038 future background results are nearly the same as the 2028 and 2033 future background results since no background growth was applied to Kingston Road.

Table 4-5: 2038 Future Background Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	B (15)	--	C (24)	--
Liverpool Road & Pickering Parkway	B (15)	--	C (24)	--
Liverpool Road & Kingston Road	C (33)	--	D (42)	EB-T (0.97) WB-L (0.87)
Kingston Road & Walnut Lane	C (23)	--	D (36)	WB-L (1.60) NB-L (0.91)
Kingston Road & Dixie Road	C (22)	--	C (21)	EB-L (0.85)
Kingston Road & Fairport Road	B (18)	--	B (18)	EB-L (0.85)
Kingston Road & Highway 401 WB Ramps	C (29)	WB-L (0.85)	C (33)	EB-T (0.93) WB-L (0.97) NB-L (0.87)
Kingston Road & Delta Boulevard	C (21)	--	C (20)	NB-L (0.89)
Kingston Road & Whites Road	C (30)	--	D (37)	EB-L (0.86) EB-T (0.90)
Whites Road & Highway 401 EB Off-Ramp	C (20)	--	C (26)	--

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-3

2038 Future Background Volumes

A queueing analysis for the study intersections is presented in **Table 4-6**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix F-3**.

Table 4-6: 2038 Future Background Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	50	67
	WBL	203	44	62
	WBT	203	44	64
	WBR	125	23	65
	NBL	50	16	18
	NBT	348	17	53
	SBT	138	24	77
	SBR	38	2	11
Liverpool Road & Pickering Parkway	EBL	59	7	31
	EBT	59	8	17
	WBL	57	30	50
	WBT	305	10	19
	WBR	62	0	15
	NBL	54	6	30
	NBT	138	37	71
	NBR	76	20	52
	SBL	133	22	54
	SBT	234	48	81
	SBR	36	0	0
Liverpool Road & Kingston Road	EBL	221	52	80
	EBT	671	82	192
	EBR	98	54	61
	WBL	237	73	104
	WBT	372	66	86
	WBR	117	0	1
	NBL	186	28	35
	NBT	234	49	121
	NBR	52	14	32
	SBL	49	20	28
	SBT	325	88	96
	SBR	61	8	14

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	13	15
	EBT	105	102	281 [135]
	WBL	159	47	81
	WBT	671	18	92
	NBL	63	78 [56]	79 [66]
	NBT	101	18	71
	SBL	19	8	13
Kingston Road & Dixie Road	EBL	184	39	84
	EBT	872	89	155
	WBL	129	48	24
	WBT	167	48	65
	NBL	13	17 [9]	44 [28]
	NBT	100	12	34
	SBL	16	47 [32]	56 [37]
Kingston Road & Fairport Road	EBL	238	30	53
	EBT	400	2	6
	WBT	872	86	82
	SBL	16	69 [49]	97 [70]
	SBR	256	21	16
Kingston Road & Highway 401 WB Ramps	EBT	245	97	275 [138]
	WBL	135	104	97
	WBT	400	73	110
	NBL	193	77	106
	NBR	52	12	18
Kingston Road & Delta Boulevard	EBL	39	37	13
	EBT	199	107	111
	WBL	121	39	13
	WBT	245	165	188
	NBL	107	57	89
	NBT	107	16	32
	SBL	146	21	34
	SBT	146	21	21

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	77
	EBT	274	55	175
	EBR	123	64	75
	WBL	87	80	79
	WBT	199	51	66
	WBR	35	9	75 [13]
	NBL	72	52	73 [40]
	NBT	135	39	65
	NBR	35	51 [31]	159 [116]
	SBL	89	45	57
	SBT	361	82	59
Whites Road & Highway 401 EB Off-Ramp	SBR	47	20	17
	EBL	272	81	125
	EBR	225	19	114
	NBT	162	56	96
	SBT	293	32	58

The queueing analysis indicates that the queues do not change significantly between the 2038 future background scenario and the 2028 and 2033 future background scenarios. The same queues exceeding their storage length in the 2033 future background scenario is present in the 2038 future background scenario.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

4.4 2043 FUTURE BACKGROUND

The background traffic operations were analyzed based on the resulting 2043 future background traffic forecasts shown in **Figure 4-4**. The resulting levels of service are outlined in **Table 4-7** and the details related to the intersection operations provided in **Appendix F-4**.

Synchro results indicate that all intersections continue to operate at an acceptable LOS. All movements operate within capacity with the exception of the westbound left-turn movement at Kingston Road & Walnut Lane, which was identified in the 2028, 2033 and 2038 future background scenarios as well.

The 2043 future background results are nearly the same as the 2028, 2033 and 2038 future background results since no background growth was applied to Kingston Road.

Table 4-7: 2043 Future Background Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	B (15)	--	C (24)	--
Liverpool Road & Pickering Parkway	B (15)	--	C (24)	--
Liverpool Road & Kingston Road	C (33)	--	D (42)	EB-T (0.97) WB-L (0.87)
Kingston Road & Walnut Lane	C (23)	--	D (36)	WB-L (1.60) NB-L (0.91)
Kingston Road & Dixie Road	C (22)	--	C (21)	EB-L (0.85)
Kingston Road & Fairport Road	B (18)	--	B (18)	EB-L (0.85)
Kingston Road & Highway 401 WB Ramps	C (29)	WB-L (0.85)	C (33)	EB-T (0.93) WB-L (0.97) NB-L (0.87)
Kingston Road & Delta Boulevard	C (21)	--	C (20)	NB-L (0.89)
Kingston Road & Whites Road	C (30)	--	D (37)	EB-L (0.86) EB-T (0.90)
Whites Road & Highway 401 EB Off-Ramp	C (20)	--	C (26)	--

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.

A queueing analysis for the study intersections is presented in **Table 4-8**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix F-4**.

Table 4-8: 2043 Future Background Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	47	67
	WBL	203	44	62
	WBT	203	44	64
	WBR	125	24	65
	NBL	50	16	18
	NBT	348	17	55
	SBT	138	25	78
	SBR	38	2	11
Liverpool Road & Pickering Parkway	EBL	59	7	31
	EBT	59	8	17
	WBL	57	30	50
	WBT	305	10	19
	WBR	62	0	15
	NBL	54	5	30
	NBT	138	38	73
	NBR	76	20	52
	SBL	133	22	55
	SBT	234	49	83
	SBR	36	0	0
Liverpool Road & Kingston Road	EBL	221	52	80
	EBT	671	82	192
	EBR	98	55	62
	WBL	237	73	104
	WBT	372	66	86
	WBR	117	0	1
	NBL	186	28	35
	NBT	234	50	125
	NBR	52	14	34
	SBL	49	20	28
	SBT	325	90	98
	SBR	61	8	14

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	13	15
	EBT	105	102	281 [135]
	WBL	159	47	81
	WBT	671	18	92
	NBL	63	78 [56]	79 [66]
	NBT	101	18	71
	SBL	19	8	13
Kingston Road & Dixie Road	EBL	184	39	84
	EBT	872	88	155
	WBL	129	48	24
	WBT	167	48	65
	NBL	13	17 [9]	44 [28]
	NBT	100	12	34
	SBL	16	47 [32]	56 [37]
Kingston Road & Fairport Road	EBL	238	30	53
	EBT	400	2	6
	WBT	872	86	82
	SBL	16	69 [49]	97 [70]
	SBR	256	21	16
Kingston Road & Highway 401 WB Ramps	EBT	245	97	275 [138]
	WBL	135	104	97
	WBT	400	73	110
	NBL	193	77	106
	NBR	52	12	18
Kingston Road & Delta Boulevard	EBL	39	37	13
	EBT	199	107	111
	WBL	121	39	13
	WBT	245	165	188
	NBL	107	57	89
	NBT	107	16	32
	SBL	146	21	34
SBT	146	21	21	

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	77
	EBT	274	55	175
	EBR	123	64	75
	WBL	87	80	79
	WBT	199	51	66
	WBR	35	9	75 [13]
	NBL	72	52	73 [40]
	NBT	135	39	65
	NBR	35	51 [31]	159 [116]
	SBL	89	45	57
	SBT	361	82	59
Whites Road & Highway 401 EB Off-Ramp	SBR	47	20	17
	EBL	272	81	125
	EBR	225	19	114
	NBT	162	56	96
	SBT	293	32	58

The queueing analysis indicates that the queues do not change significantly between the 2043 future background scenario and the 2028, 2033 and 2043 future background scenarios. The same queues exceeding their storage length in the previous future background scenarios are present in the 2043 future background scenario.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

5 SITE GENERATED TRAFFIC

5.1 TRIP GENERATION

The vehicle trips generated by the proposed development during the weekday a.m. and p.m. peak hours were estimated using the trip generation rates outlined in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition*.

Given the small size of the proposed daycare (716 m²) relative to the residential component of the development (5,238 units), it is expected that the daycare will be used by residents of the site and of the immediately surrounding area. As such, the daycare is expected to primarily attract pedestrian trips and was therefore not included in the calculation of the site generated traffic.

The following adjustments were applied to the base ITE generated trips to calculate vehicle trips:

- **Internal Trip Capture:**

It is intended that the proposed 76,951 sq. ft. of retail GFA will be mainly servicing the proposed residential use and other nearby residents. Hence, it is anticipated that the proposed retail use will not generate many new trips. However, as a conservative approach, we accounted for the potential new trips generated by the retail use, and accordingly applied a multi-use share factor to determine the number of internally captured trips. The multi-use share factor was calculated using the methodology for internal trip capture estimation for mixed-use developments from *NCHRP Project 8-51*. The multi-use adjustment factors calculations can be found in **Appendix G**.

- **Mode Split:**

As noted in the ITE's *Trip Generation Handbook*, the ITE trip generation rates include a modest (0 to 5%) transit split and are generally taken in a fairly suburban context. Therefore, the site trips initially estimated using the ITE rate were adjusted based on the TTS data to reflect the existing mode splits in the study area. The TTS mode splits for residential and retail trips in the study area traffic analysis zones (TAZ 1039, 1040, 1041, and 1043) are shown in **Table 5-1** and **Table 5-2**, respectively. The TTS mode share data is provided in **Appendix G**. As shown, a large portion of the transit related trips in the area are GO train trips as the Pickering GO Station is located in proximity to the site.

However, when the BRT is anticipated to be operational, there will likely be a shift from auto to transit trips in the area. As discussed in **Section 3.6.3**, it is assumed that non-auto mode shares in the study area will increase by 5% by 2028 and 10% by 2033/2038/2043. These increases are applied to the existing non-auto travel mode shares for the study area from the 2016 TTS data to develop non-auto mode share reductions to the site trip generation.

As a comparison, Metrolinx's *Durham Scarborough Bus Rapid Transit Study Initial Business Case Report* (2018) forecasted that the a.m. peak period transit mode

share in Downtown Pickering would be 33% when the center median BRT is in operation, as shown in **Figure 5-1**. In comparison to the existing a.m. peak hour transit mode share (i.e. 22%), the BRT is forecasted to increase transit mode share by 11%, which is comparable to the 10% transit mode increase assumed in this study.

It is our opinion that this future non-auto mode share reduction is conservative as the TMP’s auto mode share targets apply to the entire Region, and areas immediately adjacent to the rapid transit service are expected to have much higher non-auto rates. For example, the current non-auto mode split in the York Region is 14%, while the areas along Yonge Street served by the VIVA rapid transit service have a non-auto mode split above 35%. Therefore, given the close proximity of the Kingston BRT and Pickering GO Station to the site, as well as the increased DRT and GO train service in the future, it is expected that many of the auto site trips will switch to transit trips.

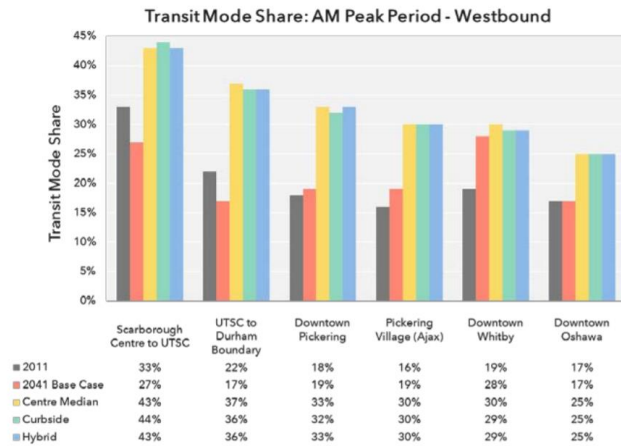
Table 5-1: Existing Mode Share – Residential Trips

Primary Travel Mode	Modal Split Percentage			
	A.M. Peak Hour		P.M. Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Auto – Driver	79%	56%	65%	83%
Auto – Passenger	4%	17%	12%	13%
Transit	0%	8%	4%	4%
Rail Transit	0%	14%	15%	0%
Walking and Cycling	17%	5%	4%	0%

Table 5-2: Existing Mode Share – Retail Trips

Primary Travel Mode	Modal Split Percentage			
	A.M. Peak Hour		P.M. Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Auto – Driver	79%	80%	93%	88%
Auto – Passenger	21%	20%	7%	11%
Transit	0%	0%	0%	0%
Rail Transit	0%	0%	0%	0%
Walking and Cycling	0%	0%	0%	1%

Figure 5-1: Future Transit Mode Share with Durham-Scarborough BRT



Source: *Durham Scarborough Bus Rapid Transit Study Initial Business Case Report* (Metrolinx, 2018)

The resulting site trip generation for horizon years 2028 and 2033/2038/2043 are presented in **Table 5-3** and **Table 5-4**, respectively.

Table 5-3: Site Generated Trips (Horizon Year 2028)

Land Use (ITE Code)	Basis/Parameter	A.M. Peak Hour		P.M. Peak Hour	
		In	Out	In	Out
Multifamily Housing (High-Rise) (222) 1,211 units	ITE Trip Rate (per unit)	0.27		0.32	
	ITE Splits	26%	74%	62%	38%
	Base Trips	85	242	240	147
	Internal Trips	-2	-2	-24	-9
	Non-Auto Trips	-18	-77	-60	-12
	Auto Trips	65	163	155	126
Shopping Centre (820) 53,242 sq. ft. GFA	ITE Trips Rate (per 1000 sq.ft.)	0.84		3.40	
	ITE Splits	62%	38%	48%	52%
	Base Trips	28	17	87	94
	Internal Trips	-2	-2	-9	-24
	Non-Auto Trips	-1	-1	-4	-4
	Auto Trips	24	15	74	65
Total Auto Trips:		89	178	229	191

Table 5-4: Site Generated Trips (Horizon Years 2033, 2038, and 2043)

Land Use (ITE Code)	Basis/Parameter	A.M. Peak Hour		P.M. Peak Hour	
		In	Out	In	Out
Multifamily Housing (High-Rise) (222) 5,238 units	ITE Trip Rate (per unit)	0.27		0.32	
	ITE Splits	26%	74%	62%	38%
	Base Trips	368	1047	1039	637
	Internal Trips	-3	-7	-35	-13
	Non-Auto Trips	-98	-385	-331	-87
	Auto Trips	266	655	673	537
Shopping Centre (820) 76,951 sq. ft. GFA	ITE Trip Rate (per 1000 sq.ft.)	0.84		3.40	
	ITE Splits	62%	38%	48%	52%
	Base Trips	40	25	126	136
	Internal Trips	-7	-3	-13	-35
	Non-Auto Trips	-3	-2	-11	-11
	Auto Trips	30	19	102	90
Total Auto Trips:		296	674	775	627

5.2 TRIP DISTRIBUTION AND ASSIGNMENT

To inform the trip assignment of the proposed development, information about the general trip distribution is required. The distribution represents the proportion of trips to and away from the site in any given direction. In this assessment, trip distribution was calculated using the TTS trip origin and destination data. Trips are grouped under cardinal directions based on the relative angle between trip origin and destination.

Trip distribution data for the site’s home-based TAZ’s (1039, 1040, 1041, and 1043) are summarized in **Table 5-5**. A summary of the TTS queries can be found in **Appendix G**.

Note that ‘internal’ refers to local trips within the home planning district (i.e. City of Pickering – PD 20 in the TTS), while ‘external’ refers to trips made outside the home planning district.

Table 5-5: TTS Trip Distribution

Time Period	NW	N	NE	E	SE	S	SW	W
Internal								
AM (IN)	0.0%	59.4%	0.0%	7.0%	11.2%	0.0%	0.0%	0.0%
AM (OUT)	0.0%	10.6%	1.3%	0.3%	6.2%	3.6%	5.0%	3.3%
PM (IN)	0.0%	6.5%	0.3%	1.5%	7.8%	1.4%	2.7%	1.9%
PM (OUT)	0.0%	6.3%	1.3%	12.5%	12.8%	11.6%	3.9%	3.3%
External								
AM (IN)	0.0%	0.0%	0.0%	22.5%	0.0%	0.0%	0.0%	0.0%
AM (OUT)	14.3%	0.0%	9.0%	10.3%	0.0%	0.0%	8.9%	27.4%
PM (IN)	20.1%	0.0%	3.1%	8.3%	0.0%	0.0%	5.9%	40.5%
PM (OUT)	0.0%	0.0%	7.1%	27.2%	0.0%	0.0%	9.1%	5.1%

Using the TTS trip distribution data above, in conjunction with the most logical path for vehicles to travel based on the future lane configuration, the site generated trips were assigned to the road network.

The resulting assignment for the 2028 and 2033/2038/2043 horizon site traffic volumes are shown in **Figure 5-2** and **Figure 5-3**, respectively.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-2

2028 Site Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-3

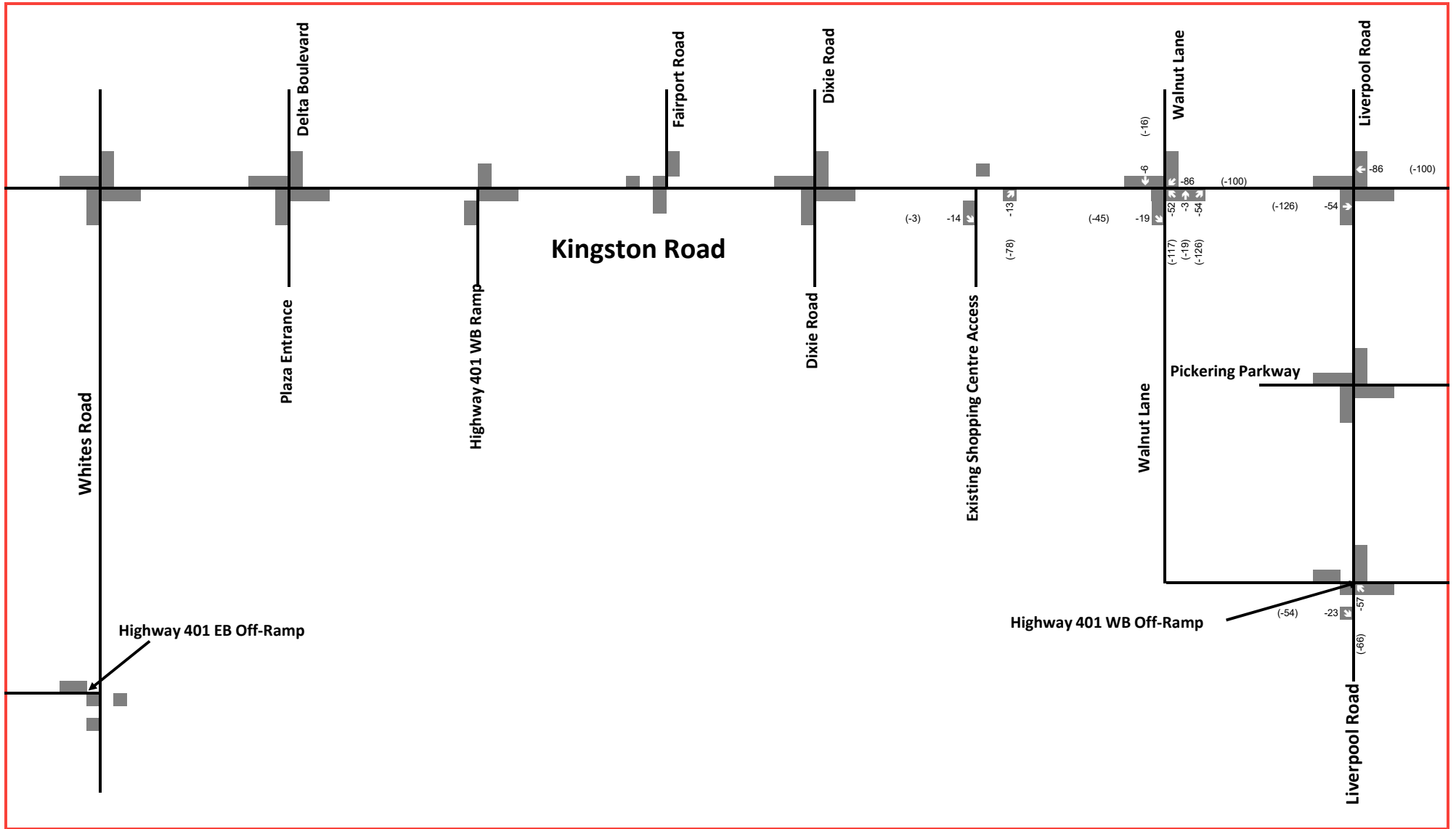
2033, 2038 and 2043 Site Traffic Volumes

5.3 EXISTING SITE TRAFFIC

As mentioned previously, the site is currently occupied by a shopping centre with various retail tenants. With the construction of the proposed development, the current land uses will be removed. To account for this removal, the existing traffic associated with the current land uses need to be removed from the traffic analysis as well. The existing site traffic was determined from the traffic counts at the existing driveway accesses. These existing site traffic volumes will be removed from all future total scenarios. The resulting net site traffic with the removal of existing site traffic is summarized in **Table 5-6**. The existing site traffic is presented in **Figure 5-4**. The net site traffic between the site generated site traffic and the existing site traffic is presented in **Figure 5-5** for the 2028 horizon and **Figure 5-6** for the 2033, 2038, and 2043 horizons.

Table 5-6: Existing Site Trips

	A.M. Peak Hour		P.M. Peak Hour	
	Inbound	Outbound	Inbound	Outbound
Existing Site Trips	238	164	327	424
2028 Site Trips	89	178	229	191
2033/2038/2043 Site Trips	296	674	775	627
2028 Net Site Trips	-149	14	-98	-233
2033/2038/2043 Net Site Trips	58	510	448	203



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-4

Existing Site Traffic (to be removed)

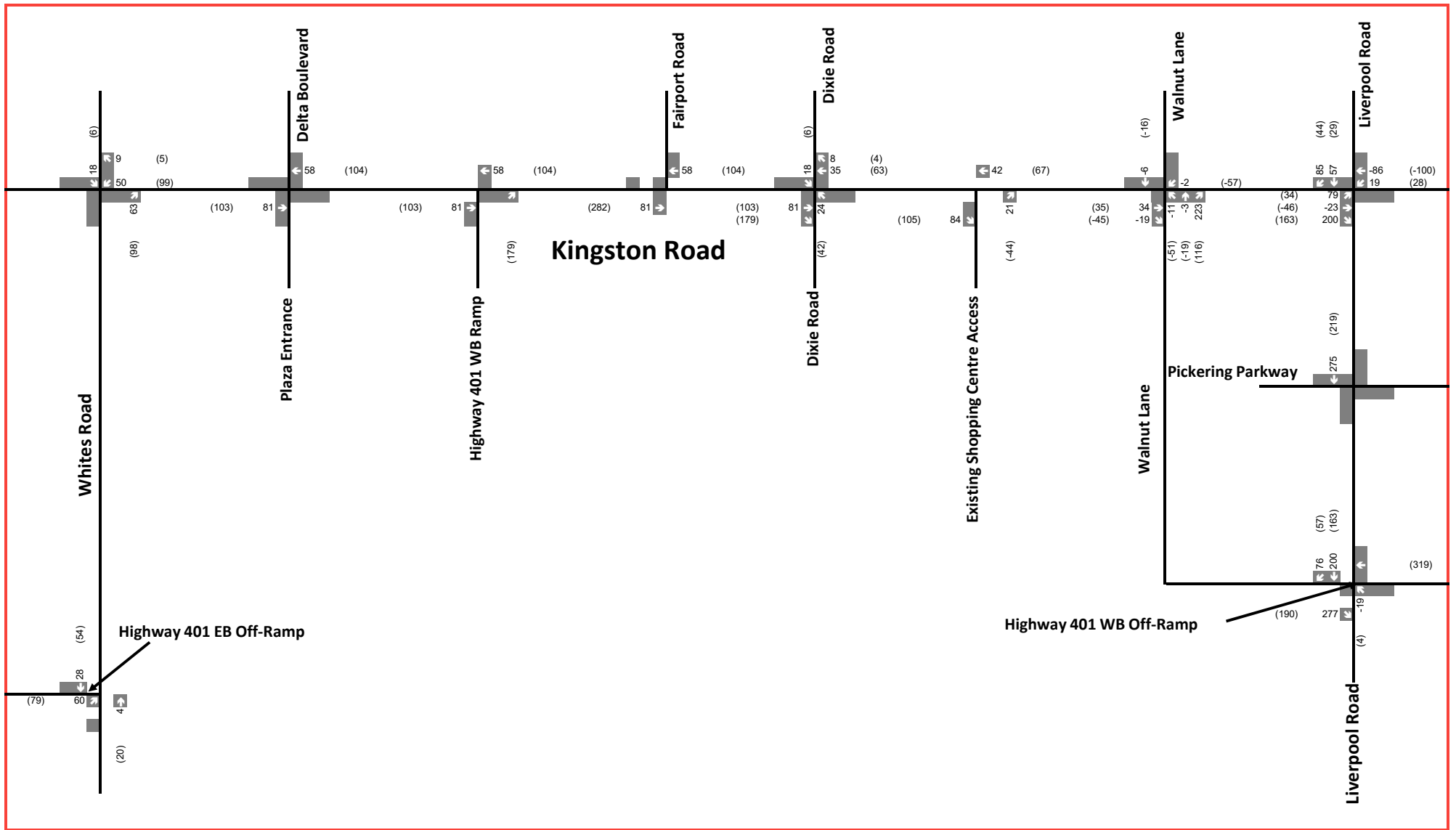


Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-5

2028 Net Site Traffic



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-6

2033, 2038 and 2043 Net Site Traffic

6 FUTURE TOTAL TRAFFIC CONDITIONS

The future total traffic volumes were developed by superimposing the corresponding future background volumes and site-generated traffic volumes.

This section of the report documents the future total traffic assessments for each of the horizon years.

6.1 2028 FUTURE TOTAL

The traffic operations were analyzed based on the resulting 2028 future total traffic forecasts shown **Figure 6-1**. The resulting levels of service are outlined in **Table 6-1** and the details related to intersection operations provided in **Appendix H-1**.

The results indicate that the 2028 future total conditions slightly changed from the future background conditions as a result of the additional site traffic, with all intersections continuing to operate at an acceptable LOS. It should be noted that, by the 2028 horizon year, the proposed development is only partially complete (phase 1 only), where the full build-out will occur for the 2033 horizon year.

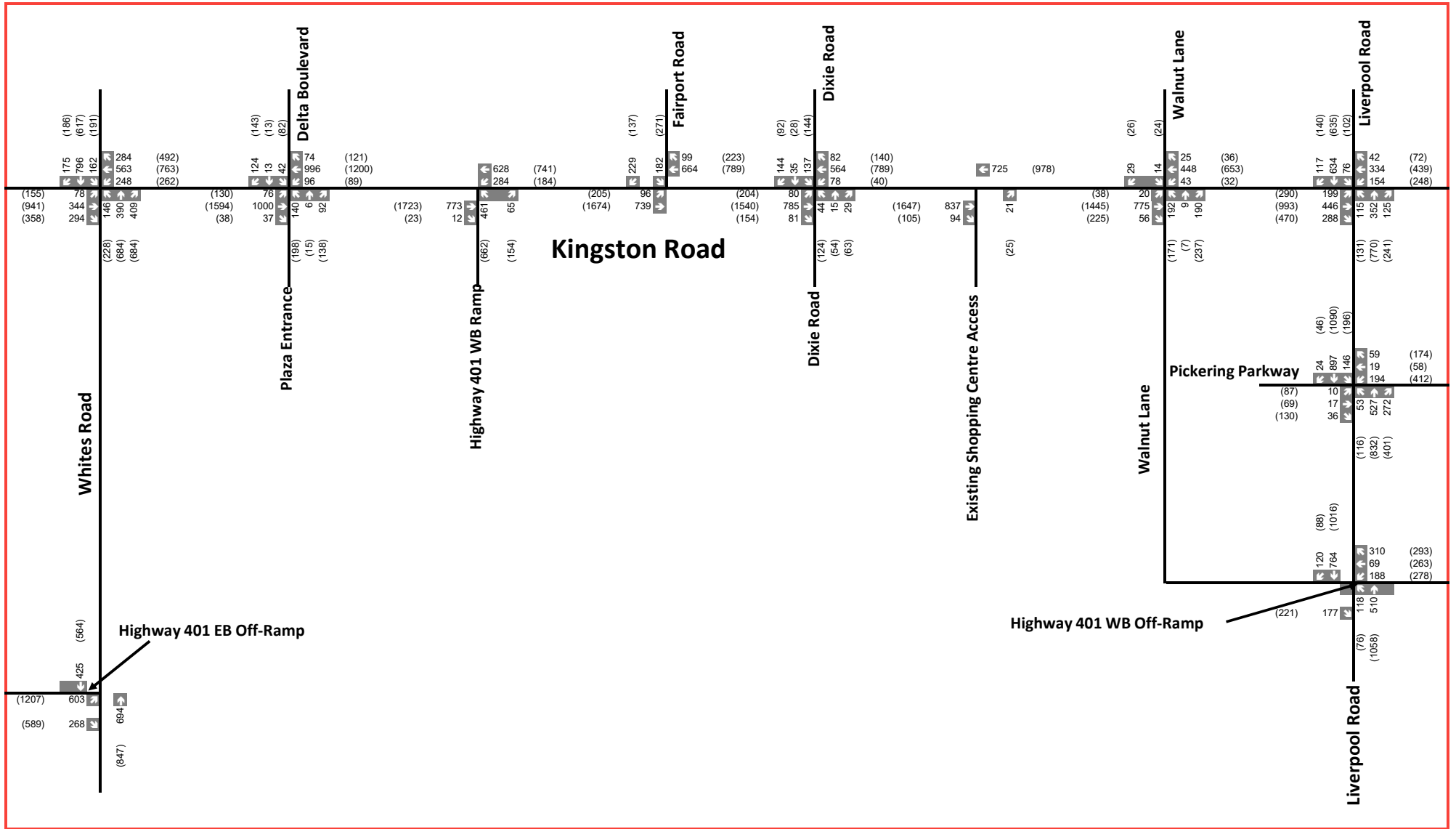
As mentioned previously, the westbound left-turn movement at the intersection of Kingston Road and Walnut Lane has improved from the future background scenarios, since the existing site trips were removed. Although this movement has improved, several movements have worsened with the additional site trips, three of which are now over-capacity. This is to be expected considering that these movements were critical and approaching capacity in the future background scenarios. To resolve these over-capacity movements, a PHF sensitivity scenario will be analyzed for the 2043 horizon year results (the worst-case scenario) in **Section 6.4**.

The RIRO site driveway access at Kingston Road operates well within capacity and with an acceptable LOS during both peak hours.

Table 6-1: 2028 Future Total Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	B (17)	--	C (25)	--
Liverpool Road & Pickering Parkway	B (15)	--	C (25)	--
Liverpool Road & Kingston Road	C (34)	WB-L (0.87)	D (43)	EB-L (0.87) EB-T (0.95) WB-L (0.93)
Kingston Road & Walnut Lane	B (17)	--	B (17)	--
Kingston Road & Dixie Road	C (22)	--	C (22)	EB-L (0.86)
Kingston Road & Fairport Road	B (18)	--	B (18)	EB-L (0.87)
Kingston Road & Highway 401 WB Ramps	C (29)	WB-L (0.85)	D (43)	EB-T (1.02) WB-L (1.03) NB-L (0.89)
Kingston Road & Delta Boulevard	C (21)	--	C (25)	EB-T (0.87) NB-L (0.93)
Kingston Road & Whites Road	C (30)	--	D (44)	EB-L (0.89) EB-T (1.00) WB-L (0.88) NB-L (0.89) NB-R (0.89)
Whites Road & Highway 401 EB Off-Ramp	C (21)	--	C (27)	--
Unsignalized Intersections				
Kingston Road & RIRO Site Access	A (10)	NB-R (0.03)	B (11)	NB-R (0.04)

- 1 For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.
- 2 For unsignalized intersections, the level of service is based on the critical movement, which is the movement with the highest delay.



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes

Figure 6-1

2028 Future Total Traffic Volumes

A queueing analysis for the study intersections is presented in **Table 6-2**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix H-1**.

Table 6-2: 2028 Future Total Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	50 th Percentile Queues (m) [95 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	52	64
	WBL	203	44	72
	WBT	203	44	83
	WBR	125	23	66
	NBL	50	13	12
	NBT	348	16	51
	SBT	138	38	82
	SBR	38	2	13
Liverpool Road & Pickering Parkway	EBL	59	7	32
	EBT	59	8	17
	WBL	57	30	53
	WBT	305	10	19
	WBR	62	0	16
	NBL	54	6	38
	NBT	138	35	71
	NBR	76	20	54
	SBL	133	22	60
	SBT	234	54	93
SBR	36	0	0	
Liverpool Road & Kingston Road	EBL	221	80	98
	EBT	671	74	181
	EBR	98	76	129 [116]
	WBL	237	77	120
	WBT	372	53	74
	WBR	117	0	2
	NBL	186	28	37
	NBT	234	47	123
	NBR	52	14	35
	SBL	49	20	30
	SBT	325	87	100
SBR	61	13	16	

Intersection	Lane Movement	Available Storage (m)	50 th Percentile Queues (m) [95 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	13	14
	EBT	105	42	301 [42]
	WBL	159	25	15
	WBT	671	23	92
	NBL	63	67 [47]	54
	NBT	101	20	61
	SBL	19	8	13
	SBT	156	0	0
Kingston Road & Dixie Road	EBL	184	39	73
	EBT	872	91	195
	WBL	129	47	29
	WBT	167	46	67
	NBL	13	20 [10]	51 [33]
	NBT	100	12	35
	SBL	16	50 [34]	58 [39]
	SBT	212	26	22
Kingston Road & Fairport Road	EBL	238	30	50
	EBT	400	2	8
	WBT	872	88	116
	SBL	16	69 [49]	102 [73]
	SBR	256	21	17
Kingston Road & Highway 401 WB Ramps	EBT	245	102	317 [273]
	WBL	135	104	104
	WBT	400	76	122
	NBL	193	77	115
	NBR	52	12	26
Kingston Road & Delta Boulevard	EBL	39	36	16
	EBT	199	112	120
	WBL	121	39	25
	WBT	245	168	225
	NBL	107	57	99
	NBT	107	16	37
	SBL	146	21	36
	SBT	146	21	27

Intersection	Lane Movement	Available Storage (m)	50 th Percentile Queues (m) [95 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	83
	EBT	274	55	190
	EBR	123	66	89
	WBL	87	89 [50]	108 [66]
	WBT	199	49	80
	WBR	35	9	114 [17]
	NBL	72	52	85 [43]
	NBT	135	39	69
	NBR	35	56 [34]	206 [133]
	SBL	89	46	69
	SBT	361	82	62
Whites Road & Highway 401 EB Off-Ramp	EBL	272	83	136
	EBR	225	19	126
	NBT	162	57	100
	SBT	293	33	62

As a result of adding the phase 1 site traffic, some of the queues under 2028 future total conditions have increased in comparison to the future background conditions. A majority of the movements where the queues exceeding their storage length were present in the future background scenarios. However, there are some that have newly occurred. This includes the eastbound right-turn movement in the p.m. peak hour at Liverpool Road & Kingston Road.

For the eastbound right-turn movement in the p.m. peak hour at Liverpool Road & Kingston Road, it is expected that queues will exceed the storage length in the 50th percentile queues. This is mainly due to the high volumes present at this movement. Considering the high volumes turning eastbound right, the existing storage length is insufficient. However, since Kingston Road has two eastbound through lanes, spillover from the right turn lane is not expected to cause significant delays for the through movement.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

6.2 2033 FUTURE TOTAL

The traffic operations were analyzed based on the resulting 2033 future total traffic forecasts shown in **Figure 6-2**. The resulting levels of service are outlined in **Table 6-3** and the details related to the intersection operations provided in **Appendix H-2**.

By 2033, it is expected that the entire proposed development will be built and operational. Therefore, when compared to the 2028 future total, the volumes are higher,

and conditions are more constrained. The Synchro results for 2033 future total scenario indicate that with all intersections continuing to operate at an acceptable LOS, with some critical movements in the a.m. peak hour and several critical and over-capacity movements in the p.m. peak hour. As mentioned previously, these capacity issues will be resolved in a PHF sensitivity scenario analyzed for the 2043 horizon year in **Section 6.4**.

Table 6-3: 2033 Future Total Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	C (28)	EB-R (0.92) SB-T (0.87)	D (41)	EB-R (1.02) WB-T (1.02) SB-T (0.95)
Liverpool Road & Pickering Parkway	B (15)	--	C (25)	--
Liverpool Road & Kingston Road	D (36)	EB-L (0.94) WB-L (0.92)	D (46)	EB-L (0.90) EB-T (1.00) EB-R (0.93) WB-L (1.00)
Kingston Road & Walnut Lane	C (23)	--	C (29)	EB-T (0.94) WB-L (0.88) NB-T (0.90)
Kingston Road & Dixie Road	C (23)	--	C (25)	EB-L (0.86) EB-T (0.94)
Kingston Road & Fairport Road	B (18)	--	B (20)	EB-L (0.87) EB-T (0.89)
Kingston Road & Highway 401 WB Ramps	C (28)	WB-L (0.85)	D (49)	EB-T (1.07) WB-L (1.03) NB-L (0.89)
Kingston Road & Delta Boulevard	C (21)	--	C (34)	EB-T (0.91) NB-L (0.93)
Kingston Road & Whites Road	C (31)	WB-L (0.90)	D (51)	EB-L (0.89) EB-T (1.04) WB-L (1.04) NB-L (0.89) NB-R (0.95) SB-L (0.85)
Whites Road & Highway 401 EB Off-Ramp	C (21)	--	C (28)	EB-L (0.86)

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Unsignalized Intersections				
Kingston Road & RIRO Site Access	A (10)	NB-R (0.04)	B (13)	NB-R (0.08)

- 1 For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.
- 2 For unsignalized intersections, the level of service is based on the critical movement, which is the movement with the highest delay.

A queueing analysis for the study intersections is presented in **Table 6-4**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix H-2**.

Table 6-4: 2033 Future Total Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	159	154
	WBL	203	44	72
	WBT	203	44	188
	WBR	125	23	66
	NBL	50	18	19
	NBT	348	17	52
	SBT	138	88	108
	SBR	38	8	17
Liverpool Road & Pickering Parkway	EBL	59	7	32
	EBT	59	8	17
	WBL	57	30	53
	WBT	305	10	19
	WBR	62	0	16
	NBL	54	6	40
	NBT	138	36	73
	NBR	76	20	54
	SBL	133	22	61
	SBT	234	66	107
SBR	36	0	0	
Liverpool Road & Kingston Road	EBL	221	112	90
	EBT	671	74	183
	EBR	98	100	156 [127]
	WBL	237	86	132
	WBT	372	53	74
	WBR	117	0	2
	NBL	186	28	37
	NBT	234	48	127
	NBR	52	14	36
	SBL	49	20	30
	SBT	325	95	106
SBR	61	15	19	

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	12	13
	EBT	105	88	297 [189]
	WBL	159	46	42
	WBT	671	27	91
	NBL	63	75 [54]	68 [49]
	NBT	101	55	118 [84]
	SBL	19	9	14
	SBT	156	0	0
Kingston Road & Dixie Road	EBL	184	39	62
	EBT	872	99	78
	WBL	129	48	29
	WBT	167	51	77
	NBL	13	25 [14]	61 [41]
	NBT	100	12	35
	SBL	16	54 [37]	59 [39]
	SBT	212	26	22
Kingston Road & Fairport Road	EBL	238	31	50
	EBT	400	2	272
	WBT	872	95	162
	SBL	16	69 [49]	102 [73]
	SBR	256	21	17
Kingston Road & Highway 401 WB Ramps	EBT	245	112	339 [296]
	WBL	135	104	104
	WBT	400	83	136
	NBL	193	77	115
	NBR	52	12	47
Kingston Road & Delta Boulevard	EBL	39	36	16
	EBT	199	122	127
	WBL	121	39	27
	WBT	245	174	237
	NBL	107	57	99
	NBT	107	16	38
	SBL	146	21	36
	SBT	146	21	29

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	83
	EBT	274	55	190
	EBR	123	70	96
	WBL	87	121 [59]	152 [96]
	WBT	199	47	84
	WBR	35	9	123 [26]
	NBL	72	52	85 [43]
	NBT	135	39	69
	NBR	35	68 [42]	276 [163]
	SBL	89	49	71
	SBT	361	82	62
Whites Road & Highway 401 EB Off-Ramp	SBR	47	20	17
	EBL	272	87	145
	EBR	225	19	130
	NBT	162	60	103
	SBT	293	36	66

The queueing analysis indicates that the queues have increased slightly when compared to the 2028 future total queues due to the larger number of site trips present in 2033. The same movements exceed their queues in the 2033 future total scenario as in the 2028 future total scenario, except for the westbound left-turn movement at Kingston Road & Whites Road. Although this movement exceeds the storage length for both the 95th and 50th percentile queues, it is not expected to create significant delays for the through movement as there are three westbound through lanes at this intersection.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

6.3 2038 FUTURE TOTAL

The traffic operations were analyzed based on the resulting 2038 future total traffic forecasts shown in **Figure 6-3**. The resulting levels of service are outlined in **Table 6-5** and the details related to the intersection operations provided in **Appendix H-3**.

The Synchro results for the 2038 future total scenario indicate that it operates similarly to the 2033 future total scenario with all intersections continuing to operate at an acceptable LOS, some critical movements in the a.m. peak hour, and several critical and over-capacity movements in the p.m. peak hour. As mentioned previously, these capacity issues will be resolved in a PHF sensitivity scenario analyzed for the 2043 horizon year in **Section 6.4**.

Table 6-5: 2038 Future Total Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	C (28)	EB-R (0.92) SB-T (0.88)	D (42)	EB-R (1.02) WB-T (1.02) SB-T (0.97)
Liverpool Road & Pickering Parkway	B (15)	--	C (25)	--
Liverpool Road & Kingston Road	D (36)	EB-L (0.94) WB-L (0.92)	D (46)	EB-L (0.90) EB-T (1.00) EB-R (0.93) WB-L (1.00)
Kingston Road & Walnut Lane	C (23)	--	C (29)	EB-T (0.94) WB-L (0.88) NB-T (0.90)
Kingston Road & Dixie Road	C (23)	--	C (25)	EB-L (0.86) EB-T (0.94)
Kingston Road & Fairport Road	B (18)	--	B (20)	EB-L (0.87) EB-T (0.89)
Kingston Road & Highway 401 WB Ramps	C (28)	WB-L (0.85)	D (49)	EB-T (1.07) WB-L (1.03) NB-L (0.89)
Kingston Road & Delta Boulevard	C (21)	--	C (34)	EB-T (0.91) NB-L (0.93)
Kingston Road & Whites Road	C (31)	WB-L (0.90)	D (51)	EB-L (0.89) EB-T (1.04) WB-L (1.04) NB-L (0.89) NB-R (0.95) SB-L (0.85)
Whites Road & Highway 401 EB Off-Ramp	C (21)	--	C (28)	EB-L (0.86)

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Unsignalized Intersections				
Kingston Road & RIRO Site Access	A (10)	NB-R (0.04)	B (13)	NB-R (0.08)

- 1 For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.
- 2 For unsignalized intersections, the level of service is based on the critical movement, which is the movement with the highest delay.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 6-3

2038 Future Total Traffic Volumes

A queueing analysis for the study intersections is presented in **Table 6-6**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix H-3**.

Table 6-6: 2038 Future Total Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	159	154
	WBL	203	44	72
	WBT	203	44	188
	WBR	125	23	66
	NBL	50	18	19
	NBT	348	17	54
	SBT	138	90	111
	SBR	38	8	17
Liverpool Road & Pickering Parkway	EBL	59	7	32
	EBT	59	8	17
	WBL	57	30	53
	WBT	305	10	19
	WBR	62	0	16
	NBL	54	6	41
	NBT	138	37	75
	NBR	76	20	55
	SBL	133	22	62
	SBT	234	68	112
SBR	36	0	0	
Liverpool Road & Kingston Road	EBL	221	112	90
	EBT	671	74	183
	EBR	98	101	156 [127]
	WBL	237	86	132
	WBT	372	53	74
	WBR	117	0	2
	NBL	186	28	38
	NBT	234	49	131
	NBR	52	14	37
	SBL	49	20	30
	SBT	325	97	108
SBR	61	15	20	

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	12	13
	EBT	105	87	297 [189]
	WBL	159	46	42
	WBT	671	27	91
	NBL	63	75 [54]	68 [49]
	NBT	101	55	118 [84]
	SBL	19	9	14
	SBT	156	0	0
Kingston Road & Dixie Road	EBL	184	39	62
	EBT	872	99	78
	WBL	129	48	29
	WBT	167	51	77
	NBL	13	25 [14]	61 [41]
	NBT	100	12	35
	SBL	16	54 [37]	59 [39]
	SBT	212	26	22
Kingston Road & Fairport Road	EBL	238	31	50
	EBT	400	2	272
	WBT	872	95	161
	SBL	16	69 [49]	102 [73]
	SBR	256	21	17
Kingston Road & Highway 401 WB Ramps	EBT	245	112	339 [296]
	WBL	135	104	104
	WBT	400	83	136
	NBL	193	77	115
	NBR	52	12	47
Kingston Road & Delta Boulevard	EBL	39	36	16
	EBT	199	122	127
	WBL	121	39	27
	WBT	245	174	237
	NBL	107	57	99
	NBT	107	16	38
	SBL	146	21	36
	SBT	146	21	29

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	83
	EBT	274	55	190
	EBR	123	70	96
	WBL	87	121 [59]	152 [96]
	WBT	199	47	84
	WBR	35	9	123 [26]
	NBL	72	52	85 [43]
	NBT	135	39	69
	NBR	35	68 [42]	276 [163]
	SBL	89	49	71
	SBT	361	82	62
Whites Road & Highway 401 EB Off-Ramp	SBR	47	20	17
	EBL	272	87	145
	EBR	225	19	130
	NBT	162	60	103
	SBT	293	36	66

The queueing analysis indicates that the queues very similar when compared to the 2033 future total queues. Overall, the same movements exceed their queues in the 2038 future total scenario as the 2033 future total scenario, with no new queueing issues.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

6.4 2043 FUTURE TOTAL

The traffic operations were analyzed based on the resulting 2043 future total traffic forecasts shown in **Figure 6-4**. The resulting levels of service are outlined in **Table 6-7** and the details related to the intersection operations provided in **Appendix H-4**.

The Synchro results for the 2043 future total scenario indicate that it operates similarly to the 2033 future total scenario with all intersections continuing to operate at an acceptable LOS, some critical movements in the a.m. peak hour, and several critical and over-capacity movements in the p.m. peak hour.

Table 6-7: 2043 Future Total Intersection Operations

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections				
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	C (28)	EB-R (0.92) SB-T (0.90)	D (43)	EB-R (1.02) WB-T (1.02) SB-T (0.99)
Liverpool Road & Pickering Parkway	B (15)	--	C (26)	--
Liverpool Road & Kingston Road	D (36)	EB-L (0.94) WB-L (0.92)	D (46)	EB-L (0.90) EB-T (1.00) EB-R (0.93) WB-L (1.00)
Kingston Road & Walnut Lane	C (23)	--	C (29)	EB-T (0.94) WB-L (0.88) NB-T (0.90)
Kingston Road & Dixie Road	C (23)	--	C (25)	EB-L (0.86) EB-T (0.94)
Kingston Road & Fairport Road	B (18)	--	B (20)	EB-L (0.87) EB-T (0.89)
Kingston Road & Highway 401 WB Ramps	C (28)	WB-L (0.85)	D (49)	EB-T (1.07) WB-L (1.03) NB-L (0.89)
Kingston Road & Delta Boulevard	C (21)	--	C (34)	EB-T (0.91) NB-L (0.93)
Kingston Road & Whites Road	C (31)	WB-L (0.90)	D (51)	EB-L (0.89) EB-T (1.04) WB-L (1.04) NB-L (0.89) NB-R (0.95) SB-L (0.85)
Whites Road & Highway 401 EB Off-Ramp	C (21)	--	C (28)	EB-L (0.86)

Intersection	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Unsignalized Intersections				
Kingston Road & RIRO Site Access	A (10)	NB-R (0.04)	B (13)	NB-R (0.08)

- 1 For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.
- 2 For unsignalized intersections, the level of service is based on the critical movement, which is the movement with the highest delay.

As mentioned previously, to resolve these capacity issues, a PHF sensitivity scenario will be analyzed. A PHF of 0.92 was assumed for intersections in the future scenarios in order to comply with the Durham Region guidelines. However, this assumption is very conservative, as increasing traffic volumes tend to result in traffic more evenly distributing itself throughout the peak hour, therefore increasing the PHF. In addition, the Walnut Lane Extension EA Study assumed a PHF of 1.00 for all study intersections as a part of their analysis. Therefore, in order to account for the busier intersections as well as aligning with the Walnut Lane Class EA, a PHF of 1.00 was adopted for any intersections in the 2043 future total scenario with movements at or over-capacity. This includes four intersections: Liverpool Road & Walnut Lane / Highway 401 WB Ramp, Liverpool Road & Kingston Road, Kingston Road & Highway 401 WB Ramps, and Kingston Road & Whites Road.

The sensitivity analysis results are shown in **Table 6-8**. The sensitivity results show that with a PHF of 1.00, although some critical movements remain, these intersections operate within capacity. Since all intersections can operate within capacity, the road network can accommodate the site trips generated by the proposed development under 2043 future total conditions with this adjustment.

Considering that 2043 future total is the worst-case scenario, it can be assumed that, if the road network can accommodate the proposed development under 2043 future total conditions, that it can accommodate all of the previous horizon years as well.

Table 6-8: 2043 Future Total Intersection Operations – PHF Sensitivity Analysis

Intersection	Weekday P.M. Peak Hour	
	Overall LOS (Delay in Seconds)	Critical Movement (Volume/Capacity Ratio)
Signalized Intersections		
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	D (35)	EB-R (0.95) WB-T (0.96) SB-T (0.88)
Liverpool Road & Kingston Road	D (40)	EB-L (0.87) EB-T (0.92) EB-R (0.85) WB-L (0.92)
Kingston Road & Highway 401 WB Ramps	C (33)	EB-T (0.97) WB-L (0.95) NB-L (0.85)
Kingston Road & Whites Road	D (42)	EB-T (0.95) WB-L (0.96) NB-R (0.88)

¹ For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for through or shared through/turning movements with values over 0.85. Critical v/c ratios are only listed for exclusive movements with values of 0.90.



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes

Figure 6-4

2043 Future Total Traffic Volumes

A queueing analysis for the study intersections is presented in **Table 6-9**. The 50th percentile queue lengths are shown only for movements with 95th percentile queue lengths exceeding the available storage. Detailed queue results for all intersections and individual movements are provided in **Appendix H-4**.

Table 6-9: 2043 Future Total Intersection Queue Lengths

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Liverpool Road & Walnut Lane / Highway 401 WB Off-Ramp	EBR	N/A	159	154
	WBL	203	44	72
	WBT	203	44	188
	WBR	125	24	66
	NBL	50	18	19
	NBT	348	17	56
	SBT	138	93	115
	SBR	38	8	16
Liverpool Road & Pickering Parkway	EBL	59	7	32
	EBT	59	8	17
	WBL	57	30	53
	WBT	305	10	19
	WBR	62	0	16
	NBL	54	5	42
	NBT	138	38	77
	NBR	76	20	55
	SBL	133	22	63
	SBT	234	69	120
	SBR	36	0	0
Liverpool Road & Kingston Road	EBL	221	112	90
	EBT	671	74	183
	EBR	98	102	156 [127]
	WBL	237	86	132
	WBT	372	53	74
	WBR	117	0	2
	NBL	186	28	40
	NBT	234	50	135
	NBR	52	14	38
	SBL	49	20	31
	SBT	325	99	111
SBR	61	15	21	

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Walnut Lane	EBL	107	12	13
	EBT	105	87	297 [189]
	WBL	159	46	42
	WBT	671	27	91
	NBL	63	75 [54]	68 [49]
	NBT	101	55	118 [84]
	SBL	19	9	14
	SBT	156	0	0
Kingston Road & Dixie Road	EBL	184	39	62
	EBT	872	99	78
	WBL	129	48	29
	WBT	167	51	77
	NBL	13	25 [14]	61 [41]
	NBT	100	12	35
	SBL	16	54 [37]	59 [39]
	SBT	212	26	22
Kingston Road & Fairport Road	EBL	238	31	50
	EBT	400	2	272
	WBT	872	95	161
	SBL	16	69 [49]	102 [73]
	SBR	256	21	17
Kingston Road & Highway 401 WB Ramps	EBT	245	112	339 [296]
	WBL	135	104	104
	WBT	400	83	136
	NBL	193	77	115
	NBR	52	12	47
Kingston Road & Delta Boulevard	EBL	39	36	16
	EBT	199	122	127
	WBL	121	39	27
	WBT	245	174	237
	NBL	107	57	99
	NBT	107	16	38
	SBL	146	21	36
	SBT	146	21	29

Intersection	Lane Movement	Available Storage (m)	95 th Percentile Queues (m) [50 th Percentile Queues (m)]	
			A.M. Peak Hour	P.M. Peak Hour
Kingston Road & Whites Road	EBL	153	38	83
	EBT	274	55	190
	EBR	123	70	96
	WBL	87	121 [59]	152 [96]
	WBT	199	47	84
	WBR	35	9	123 [26]
	NBL	72	52	85 [43]
	NBT	135	39	69
	NBR	35	68 [42]	276 [163]
	SBL	89	49	71
	SBT	361	82	62
	SBR	47	20	17
Whites Road & Highway 401 EB Off-Ramp	EBL	272	87	145
	EBR	225	19	130
	NBT	162	60	103
	SBT	293	36	66

The 2043 future total queueing analysis indicates that the queues very similar to the 2038 future total queues. Overall, the same movements exceed their queues in the 2043 future total scenario as the 2038 future total scenario, with no new queueing issues.

As discussed, the 95th percentile queue lengths are typically reached only a few times during peak periods; therefore, the impact of the queues would be limited as long as the 50th percentile (average) queue lengths are within the available storage lengths.

7 PARKING ASSESSMENT

7.1 VEHICLE PARKING

The development is proposing to supply a total of 4,368 vehicle parking spaces.

Per the Pickering City Centre Zoning By-Law 7553/17², the following parking supply rates are required for the site:

- **Apartment Residents:** minimum of 0.80 parking spaces per unit;
- **Visitors:** minimum of 0.15 parking spaces per unit;
- **Retail:** minimum of 3.5 spaces per 100 sq.m. GFA; and
- **Daycare:** minimum of 1.0 space per employee plus 3.0 spaces and an additional 1.0 space per classroom.

It is expected that the retail and daycare uses will largely service the residents; therefore, they are expected to generate lower parking demands compared to the by-law requirements. Regardless, as a conservative approach, it was assumed that the parking demand will be equal to the by-law requirements.

The By-law also provides a shared parking formula that can be used to calculate the required parking for multi-use developments such as this site. The relevant weekday shared parking formulas per Table 2 of the by-law (reproduced in **Table 7-1**) were used to calculate the site's parking requirement, with resident demand being assumed to be 100% during all periods of the day. As no formulas were provided for the daycare use, it was conservatively assumed to also be 100% during all periods of the day.

Table 7-1: Pickering City Centre Zoning By-law 7553/17 Weekday Shared Parking Formula

Type of Use	Percentage of Peak Period (Weekday)			
	Morning	Noon	Afternoon	Evening
Food Store/Personal Service Shop/Retail Store	65%	90%	90%	90%
Residential - Visitors	20%	20%	60%	100%

The parking supply requirements are provided in **Table 7-2**. As the details necessary to calculate the daycare parking requirement (number of employees and classrooms) are not currently known, the minimum retail parking rate has also been applied to the daycare component for the purpose of this preliminary analysis.

² While the site's location is just west of the area for which by-law 7553/17 applies, it is our opinion that the parking standards from this by-law should be applied to the site given its comparable land uses, density, and proximity to higher-order transit.

Table 7-2: Vehicle Parking Calculation – Pickering City Centre Zoning By-Law

Land Use	Density	Min. Parking Requirement (By-law 7553-17)	Peak Parking Demand	Shared Parking Formula Adjustment (City of Pickering Zoning By-law 7553-17)				Adjusted Parking Demand			
				Morning	Noon	Afternoon	Evening	Morning	Noon	Afternoon	Evening
Resident	5,238 units	0.80 spaces/unit	4,191	100%	100%	100%	100%	4,191	4,191	4,191	4,191
Visitor	5,238 units	0.15 spaces/unit	786	20%	20%	60%	100%	158	158	472	786
Retail	7,149 m ²	3.5 spaces/100 m ²	251	65%	90%	90%	90%	164	226	226	226
Daycare	716 m ²	3.5 spaces/100 m ²	26	100%	100%	100%	100%	26	26	26	26
							Total:	4,539	4,601	4,915	5,229
Total Non-adjusted Parking Requirement:			5,254	Total Adjusted Parking Requirement:				5,229			

Table 7-3: Vehicle Parking Calculation – Proposed Parking Rates

Land Use	Density	Min. Parking Requirement (By-law 7553-17)	Peak Parking Demand	Shared Parking Formula Adjustment (City of Pickering Zoning By-law 7553-17)				Adjusted Parking Demand				
				Morning	Noon	Afternoon	Evening	Morning	Noon	Afternoon	Evening	
Resident	5,238 units	0.60 spaces/unit	3,143	100%	100%	100%	100%	3,143	3,143	3,143	3,143	
Visitor	5,238 units	0.15 spaces/unit	786	20%	20%	60%	100%	158	158	472	786	
Retail	7,149 m ²	3.3 spaces/100 m ²	236	65%	90%	90%	90%	154	213	213	213	
Daycare	716 m ²	3.3 spaces/100 m ²	24	100%	100%	100%	100%	24	24	24	24	
							Total:	3,479	3,538	3,852	4,166	
Total Non-adjusted Parking Requirement:			4,189	Total Adjusted Parking Requirement:				4,166				

As shown above, the unadjusted parking requirement is 5,254 spaces and the adjusted parking requirement is 5,229 spaces.

However, for the nearby development at 1786-1790 Liverpool Road, the City approved site-specific zoning by-law 8023/23 which permitted a minimum apartment resident parking supply of 0.55 spaces per unit and a minimum non-residential parking supply of 3.3 spaces per 100 m² GFA.

Based on this nearby approval, it is proposed that the development provide a minimum apartment resident parking supply of 0.60 spaces per unit (higher than the nearby approved development) and a minimum supply of 3.3 spaces per 100 m² GFA for each of the non-residential uses (equivalent to the nearby approved development). With these proposed rates applied to the subject development, as shown in **Table 7-3**, the unadjusted parking requirement becomes 4,189 spaces and the adjusted parking requirement would become 4,166 spaces, both of which fall below the proposed parking supply of 4,368 spaces. Therefore, it is our opinion that a sufficient parking supply has been provided for the site.

7.2 ACCESSIBLE PARKING

Based on the City's Traffic and Parking By-Law 6604/05, accessible parking spaces should be calculated based on the visitor and non-residential parking supply. Assuming that a total of 1,038 visitor and non-residential parking spaces (residential visitor, retail, and daycare spaces) are provided, the by-law requires 11 Type A and 11 Type B accessible spaces.

The requirement of 11 Type A and 11 Type B accessible spaces will be met in a future site plan approval application submission.

7.3 BICYCLE PARKING

As per the City Centre Zoning By-law 7553/17, **Table 7-4** summarizes the bicycle parking requirements for the site. In total, 2,629 bicycle parking spaces are required for the development.

Table 7-4: Bicycle Parking Requirements

Land Use	Density	Minimum Bicycle Parking Rate	Bicycle Parking Requirement
Residential	5,238 units	0.5 spaces/unit	2,619
Retail	7,149 m ²	greater of 2 or 1.0 space/1,000 m ²	8
Daycare	716 m ²	greater of 2 or 1.0 space/1,000 m ²	2
Total:			2,629

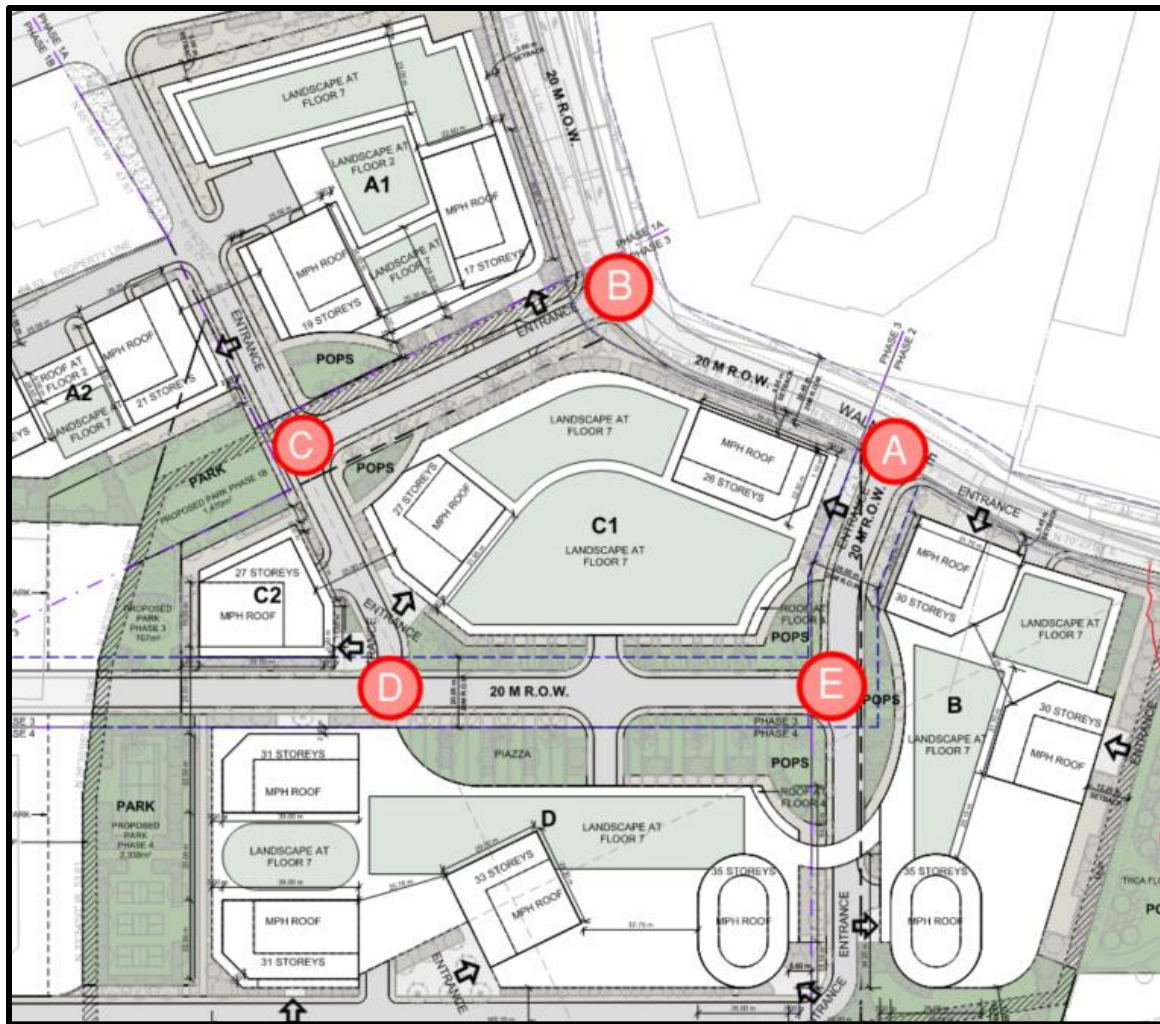
The requirement of 2,629 bicycle parking spaces will be met in a future site plan approval application submission.

8 SITE PLAN ASSESSMENT

8.1 INTERNAL INTERSECTION CONTROLS

There are several internal intersections within the proposed site plan. The five internal intersections have been identified as intersections A to E, as shown in Figure 8-1. The estimated volumes of these internal intersections under 2043 future total conditions are provided in Figure 8-2.

Figure 8-1: Internal Intersections



To determine the control type of the internal intersections, the all-way stop warrant methodology outlined in Ontario Traffic Manual (OTM) Book 5 was used. According to OTM Book 5, an all-way stop is warranted at the intersection of two local roads under three conditions. Firstly, the total number of vehicles at all intersection approaches must be greater than 200 vehicles. Secondly, the minor street volumes must be greater than 75 vehicles. Finally, the volume split between the minor and major street volumes must be at least 30 to 70, or 25 to 75 for 3-legged intersections. Based on these three

conditions, the internal intersections were assessed. The results are presented in **Table 8-1**.

Table 8-1: Internal Intersection All-Way Stop Warrant

Internal Intersection	Condition 1 (Total Volume)	Condition 2 (Minor Street Volume)	Condition 3 (Volume Split)	All-way Stop warranted?
A	Yes	Yes	Yes	Yes
B	Yes	Yes	No	No
C	Yes	Yes	Yes	Yes
D	Yes	Yes	Yes	Yes
E	Yes	Yes	Yes	Yes

As shown in **Table 8-1**, most of the internal intersections are warranted for all-way stop control with the exception of intersection B. Therefore, intersection B is recommended to be two-way stop-controlled intersection and the remaining internal intersections are recommended to be all-way stop-controlled intersections. **Figure 8-3** illustrates the recommended control type for the internal intersections.

Given the recommended provision of all-way stop control at almost all of the internal intersections and the short distances between the intersections, mid-block pedestrian crossings are not required at any location within the development.

The ROW widths for the internal road network and the road design were established based on the City of Pickering road engineering design criteria.

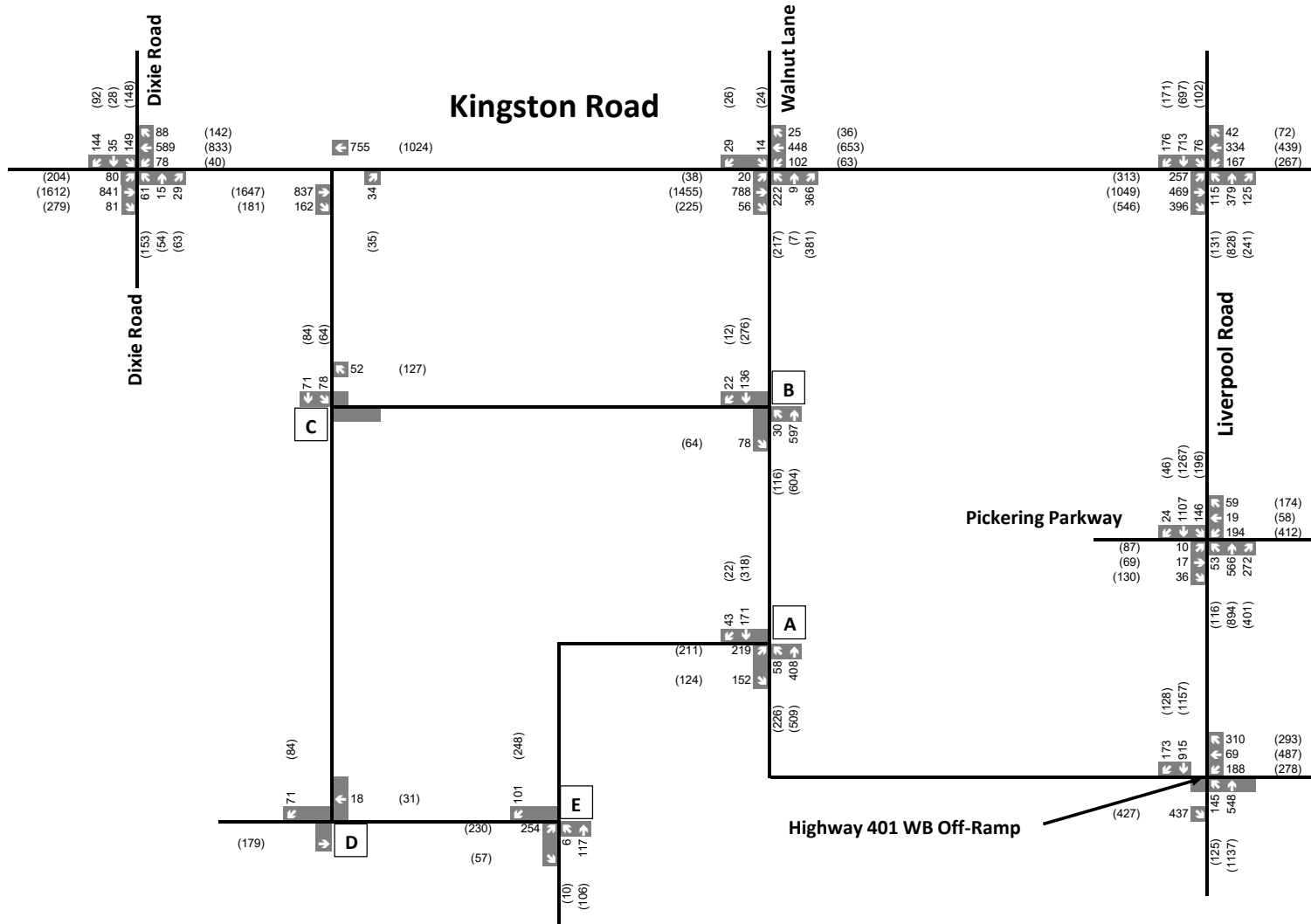


Figure 8-1

2043 Future Total Internal Road Volumes



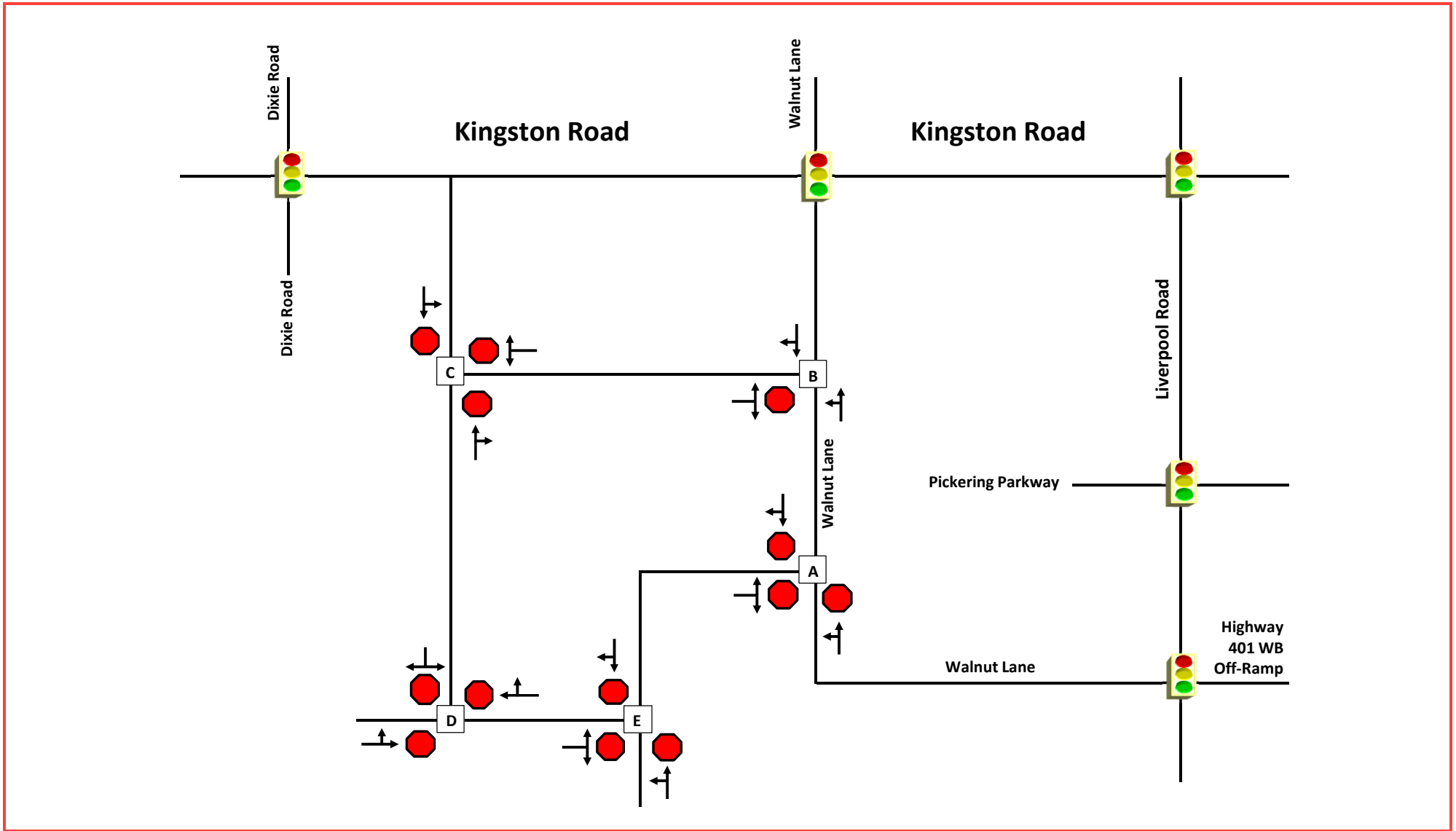


Figure 8-2

Internal Roads Lane Configuration

8.2 DIXIE ROAD ACCESS

In designing internal road network, the consideration was given not only to the City's and Region's road engineering design criteria, but also to the potential future redevelopment of the adjacent site to the west. The shopping centre is currently served by an east-west road that intersects with Dixie Road approximately 30 metres south of Kingston Road. The existing alignment of the east-west road is problematic since its intersecting point with Dixie Road is located in the functional area of the Kingston Road and Dixie Road intersection. Additionally, due to the short spacing between the Dixie Road and east-west road intersection to Kingston Road, the current alignment would not allow for the west leg of the intersection to be introduced to provide access to the adjacent site to the west.

To address these concerns, the alignment of the east-west road was moved approximately 54 metres to the south as illustrated in **Figure 8-4** below. The proposed new alignment of the east-west provides adequate separation from Kingston Road, and at the same time provides sufficient flexibility for the appropriate site access arrangements related to the adjacent site to the west.

Figure 8-4: Dixie Road Access – Intersection Distances



9 TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation Demand Management (TDM) is a general concept under which various transportation strategies are considered to increase the efficiency of the transportation system through the management of travel demands across all available modes of transportation. It treats mobility as a means to an end itself and emphasizes the movement of people and goods rather than the movement of vehicles. TDM initiatives generally discourage single-occupant vehicle travel and encourage more effective use of various alternative modes and strategies such as walking, cycling, public transit, and ridesharing/carpooling in order to reduce traffic congestion in the road network.

An effective TDM program is successful at reducing peak hour roadway demand. This section of the report details the wider measures already implemented and/or planned by the Region of Durham and/or the City of Pickering, and the specific TDM initiatives that are proposed for the subject development.

There are several planned transit and multimodal improvements that will play a key role in the mobility in the study area. Multi modal transportation facilities planned for the study area include the future Durham-Scarborough BRT and several transit service options, cycle network improvements, and pedestrian amenities, as previously discussed in detail in **Sections 3.4 and 3.5**. Furthermore, the site is located approximately 1 km away from the Pickering GO station which provides residents convenient transit options for long-distance travel/commute trips.

This section outlines some of the TDM components that could be incorporated into the proposed development to facilitate the reduction of trips to and from the study area by single-occupant vehicles. In the context of a new subdivision development, TDM initiatives provide essential elements to a progressive transportation plan that promotes and maintains an efficient and functional transportation system in and around the study area.

9.1 DEVELOPMENT OF SITE SPECIFIC TDM STRATEGY

9.1.1 PRESTO TRANSIT CARDS

Durham Region Transit (DRT) currently uses the Presto card as the electronic fare option. The Presto card is also accepted on GO Transit and all other transit agencies in the Greater Toronto Area. The Presto card is an alternative to buying bus tickets or having the correct change to ride the DRT.

To encourage transit use, the occupants of the development should be provided a Presto Card with pre-loaded funds to incentivize new residents to try and become familiar with the local transit network.

It is recommended that the developer provide all initial occupants with a Presto transit card loaded with a minimum of \$120 (one card per unit).

9.1.2 BICYCLE PARKING

With the planned cycle tracks on Kingston Road and cycling facilities on Liverpool Road, providing on-site cycling amenities such as bicycle parking will encourage residents to cycle. As discussed in **Section 7.3**, the City of Pickering's City Centre Zoning By-Law 7553/17 requires 2,629 bicycle parking spaces at the subject site.

The proposed development will provide at least 2,629 bicycle parking spaces in order to meet the by-law requirements. Additionally, it is recommended that bicycle repair stations be provided in the bicycle parking areas (one per building) in order to allow residents to do maintenance and minor repairs on their bicycles.

9.1.3 UNBUNDLING OF PARKING

All resident parking spaces will be provided as 'unbundled parking', and unit purchasers will have the option to decide whether to purchase a parking space or not. Based on the recent trend observed at several sites in the GTA, it appears this strategy has become a very effective in reducing the parking demand requirements and consequently a number of auto trips generated by the site.

The practice of unbundled parking is an important and standard TDM strategy for medium and high-density residential developments. This TDM measure allows potential residents the option to purchase their unit separately from the parking space at a reduced cost. The reduced cost should reflect the realistic and actual cost of the parking space to provide reasonable incentives and encourage purchasers to consider an unbundled parking option. This, in turn, promotes residents to explore alternative transportation options aside from single occupancy driving. Furthermore, it will also allow residents of larger units to purchase more than one space, if desired. As a result, the likelihood of oversupplying parking spaces for the development is reduced.

9.1.4 ON-SITE MOBILITY ALTERNATIVES INFORMATION

To help facilitate non-auto trips, it is important to provide transportation information to new residents so that they can view and understand their travel options before establishing new travel habits. This will increase the chance that new residents incorporate these alternatives in their travel patterns after moving into the development.

Information regarding transit availability and schedules, available cycling facilities and connections, as well as other non-auto travel options would be made available on-site in a convenient and logical location, and/or be included as part of the welcome package to new residents of the development to inform them of the alternative modes of transportation available to them.

The developer will provide information about transportation options to new residents in an information package that will include items such as:

- Existing transit services, including a Durham Region Transit system map, a GO system map, route navigators for each area transit route (including GO bus and rail), and seven-day schedules for nearby stops for each of these routes. Information will

be provided by the Region and the Municipality and will also include relevant fare and incentive-based information such as the preloaded Presto card provided by the developer.

- A map of the surrounding area with sidewalks and bicycle facilities, a copy of the Durham Region Cycle Tours Map, cycling and pedestrian safety tips, and information on active transportation events (such as Bike to Work Day and CAN-BIKE cycling lessons). This information would also be provided by the Region and Municipality.
- Carpooling information, including information on Smart Commute and how one can join through their employer.

The Region requires the developer to develop and distribute to all initial occupants an information package including transit maps, schedules, fares, bicycle route maps and any other relevant local transit information. Costs associated with the information package will be the responsibility of the developer.

9.1.5 TRANSPORTATION INTERACTIVE DISPLAY

In the past, interactive displays were recommended to be provided within the lobby or elevators of residential and commercial buildings to provide residents and visitors with an array of information including transportation. These could include the expected arrival time for the next bus on each route by using real-time transit data that can be obtained from the Region.

However, given the widespread adoption of smartphones, it is expected that many residents will use transit applications on their phones to obtain live information about bus transit arrival times. Therefore, an interactive display is not recommended as a required TDM measure. However, should the condominium corporation wish to include an interactive display for their use, they can program transportation information on the unit. As such, where possible the developer should include the appropriate electronic connections within the common area (lobby or elevator) where such a display can be installed by the Condominium Corporation.

9.1.6 RIDESHARE SERVICES, HOME-DELIVERY SERVICES, REMOTE WORKING

In recent years, more and more people are shifting to the use of private transportation companies (PTC) such as Uber and Lyft to reach their destinations. Moreover, during the Covid-19 pandemic, there has been a significant increase in reliance on home-delivery services, including food and grocery delivery services. It is anticipated that this type of services will continue to be widely used even after the pandemic. This also apply to remote work, which will likely continue to be a viable option for many people. These types of technological trends and the continued high cost of car ownership will continue to reduce the demand for parking spaces.

9.2 SITE TDM SUMMARY

It is recommended that the owner/developer complete the following as part of a site TDM strategy:

A. Presto Card

- It is recommended that the developer provide all initial occupants with a Presto transit card loaded with a minimum of \$120 (1 card per unit).

B. Bicycle Parking & Facilities

- The development will provide at least 2,629 bicycle parking spaces which meets the City's by-law requirement.
- It is recommended that bicycle repair stations be provided in the bicycle parking areas (one per building) in order to allow residents to do maintenance and minor repairs on their bicycles.

C. Unbundling of Parking Spaces

- Unbundling of residential parking spaces from unit sales should be implemented such that only residents requiring parking spaces purchase them, thus reducing demand.

D. Information Package

- Provide a package of transportation information to new residents at the time of purchase.
- Costs associated with the information package will be the responsibility of the developer.

10 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis contained in this report, our conclusions and recommendations are as follows:

- The proposed development is expected to produce:
 - 2028 a.m. peak hour – 89 inbound and 178 outbound vehicle trips;
 - 2028 p.m. peak hour – 229 inbound and 191 outbound vehicle trips;
 - 2033/2038/2043 a.m. peak hour – 296 inbound and 674 outbound vehicle trips; and
 - 2033/2038/2043 p.m. peak hour – 775 inbound and 627 outbound vehicle trips.
- The trips associated with the proposed development can readily be accommodated by the road network in all four horizons (following the application of a higher PHF at certain constrained intersections) with the following signal timing improvements:
 - In order to accommodate the combination of background traffic growth, lane configuration changes due to the BRT, and the addition of protected left-turn phases, the cycle length should be increased to 130 seconds at all study intersections along Kingston Road during the p.m. peak hour and at the intersections along Kingston Road between Whites Road and Fairport Road during the a.m. peak hour;
 - A northbound left-turn phase should be added during the p.m. peak hour at the intersection of Kingston Road & Walnut Lane;
 - An eastbound right-turn phase (overlapping with the existing northbound left-turn phase) should be added during the p.m. peak hour at the intersection of Kingston Road & Liverpool Road; and
 - Various signal phase splits optimizations should be made throughout the study network.
- The proposed parking supply meet the needs of the development.
- All-way stop control is recommended for four of the internal intersections, as indicated in **Section 8.1**.
- A summary of the development’s recommended TDM strategy is provided in **Section 9.2**.

APPENDIX

A TRAFFIC DATA





INTERSECTION SIGNAL TIMING REPORT

Location	Liverpool Rd (RR 29) and Pickering Pkwy.		
Date	2022-06-24	C&E No.	35081473
Prepared for	BA Consulting	Prepared by	MA

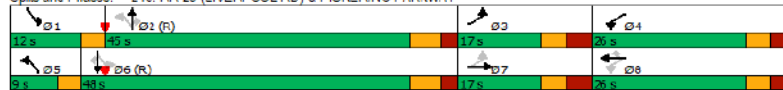
AM Peak 05:30 - 09:00

	1	2	3	4	5	6	7	8
Movement	SBL	NBTL	EBL	WBL	NBL	SBTL	EBTL	WBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	None	C-Max	None	None
Maximum Split (s)	12	45	17	25	9	43	17	26
Maximum Split (%)	12.0%	45.0%	17.0%	26.0%	9.0%	48.0%	17.0%	26.0%
Minimum Split (s)	8	30	15	15	8	30	15	34
Yellow Time (s)	3	4.2	3.3	3.3	3	4.2	3.3	3.3
All-Red Time (s)	0	2.1	3.3	3.3	0	2.1	3.3	3.3
Minimum Initial (s)	5	20	8	8	5	20	8	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		17				17		19
Flash Dont Walk (s)		6				6		8

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 34 (34%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 240: RR 29 (LIVERPOOL RD) & PICKERING PARKWAY



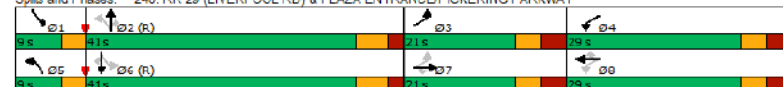
PM Peak 14:30 - 21:00

	1	2	3	4	5	6	7	8
Movement	SBL	NBTL	EBL	WBL	NBL	SBTL	EBTL	WBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	None	C-Max	None	None
Maximum Split (s)	9	41	21	29	9	41	21	29
Maximum Split (%)	9.0%	41.0%	21.0%	29.0%	9.0%	41.0%	21.0%	29.0%
Minimum Split (s)	8	30	15	15	8	30	15	34
Yellow Time (s)	3	4.2	3.3	3.3	3	4.2	3.3	3.3
All-Red Time (s)	0	2.1	3.3	3.3	0	2.1	3.3	3.3
Minimum Initial (s)	5	20	8	8	5	20	8	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		17				17		19
Flash Dont Walk (s)		6				6		8

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 240: RR 29 (LIVERPOOL RD) & PLAZA ENTRANCE/PICKERING PARKWAY



Weekend Peak 08:00 - 21:00

	1	2	3	4	5	6	7	8
Movement	SBL	NBTL	EBL	WBL	NBL	SBTL	EBTL	WBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	None	None	C-Max	None	None
Maximum Split (s)	10	34	21	35	10	34	21	35
Maximum Split (%)	10.0%	34.0%	21.0%	35.0%	10.0%	34.0%	21.0%	35.0%
Minimum Split (s)	8	30	15	15	8	30	15	34
Yellow Time (s)	3	4.2	3.3	3.3	3	4.2	3.3	3.3
All-Red Time (s)	0	2.1	3.3	3.3	0	2.1	3.3	3.3
Minimum Initial (s)	5	20	8	8	5	20	8	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		17				17		19
Flash Dont Walk (s)		6				6		8

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 60 (60%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 240: RR 29 (LIVERPOOL RD) & PLAZA ENT/PICKERING PARKWAY



*Please note Cycle Extension enabled for Phase 4 and Phase 8

*Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.



INTERSECTION SIGNAL TIMING REPORT

Location	Liverpool Rd. (RR29) and Hwy. 401 WB Ramp		
Date	2022-06-27	C&E No.	35081473
Prepared for	BA Consulting	Prepared by	M.A.

AM Peak 05:30 - 09:00



Phase Number	2	6	7	8
Movement	NBTL	SBT	EBL	WBTL
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	C-Max	None	None
Maximum Split (s)	58	58	16	26
Maximum Split (%)	58.0%	58.0%	16.0%	26.0%
Minimum Split (s)	25	25	14	25
Yellow Time (s)	3.3	3.3	3	3.3
All-Red Time (s)	3	3	2.7	2.7
Minimum Initial (s)	15	15	8	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	13	13		14
Flash Dont Walk (s)	5	5		5

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 38 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	

Splits and Phases: 241: RR 29 (LIVERPOOL RD) & PRIVATE ENTRANCE/401 WB RAMP



PM Peak 14:30 - 21:00



Phase Number	2	6	7	8
Movement	NBTL	SBT	EBL	WBTL
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	C-Max	None	None
Maximum Split (s)	58	58	16	26
Maximum Split (%)	58.0%	58.0%	16.0%	26.0%
Minimum Split (s)	25	25	14	25
Yellow Time (s)	3.3	3.3	3	3.3
All-Red Time (s)	3	3	2.7	2.7
Minimum Initial (s)	15	15	8	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	13	13		14
Flash Dont Walk (s)	5	5		5

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	

Splits and Phases: 241: RR 29 (LIVERPOOL RD) & PLAZA ENTRANCE/401 WB RAMP



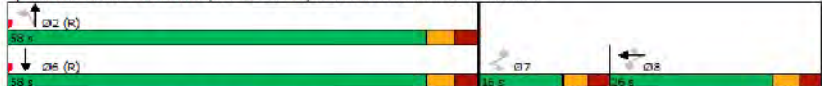
Weekend Peak (8:00 - 19:00)



Phase Number	2	6	7	8
Movement	NBTL	SBT	EBL	WBTL
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	C-Max	None	None
Maximum Split (s)	58	58	16	26
Maximum Split (%)	58.0%	58.0%	16.0%	26.0%
Minimum Split (s)	25	25	14	25
Yellow Time (s)	3.3	3.3	3	3.3
All-Red Time (s)	3	3	2.7	2.7
Minimum Initial (s)	15	15	8	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	13	13		14
Flash Dont Walk (s)	5	5		5

Intersection Summary	
Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 37 (37%), Referenced to phase 2:NBTL and 6:SBT, Start of Green	

Splits and Phases: 241: RR 29 (LIVERPOOL RD) & PRIVATE ENTRANCE/401 WB RAMP



*Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.



INTERSECTION SIGNAL TIMING REPORT

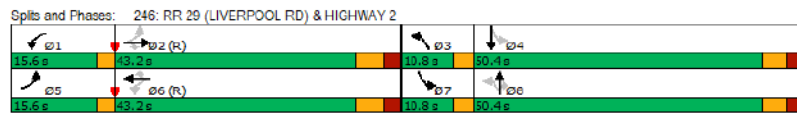
Location	Kingston Rd. (Hwy. 2) and Liverpool Rd. (RR 29)		
Date	2022-06-24	C&E No.	35081473
Prepared for	BA Consulting	Prepared by	M.A.

AM Peak 05:30 - 09:00



Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	Max	None	C-Max	None	Max
Maximum Split (s)	15.6	43.2	10.8	50.4	15.6	43.2	10.8	50.4
Maximum Split (%)	13.0%	36.0%	9.0%	42.0%	13.0%	36.0%	9.0%	42.0%
Minimum Split (s)	8	36	8	41	8	36	8	41
Yellow Time (s)	3	4.3	3	3.8	3	4.3	3	3.8
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		7		7		7		7
Flash Dont Walk (s)		21		27		21		27

Intersection Summary	
Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	95
Offset: 80.4 (87%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

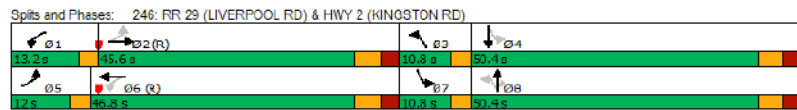


PM Peak 14:30 - 20:00



Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	Max	None	C-Max	None	Max
Maximum Split (s)	13.2	45.6	10.8	50.4	12	46.8	10.8	50.4
Maximum Split (%)	11.0%	38.0%	9.0%	42.0%	10.0%	38.0%	9.0%	42.0%
Minimum Split (s)	8	36	8	41	8	36	8	41
Yellow Time (s)	3	4.3	3	3.8	3	4.3	3	3.8
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		7		7		7		7
Flash Dont Walk (s)		21		27		21		27

Intersection Summary	
Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	105
Offset: 88.4 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

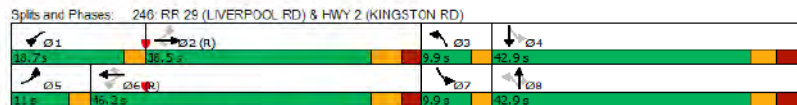


Weekend Peak 08:00 - 21:00



Phase Number	1	2	3	4	5	6	7	8
Movement	WBL	EBTL	NBL	SBTL	EBL	WBTL	SBL	NBTL
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	None	Max	None	C-Max	None	Max
Maximum Split (s)	18.7	38.5	9.9	42.9	11	46.2	9.9	42.9
Maximum Split (%)	17.0%	35.0%	9.0%	39.0%	10.0%	42.0%	9.0%	39.0%
Minimum Split (s)	8	36	8	41	8	36	8	41
Yellow Time (s)	3	4.3	3	3.8	3	4.3	3	3.8
All-Red Time (s)	0	2.8	0	3.2	0	2.8	0	3.2
Minimum Initial (s)	5	20	5	8	5	20	5	8
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		7		7		7		7
Flash Dont Walk (s)		21		27		21		27

Intersection Summary	
Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	105
Offset: 28.6 (26%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	



*Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.

INTERSECTION SIGNAL TIMING REPORT

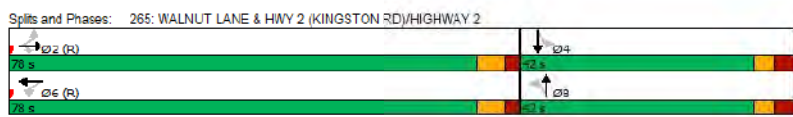
Location: Kingston Rd. and Walnut Ln.
 Date: 2022-06-24 C&E No. 35081473 Prepared by M.A.
 Prepared for BA Consulting

AM Peak 05:30 - 09:00

	2	4	6	8
Phase Number	2	4	6	8
Movement	EBTL	SBTL	WBTL	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	C-Max	None	C-Max	None
Maximum Split (s)	78	42	78	42
Maximum Split (%)	65.0%	35.0%	65.0%	35.0%
Minimum Split (s)	33	36	33	36
Yellow Time (s)	4.4	3.3	4.4	3.3
All-Red Time (s)	2.2	3.2	2.2	3.2
Minimum Initial (s)	20	8	20	8
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	22	19	22

Intersection Summary

Cycle Length: 120
 Control Type: Actuated-Coordinated
 Natural Cycle: 70
 Offset: 116.4 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

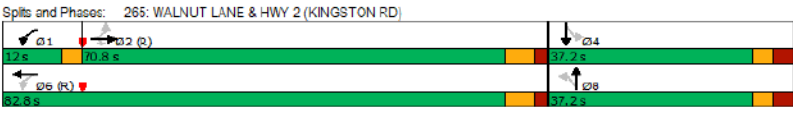


PM Peak 14:30 - 20:00

	1	2	4	6	8
Phase Number	1	2	4	6	8
Movement	WBL	EBTL	SBTL	WBTL	NBTL
Lead/Lag	Lead	Lag			
Lead-Lag Optimize	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None
Maximum Split (s)	12	70.0	37.2	82.0	37.2
Maximum Split (%)	10.0%	59.0%	31.0%	69.0%	31.0%
Minimum Split (s)	8	33	36	33	36
Yellow Time (s)	3	4.4	3.3	4.4	3.3
All-Red Time (s)	0	2.2	3.2	2.2	3.2
Minimum Initial (s)	5	20	8	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	7	7	7	7	7
Flash Dont Walk (s)		19	22	19	22

Intersection Summary

Cycle Length: 120
 Control Type: Actuated-Coordinated
 Natural Cycle: 90
 Offset: 0 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

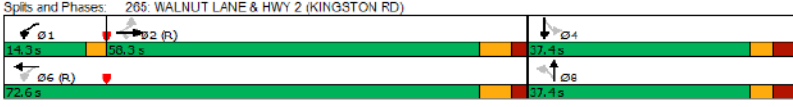


Weekend Peak 08:00 - 21:00

	1	2	4	6	8
Phase Number	1	2	4	6	8
Movement	WBL	EBTL	SBTL	WBTL	NBTL
Lead/Lag	Lead	Lag			
Lead-Lag Optimize	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None
Maximum Split (s)	14.3	58.3	37.4	72.6	37.4
Maximum Split (%)	13.0%	53.0%	34.0%	66.0%	34.0%
Minimum Split (s)	8	33	36	33	36
Yellow Time (s)	3	4.4	3.3	4.4	3.3
All-Red Time (s)	0	2.2	3.2	2.2	3.2
Minimum Initial (s)	5	20	8	20	8
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)	7	7	7	7	7
Flash Dont Walk (s)		19	22	19	22

Intersection Summary

Cycle Length: 110
 Control Type: Actuated-Coordinated
 Natural Cycle: 90
 Offset: 18.7 (17%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green



*Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.



INTERSECTION SIGNAL TIMING REPORT

Location	Kingston Rd. (Hwy 2) and Fairport Rd.		
Date	16-08-23	C&E No.	43688597
Prepared for	WSP		Prepared by
			N. Mimay

AM Peak 05:30-9:00



Phase Number	2	4	5	6
Movement	EBTL	SBL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	70.8	49.2	16.8	54
Maximum Split (%)	59.0%	41.0%	14.0%	45.0%
Minimum Split (s)	33	29	8	33
Yellow Time (s)	4.3	3.3	3	4.3
All-Red Time (s)	2	2.7	0	2
Minimum Initial (s)	20	8	5	20
Vehicle Extension (s)	0.2	3	3	0.2
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	16		19

Intersection Summary	
Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	70
Offset: 60 (50%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	



PM Peak (14:30-20:00)



Phase Number	2	4	5	6
Movement	EBTL	SBL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	75.6	44.4	14.4	61.2
Maximum Split (%)	63.0%	37.0%	12.0%	51.0%
Minimum Split (s)	33	29	8	33
Yellow Time (s)	4.3	3.3	3	4.3
All-Red Time (s)	2	2.7	0	2
Minimum Initial (s)	20	8	5	20
Vehicle Extension (s)	0.2	3	3	0.2
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	16		19

Intersection Summary	
Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	70
Offset: 72 (60%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	

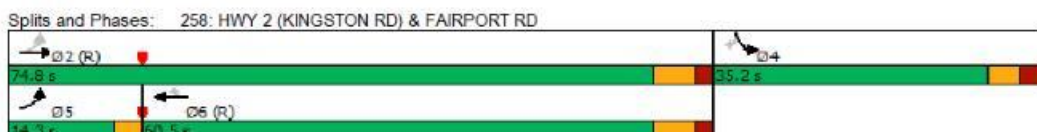


Weekend Peak 8:00-21:00



Phase Number	2	4	5	6
Movement	EBTL	SBL	EBL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize			Yes	Yes
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	74.8	35.2	14.3	60.5
Maximum Split (%)	68.0%	32.0%	13.0%	55.0%
Minimum Split (s)	33	29	8	33
Yellow Time (s)	4.3	3.3	3	4.3
All-Red Time (s)	2	2.7	0	2
Minimum Initial (s)	20	8	5	20
Vehicle Extension (s)	0.2	3	3	0.2
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7	7	7	7
Flash Dont Walk (s)	19	16		19

Intersection Summary	
Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	70
Offset: 71.5 (65%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	



**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*



INTERSECTION SIGNAL TIMING REPORT

Location	Hwy. 2 and Dixie Rd.				
Date	2021-06-08	C&E No.	34466194	Prepared by	C. Maw
Prepared for	WSP Canada Inc.				

AM Peak 05:30 - 09:00

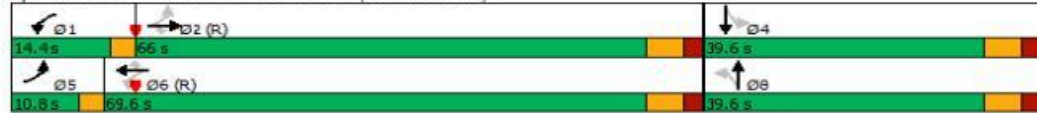


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	14.4	66	39.6	10.8	69.6	39.6
Maximum Split (%)	12.0%	55.0%	33.0%	9.0%	58.0%	33.0%
Minimum Split (s)	8	28	41	8	28	41
Yellow Time (s)	3	4.2	4.4	3	4.2	4.4
All-Red Time (s)	0	2.4	2.7	0	2.4	2.7
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		14	26		14	26

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 112.8 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 245: DIXIE RD & HWY 2 (KINGSTON RD)



PM Peak 14:30 - 20:00

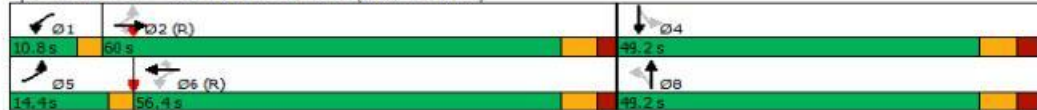


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	10.8	60	49.2	14.4	56.4	49.2
Maximum Split (%)	9.0%	50.0%	41.0%	12.0%	47.0%	41.0%
Minimum Split (s)	8	28	41	8	28	41
Yellow Time (s)	3	4.2	4.4	3	4.2	4.4
All-Red Time (s)	0	2.4	2.7	0	2.4	2.7
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		14	26		14	26

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	100
Offset: 28.8 (24%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 245: DIXIE RD & HWY 2 (KINGSTON RD)



Weekend Peak 08:00 - 21:00

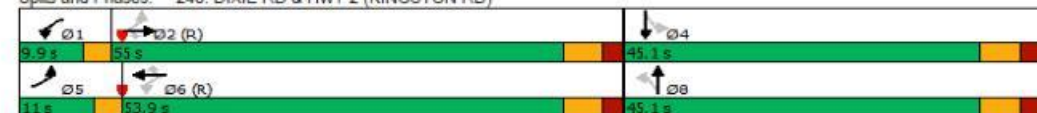


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	9.9	55	45.1	11	53.9	45.1
Maximum Split (%)	9.0%	50.0%	41.0%	10.0%	49.0%	41.0%
Minimum Split (s)	8	28	41	8	28	41
Yellow Time (s)	3	4.2	4.4	3	4.2	4.4
All-Red Time (s)	0	2.4	2.7	0	2.4	2.7
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		14	26		14	26

Intersection Summary

Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 5.5 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 245: DIXIE RD & HWY 2 (KINGSTON RD)



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INTERSECTION SIGNAL TIMING REPORT

Location	Kingston Rd & Delta / Boyer				
Date	31-07-23	C&E No.	43688597	Prepared by	N. Mimay
Prepared for	WSP				

AM Peak 05:30 - 09:00



Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	8.4	73.2	38.4	14.4	67.2	38.4
Maximum Split (%)	7.0%	61.0%	32.0%	12.0%	56.0%	32.0%
Minimum Split (s)	8	32	38	8	32	38
Yellow Time (s)	3	4.7	3.8	3	4.7	3.8
All-Red Time (s)	0	2.2	2.8	0	2.2	2.8
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	0.2	3	3	0.2	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		18	24		18	24

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 105.6 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 254: BOYER PLAZA/DELTA BV & HWY 2 (KINGSTON RD)



PM Peak (14:30-20:00)

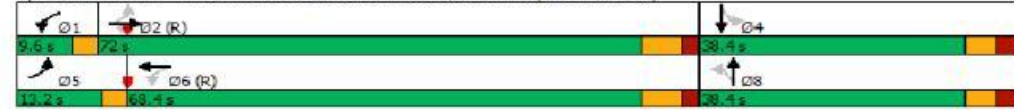


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	9.6	72	38.4	13.2	68.4	38.4
Maximum Split (%)	8.0%	60.0%	32.0%	11.0%	57.0%	32.0%
Minimum Split (s)	8	32	38	8	32	38
Yellow Time (s)	3	4.7	3.8	3	4.7	3.8
All-Red Time (s)	0	2.2	2.8	0	2.2	2.8
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	0.2	3	3	0.2	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		18	24		18	24

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 111.6 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 254: BOYER ENTRANCE/DELTA BV & HWY 2 (KINGSTON RD)



Weekend Peak (8:00-21:00)

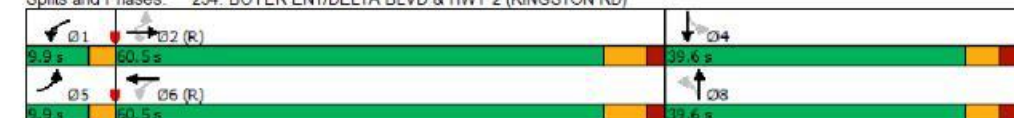


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes		Yes	Yes	
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	9.9	60.5	39.6	9.9	60.5	39.6
Maximum Split (%)	9.0%	55.0%	36.0%	9.0%	55.0%	36.0%
Minimum Split (s)	8	32	38	8	32	38
Yellow Time (s)	3	4.7	3.8	3	4.7	3.8
All-Red Time (s)	0	2.2	2.8	0	2.2	2.8
Minimum Initial (s)	5	20	8	5	20	8
Vehicle Extension (s)	3	0.2	3	3	0.2	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		18	24		18	24

Intersection Summary

Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	80
Offset: 103.4 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green	

Splits and Phases: 254: BOYER ENT/DELTA BLVD & HWY 2 (KINGSTON RD)



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INTERSECTION SIGNAL TIMING REPORT

Location	Kingston Rd & Hwy 401 Ramp (E of Whites Rd.)		
Date	24-05-23	C&E No.	43688597
Prepared for	WSP	Prepared by	N. Mimay

AM Peak 05:30 - 09:00



Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	None	C-Max	C-Max	None
Maximum Split (s)	25.2	52.8	78	42
Maximum Split (%)	21.0%	44.0%	65.0%	35.0%
Minimum Split (s)	8	50	50	32
Yellow Time (s)	3	4.2	4.2	3.7
All-Red Time (s)	0	3	3	1.7
Minimum Initial (s)	5	20	20	8
Vehicle Extension (s)	3	0.2	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7	7	7
Flash Dont Walk (s)		35	35	19

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	100
Offset: 96 (80%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	

Splits and Phases: 256: 401 WB RAMP & HWY 2 (KINGSTON RD)



PM Peak (14:30-20:00)

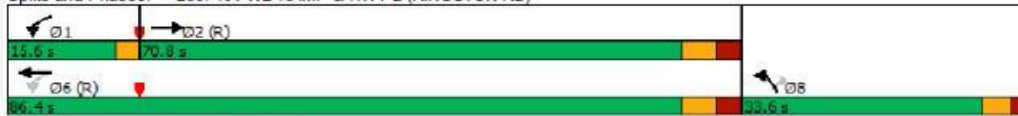


Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	None	C-Max	C-Max	None
Maximum Split (s)	15.6	70.8	86.4	33.6
Maximum Split (%)	13.0%	59.0%	72.0%	28.0%
Minimum Split (s)	8	50	50	32
Yellow Time (s)	3	4.2	4.2	3.7
All-Red Time (s)	0	3	3	1.7
Minimum Initial (s)	5	20	20	8
Vehicle Extension (s)	3	0.2	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7	7	7
Flash Dont Walk (s)		35	35	19

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 8.4 (7%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	

Splits and Phases: 256: 401 WB RAMP & HWY 2 (KINGSTON RD)



Weekend Peak 8:00-21:00

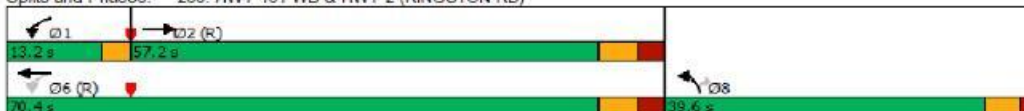


Phase Number	1	2	6	8
Movement	WBL	EBT	WBTL	NBL
Lead/Lag	Lead	Lag		
Lead-Lag Optimize	Yes	Yes		
Recall Mode	None	C-Max	C-Max	None
Maximum Split (s)	13.2	57.2	70.4	39.6
Maximum Split (%)	12.0%	52.0%	64.0%	36.0%
Minimum Split (s)	8	50	50	32
Yellow Time (s)	3	4.2	4.2	3.7
All-Red Time (s)	0	3	3	1.7
Minimum Initial (s)	5	20	20	8
Vehicle Extension (s)	3	0.2	0.2	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7	7	7
Flash Dont Walk (s)		35	35	19

Intersection Summary

Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 20 (18%), Referenced to phase 2:EBT and 6:WBTL, Start of Green	

Splits and Phases: 256: HWY 401 WB & HWY 2 (KINGSTON RD)



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INTERSECTION SIGNAL TIMING REPORT

Location	Whites Rd. (RR 38) and Hwy. 401 EB Off-Ramp		
Date	31-07-23	C&E No.	43688597
Prepared for	WSP		Prepared by N. Mimay

AM Peak 06:15 - 9:15



Phase Number	2	4	6
Movement	NBT	EBL	SBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	C-Max	None	C-Max
Maximum Split (s)	63.8	46.2	63.8
Maximum Split (%)	58.0%	42.0%	58.0%
Minimum Split (s)	28	29	28
Yellow Time (s)	4.5	3.7	4.5
All-Red Time (s)	2.2	1.8	2.2
Minimum Initial (s)	20	8	20
Vehicle Extension (s)	0.2	3	0.2
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	7	7	7
Flash Dont Walk (s)	14	16	14

Intersection Summary

Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 251: RR 38 (WHITES ROAD) & 401 EB RAMP



PM Peak (14:30-19:00)



Phase Number	2	4	6
Movement	NBT	EBL	SBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	C-Max	None	C-Max
Maximum Split (s)	44	56	44
Maximum Split (%)	44.0%	56.0%	44.0%
Minimum Split (s)	28	29	28
Yellow Time (s)	4.5	3.7	4.5
All-Red Time (s)	2.2	1.8	2.2
Minimum Initial (s)	20	8	20
Vehicle Extension (s)	0.2	3	0.2
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	7	7	7
Flash Dont Walk (s)	14	16	14

Intersection Summary

Cycle Length	100
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 251: RR 38 (WHITES ROAD)/RR 38 (WHITES RD) & 401 EB RAMP



Weekend Peak (8:00-21:00)



Phase Number	2	4	6
Movement	NBT	EBL	SBT
Lead/Lag			
Lead-Lag Optimize			
Recall Mode	C-Max	None	C-Max
Maximum Split (s)	49.5	60.5	49.5
Maximum Split (%)	45.0%	55.0%	45.0%
Minimum Split (s)	28	29	28
Yellow Time (s)	4.5	3.7	4.5
All-Red Time (s)	2.2	1.8	2.2
Minimum Initial (s)	20	8	20
Vehicle Extension (s)	0.2	3	0.2
Minimum Gap (s)	3	3	3
Time Before Reduce (s)	0	0	0
Time To Reduce (s)	0	0	0
Walk Time (s)	7	7	7
Flash Dont Walk (s)	14	16	14

Intersection Summary

Cycle Length	110
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 24.2 (22%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 251: RR 38 (WHITES RD) & HWY 401 EB RAMP

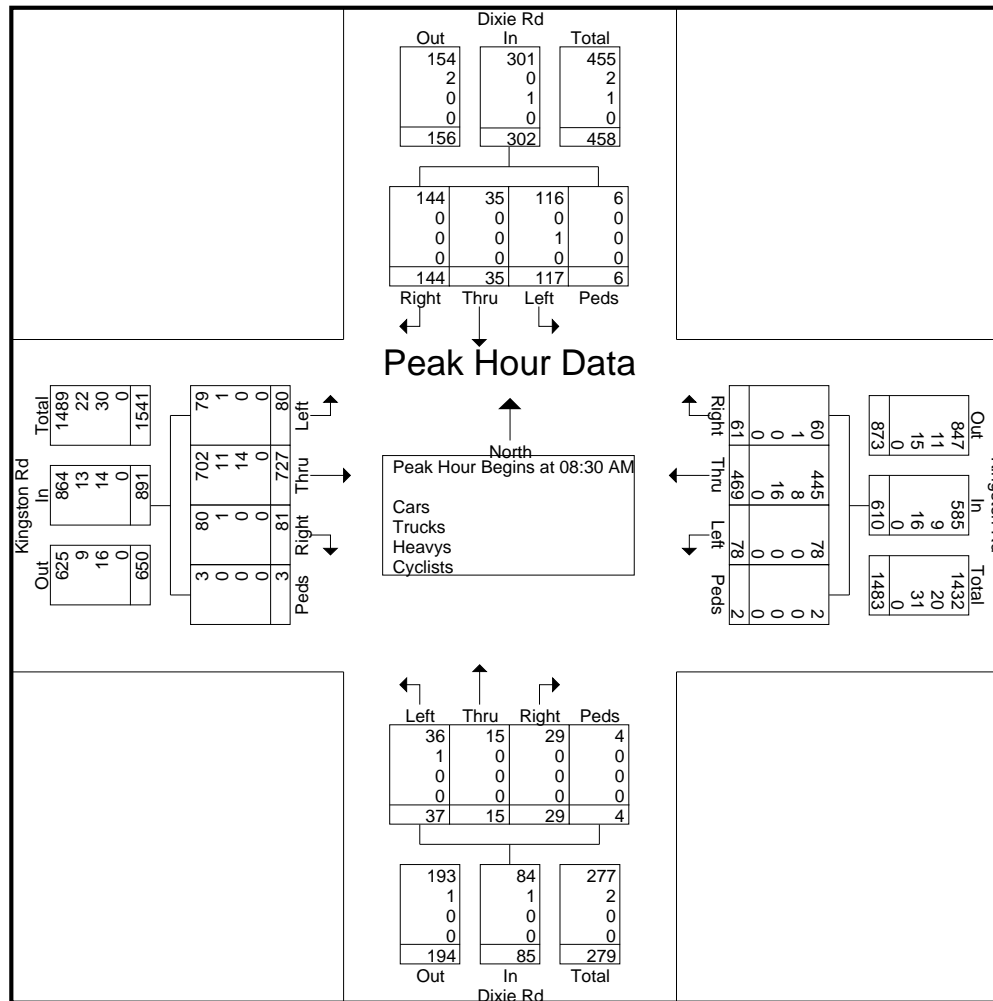


**Please note a concerted effort has been made to ensure the accuracy and completeness of the data provided, however, inadvertent errors or omissions can still occur. Please bring any errors or omissions to the Region's attention.*

Horizon Data Services Ltd

Email: nhyree@gmail.com
 Phone: (416) 840-6619 Fax: (416) 840-5297
"Your Traffic Count Specialist"

File Name : Kingston Road at Dixie Road
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 5

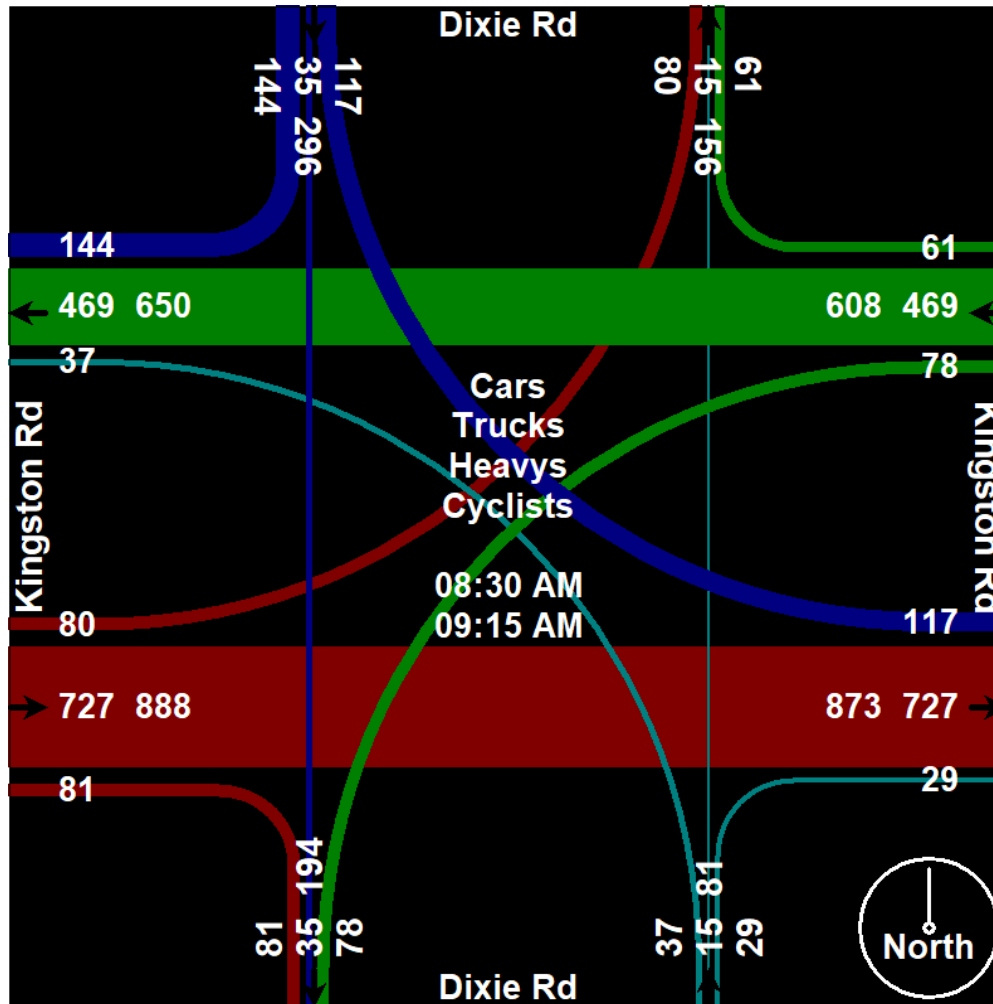


Horizon Data Services Ltd

Email: nhyree@gmail.com
Phone: (416) 840-6619 Fax: (416) 840-5297

"Your Traffic Count Specialist"

File Name : Kingston Road at Dixie Road
Site Code : 00000000
Start Date : 01/10/2023
Page No : 6



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Email: nhyree@gmail.com
 Phone: (416) 840-6619 Fax: (416) 840-5297
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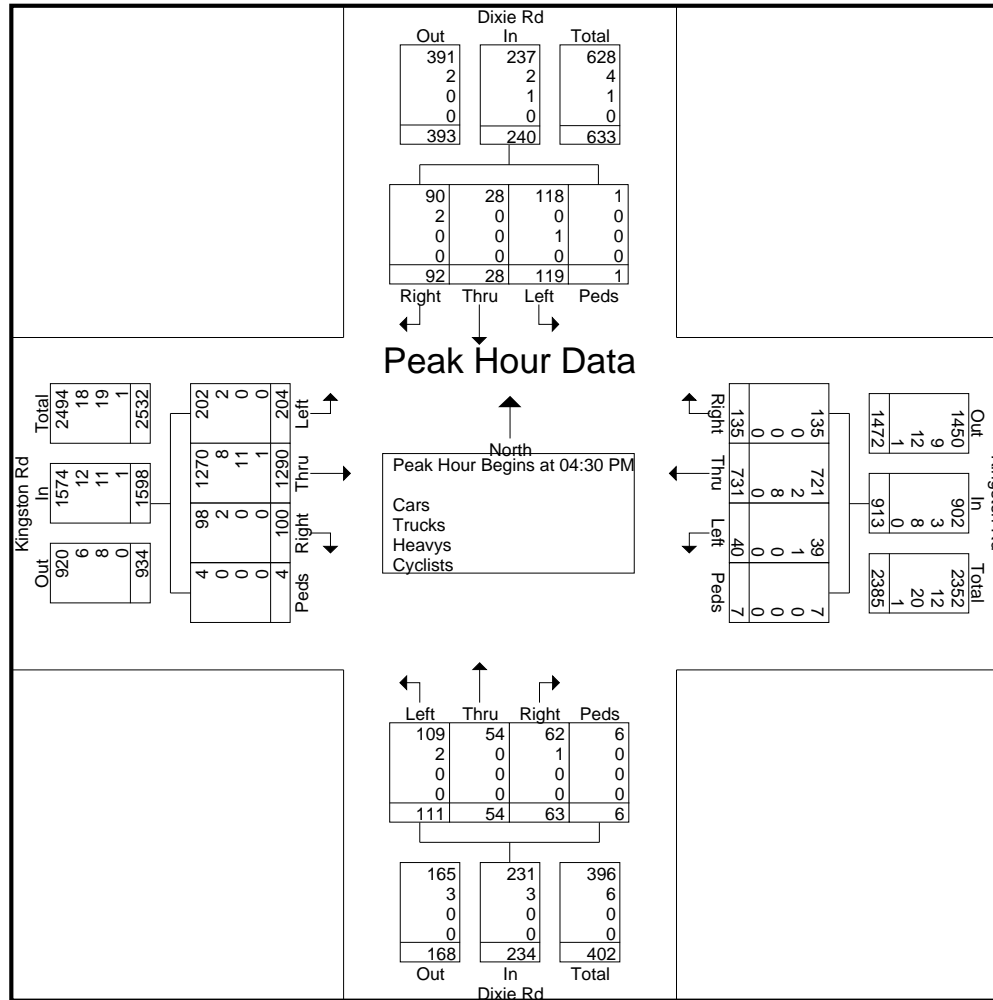
File Name : Kingston Road at Dixie Road
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 7

Start Time	Dixie Rd From North					Kingston Rd From East					Dixie Rd From South					Kingston Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	33	4	34	0	71	34	181	10	3	228	15	12	31	5	63	25	349	52	1	427	789
04:45 PM	16	12	25	1	54	32	184	10	1	227	24	9	24	0	57	22	338	46	1	407	745
05:00 PM	20	6	29	0	55	36	177	11	2	226	15	18	27	1	61	32	317	55	2	406	748
05:15 PM	23	6	31	0	60	33	189	9	1	232	9	15	29	0	53	21	286	51	0	358	703
Total Volume	92	28	119	1	240	135	731	40	7	913	63	54	111	6	234	100	1290	204	4	1598	2985
% App. Total	38.3	11.7	49.6	0.4		14.8	80.1	4.4	0.8		26.9	23.1	47.4	2.6		6.3	80.7	12.8	0.3		
PHF	.697	.583	.875	.250	.845	.938	.967	.909	.583	.984	.656	.750	.895	.300	.929	.781	.924	.927	.500	.936	.946
Cars	90	28	118	1	237	135	721	39	7	902	62	54	109	6	231	98	1270	202	4	1574	2944
% Cars	97.8	100	99.2	100	98.8	100	98.6	97.5	100	98.8	98.4	100	98.2	100	98.7	98.0	98.4	99.0	100	98.5	98.6
Trucks	2	0	0	0	2	0	2	1	0	3	1	0	2	0	3	2	8	2	0	12	20
% Trucks	2.2	0	0	0	0.8	0	0.3	2.5	0	0.3	1.6	0	1.8	0	1.3	2.0	0.6	1.0	0	0.8	0.7
Heavyvs	0	0	1	0	1	0	8	0	0	8	0	0	0	0	0	0	11	0	0	11	20
% Heavyvs	0	0	0.8	0	0.4	0	1.1	0	0	0.9	0	0	0	0	0	0	0.9	0	0	0.7	0.7
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.0

Horizon Data Services Ltd

Email: nhyree@gmail.com
 Phone: (416) 840-6619 Fax: (416) 840-5297
"Your Traffic Count Specialist"

File Name : Kingston Road at Dixie Road
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 8

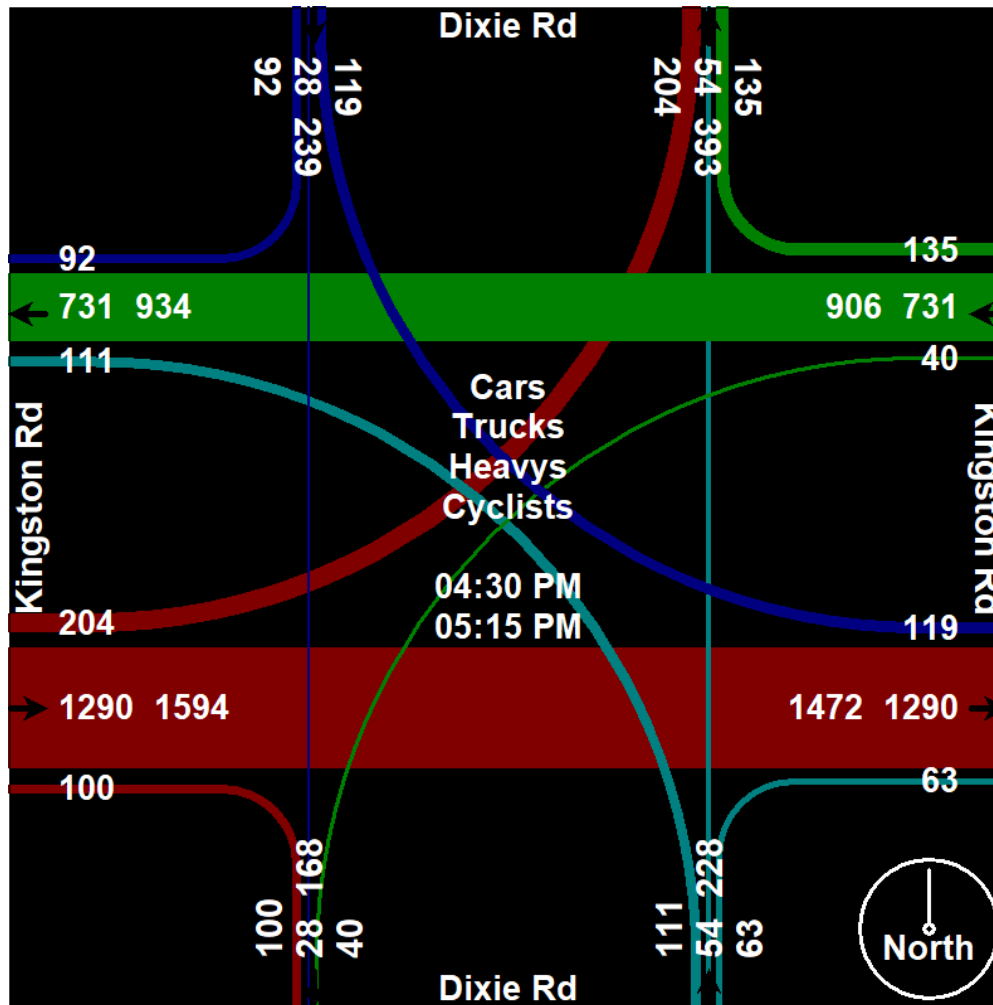


Horizon Data Services Ltd

Email: nhyree@gmail.com
Phone: (416) 840-6619 Fax: (416) 840-5297

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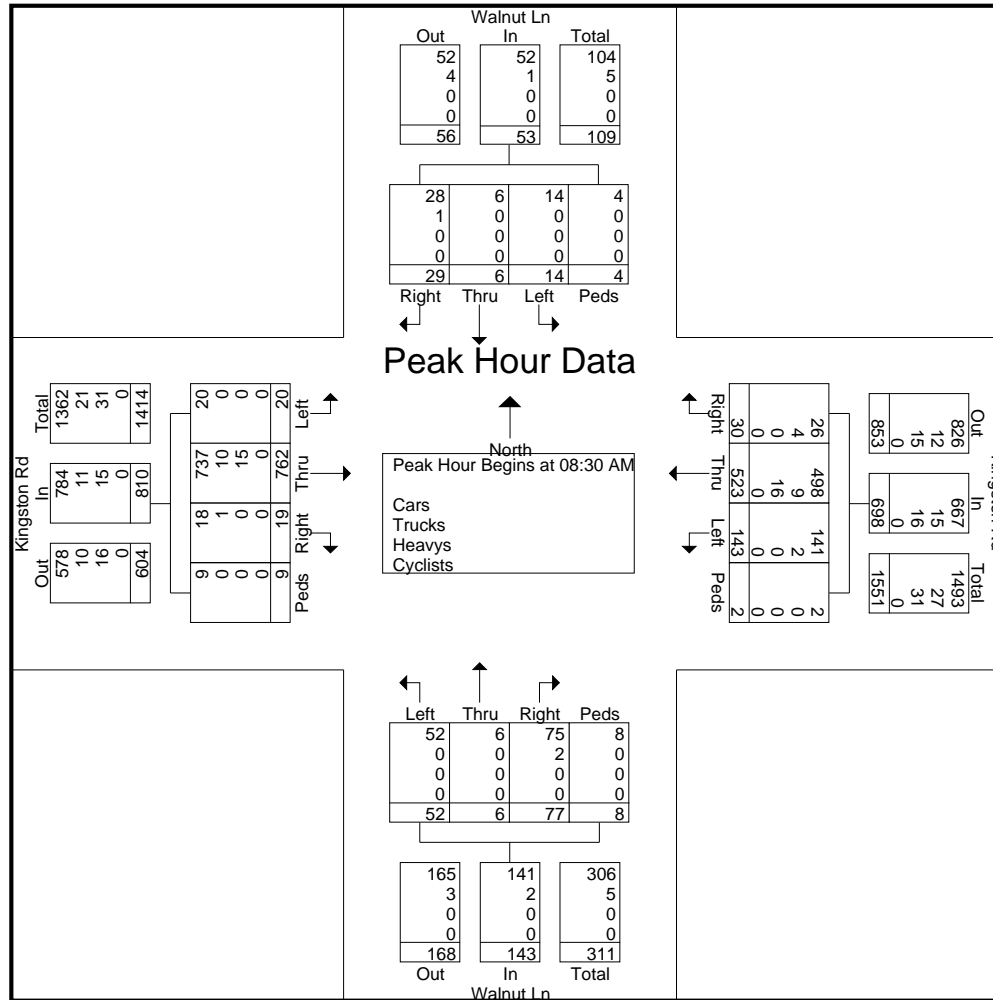
File Name : Kingston Road at Dixie Road
Site Code : 00000000
Start Date : 01/10/2023
Page No : 9



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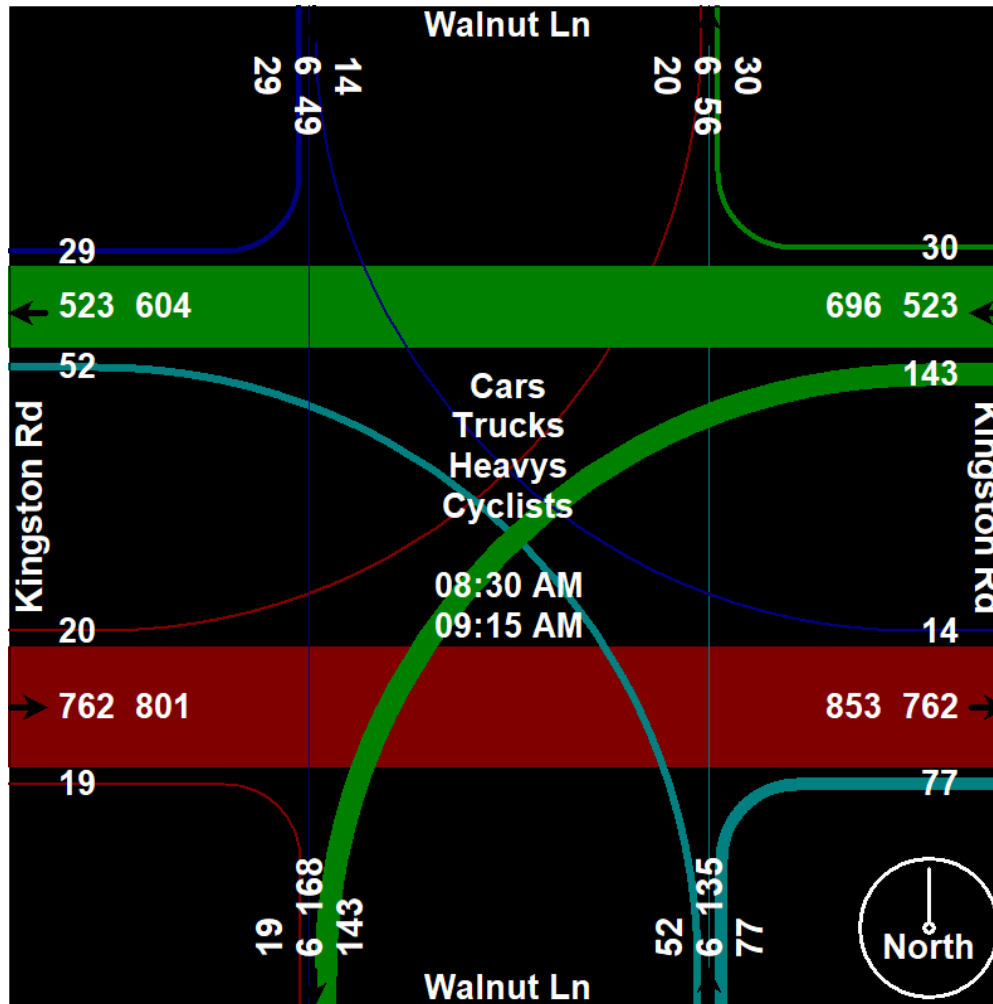
File Name : Kingston Road at Walnut Lane
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 5



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Email: nhyree@gmail.com
Phone: (416) 840-6619 Fax: (416) 840-5297
"Your Traffic Count Specialist"

File Name : Kingston Road at Walnut Lane
Site Code : 00000000
Start Date : 01/10/2023
Page No : 6



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Email: nhyree@gmail.com
 Phone: (416) 840-6619 Fax: (416) 840-5297
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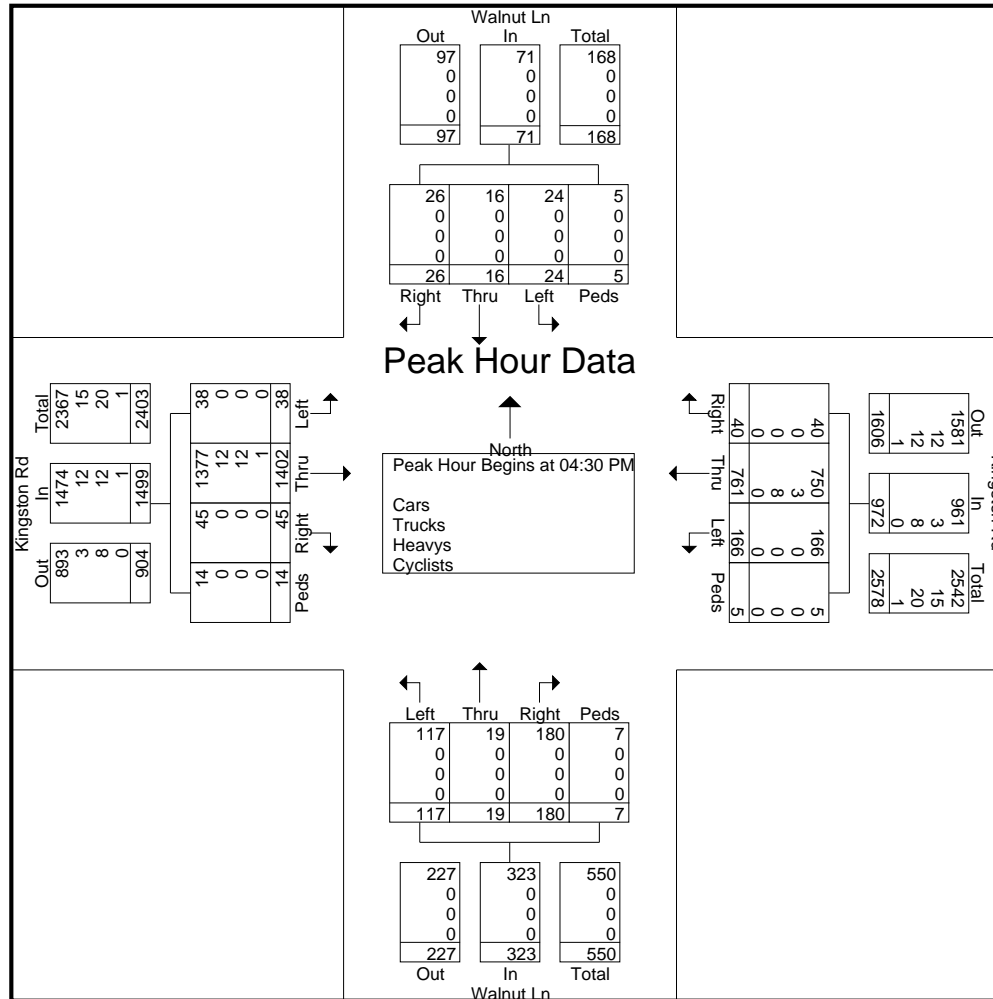
File Name : Kingston Road at Walnut Lane
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 7

Start Time	Walnut Ln From North					Kingston Rd From East					Walnut Ln From South					Kingston Rd From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	9	4	3	2	18	5	189	34	1	229	41	10	27	2	80	11	372	8	2	393	720
04:45 PM	7	5	10	0	22	14	187	42	2	245	38	7	35	3	83	15	363	8	5	391	741
05:00 PM	3	6	4	1	14	12	192	44	1	249	56	0	22	0	78	10	356	15	5	386	727
05:15 PM	7	1	7	2	17	9	193	46	1	249	45	2	33	2	82	9	311	7	2	329	677
Total Volume	26	16	24	5	71	40	761	166	5	972	180	19	117	7	323	45	1402	38	14	1499	2865
% App. Total	36.6	22.5	33.8	7		4.1	78.3	17.1	0.5		55.7	5.9	36.2	2.2		3	93.5	2.5	0.9		
PHF	.722	.667	.600	.625	.807	.714	.986	.902	.625	.976	.804	.475	.836	.583	.973	.750	.942	.633	.700	.954	.967
Cars	26	16	24	5	71	40	750	166	5	961	180	19	117	7	323	45	1377	38	14	1474	2829
% Cars	100	100	100	100	100	100	98.6	100	100	98.9	100	100	100	100	100	100	98.2	100	100	98.3	98.7
Trucks	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	12	0	0	12	15
% Trucks	0	0	0	0	0	0	0.4	0	0	0.3	0	0	0	0	0	0	0.9	0	0	0.8	0.5
Heavyvs	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	0	12	0	0	12	20
% Heavyvs	0	0	0	0	0	0	1.1	0	0	0.8	0	0	0	0	0	0	0.9	0	0	0.8	0.7
Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Cyclists	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0.0

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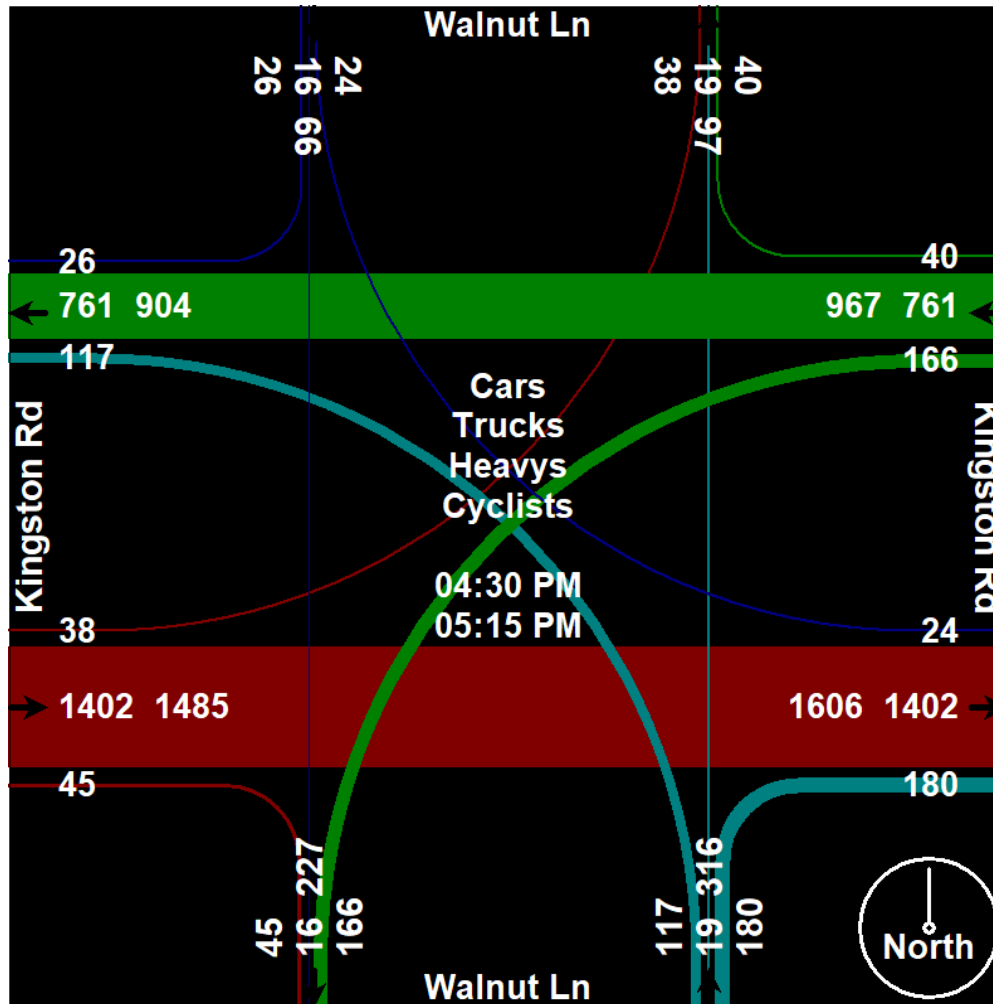
File Name : Kingston Road at Walnut Lane
 Site Code : 00000000
 Start Date : 01/10/2023
 Page No : 8

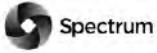


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File Name : Kingston Road at Walnut Lane
Site Code : 00000000
Start Date : 01/10/2023
Page No : 9





Turning Movement Count
 Location Name: LIVERPOOL RD & HWY 401 WB RAMPS
 Date: Wed, Jun 08, 2022 Deployment Lead: Tasos Issaakidis

BA Group
 300 45 ST. CLAIR AVE W
 TORONTO ONTARIO, M4V 1K9
 CANADA

Turning Movement Count (5 - LIVERPOOL RD & HWY 401 WB RAMPS)

Start Time	N Approach LIVERPOOL RD						E Approach WB 401 OFF RAMP						S Approach LIVERPOOL RD						W Approach WESTSIDE DRIVEWAY						SE Approach HWY 401 WB ON RAMP (NB LIVERPOOL)			SW Approach HWT 401 WB ON RAMP			Int. Total (15 min)	Int. Total (1 hr)				
	Right N/W	Bar Right N/SW	Thru N/S	UTurn N/N	Peds N:	Approach Total	Right E/N	Thru E/W	Bar Left E/SW	Left E/S	UTurn E/E	Peds E:	Approach Total	Right S/E	Thru S/N	Left S/W	Hard Left S/SW	UTurn S/S	Peds S:	Approach Total	Hard Right W/SW	Right W/S	Left W/N	UTurn W/W	Peds W:	Approach Total	UTurn SE/SE	Peds SE:	Approach Total	UTurn SWSW			Peds SW:	Approach Total		
07:30:00	0	106	83	0	0	189	39	0	0	43	0	3	82	91	95	1	0	1	0	188	2	1	3	0	2	6	0	3	0	0	0	0	465			
07:45:00	0	119	154	0	0	273	66	0	0	53	0	2	119	80	99	2	0	0	0	181	1	2	2	0	1	5	0	2	0	0	0	1	0	578		
08:00:00	0	93	140	0	0	233	71	0	0	50	0	4	121	77	138	2	0	0	0	217	0	0	2	0	1	2	0	4	0	0	0	0	573			
08:15:00	0	89	151	0	0	240	86	0	0	43	0	3	129	86	168	3	1	0	0	258	0	1	1	0	1	2	0	3	0	0	0	0	629	2245		
08:30:00	0	81	138	0	0	219	74	0	1	43	0	6	118	80	157	2	0	2	0	241	0	1	1	0	1	2	0	6	0	0	1	0	580	2360		
08:45:00	0	72	151	0	0	223	107	2	0	52	0	1	161	74	167	1	0	0	0	242	1	0	2	0	4	3	0	1	0	0	4	0	629	2411		
09:00:00	1	91	121	0	0	213	89	1	0	53	0	2	143	58	137	2	0	1	0	198	2	4	4	0	1	10	0	2	0	0	1	0	564	2402		
09:15:00	0	82	125	0	0	207	84	0	0	40	0	1	124	67	145	2	0	0	0	214	1	2	4	0	2	7	0	1	0	0	0	5	552	2325		
BREAK																																				
16:00:00	0	109	189	0	0	298	86	2	2	49	0	2	139	103	210	4	0	1	0	318	2	1	12	0	3	15	0	2	0	0	4	0	770			
16:15:00	2	116	196	0	0	314	98	5	0	63	0	7	166	132	221	5	0	0	0	358	8	5	8	0	5	19	0	7	0	0	5	0	857			
16:30:00	0	130	195	0	1	325	92	2	1	47	0	4	142	133	224	8	0	0	0	365	3	5	8	0	4	16	0	4	0	0	5	0	848			
16:45:00	0	102	193	0	0	295	99	1	0	52	0	3	152	113	268	6	0	0	0	387	2	1	7	0	4	10	0	3	0	0	7	0	844	3319		
17:00:00	0	120	212	0	0	332	107	2	0	76	0	4	185	105	258	3	0	0	0	366	5	7	8	0	5	20	0	4	0	0	6	0	903	3462		
17:15:00	1	105	233	0	0	339	106	2	3	85	0	7	196	125	278	8	0	0	0	411	4	3	11	0	6	18	0	8	0	0	6	0	964	3559		
17:30:00	1	102	249	0	0	352	93	3	0	65	0	1	161	86	251	8	0	0	0	345	4	5	10	0	2	19	0	1	0	0	2	0	877	3588		
17:45:00	0	103	227	0	0	330	92	3	0	60	0	4	155	70	251	4	0	0	0	325	2	2	14	0	6	18	0	4	0	0	8	0	828	3572		
Grand Total	5	1620	2757	0	1	4382	1389	23	7	874	0	54	2293	1480	3067	61	1	5	0	4614	35	40	97	0	48	172	0	55	0	0	55	0	11461	-		
Approach%	0.1%	37%	62.9%	0%	-	-	60.6%	1%	0.3%	38.1%	0%	-	-	32.1%	66.9%	1.3%	0%	0.1%	-	20.3%	23.3%	56.4%	0%	-	-	0%	-	-	-	-	-	-				
Totals %	0%	14.1%	24.1%	0%	38.2%	12.1%	0.2%	0.1%	7.6%	0%	20%	12.9%	26.8%	0.5%	0%	0%	40.3%	0.3%	0.3%	0.8%	0%	1.5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Heavy	0	23	62	0	-	-	19	1	1	8	0	-	-	81	66	3	0	0	-	2	2	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0
Heavy %	0%	1.4%	2.2%	0%	-	-	1.4%	4.3%	14.3%	0.9%	0%	-	-	5.5%	2.2%	4.9%	0%	0%	-	5.7%	5%	0%	0%	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bicycles	0	1	4	0	-	-	0	0	0	0	0	-	-	1	13	0	0	0	-	0	0	0	0	-	-	0	0	0	0	0	0	0	0	0	0	0
Blcyde %	0%	0.1%	0.1%	0%	-	-	0%	0%	0%	0%	0%	-	-	0.1%	0.4%	0%	0%	0%	-	0%	0%	0%	0%	-	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

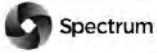


Turning Movement Count
 Location Name: LIVERPOOL RD & HWY 401 WB RAMP
 Date: Wed, Jun 08, 2022 Deployment Lead: Tasos Issaakidis

BA Group
 300 45 ST. CLAIR AVE W
 TORONTO ONTARIO, M4V 1K9
 CANADA

Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (15.24 °C)

Start Time	N Approach LIVERPOOL RD						E Approach WB 401 OFF RAMP						S Approach LIVERPOOL RD						W Approach WESTSIDE DRIVEWAY						SE Approach HWY 401 WB ON RAMP (NB LIVERPOOL)			SW Approach HWT 401 WB ON RAMP			Int. Total (15 min)								
	Right	Bear Right	Thru	UTurn	Peds	Approach Total	Right	Thru	Bear Left	Left	UTurn	Peds	Approach Total	Right	Thru	Left	Hard Left	UTurn	Peds	Approach Total	Hard Right	Right	Left	UTurn	Peds	Approach Total	UTurn	Peds	Approach Total	UTurn		Peds	Approach Total						
08:00:00	0	93	140	0	0	233	71	0	0	50	0	4	121	77	138	2	0	0	0	217	0	0	2	0	1	2	0	4	0	0	0	4	0	0	0	0	0	0	573
08:15:00	0	89	151	0	0	240	86	0	0	43	0	3	129	86	168	3	1	0	0	258	0	1	1	0	1	2	0	3	0	0	0	3	0	0	0	0	0	0	629
08:30:00	0	81	138	0	0	219	74	0	1	43	0	6	118	80	157	2	0	2	0	241	0	1	1	0	1	2	0	6	0	0	0	6	0	1	0	0	0	1	590
08:45:00	0	72	151	0	0	223	107	2	0	52	0	1	161	74	167	1	0	0	0	242	1	0	2	0	4	3	0	1	0	0	0	1	0	4	0	0	0	4	629
Grand Total	0	335	500	0	0	915	338	2	1	188	0	14	529	317	630	8	1	2	0	958	1	2	6	0	7	9	0	14	0	0	0	14	0	5	0	0	0	5	2411
Approach%	0%	36.8%	63.4%	0%	0%	-	63.9%	0.4%	0.2%	35.5%	0%	-	33.1%	65.8%	0.8%	0.1%	0.2%	-	11.1%	22.2%	66.7%	0%	-	0%	-	0%	-	0%	-	0%	-	-	-						
Totals %	0%	13.9%	24.1%	0%	0%	38%	14%	0.1%	0%	7.8%	0%	21.9%	13.1%	26.1%	0.3%	0%	0.1%	39.7%	0%	0.1%	0.2%	0%	0.4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
PHF	0	0.9	0.96	0	0	0.95	0.79	0.25	0.25	0.9	0	0.82	0.92	0.94	0.67	0.25	0.25	0.93	0.25	0.5	0.75	0	0.75	0	0	0	0	0	0	0	0	0	0						
Heavy	0	6	19	0	0	25	9	0	0	2	0	11	19	19	2	0	0	40	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0						
Heavy %	0%	1.8%	3.3%	0%	0%	2.7%	2.7%	0%	0%	1.1%	0%	2.1%	6%	3%	25%	0%	0%	4.2%	0%	50%	0%	0%	0%	11.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
Lights	0	329	561	0	0	890	329	2	1	188	0	518	298	611	6	1	2	918	1	1	6	0	0	8	0	0	0	0	0	0	0	0	0						
Lights %	0%	98.2%	96.7%	0%	0%	97.3%	97.3%	100%	100%	98.9%	0%	97.9%	94%	97%	75%	100%	100%	95.8%	100%	50%	100%	0%	0%	88.9%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
Single-Unit Trucks	0	5	6	0	0	11	4	0	0	1	0	5	10	7	1	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Single-Unit Trucks %	0%	1.5%	1%	0%	0%	1.2%	1.2%	0%	0%	0.5%	0%	0.9%	3.2%	1.1%	12.8%	0%	0%	1.9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
Buses	0	0	13	0	0	13	2	0	0	1	0	3	1	11	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
Buses %	0%	0%	2.2%	0%	0%	1.4%	0.6%	0%	0%	0.5%	0%	0.6%	0.3%	1.7%	0%	0%	0%	1.3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
Articulated Trucks	0	1	0	0	0	1	3	0	0	0	0	3	8	1	1	0	0	10	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0						
Articulated Trucks %	0%	0.3%	0%	0%	0%	0.1%	0.9%	0%	0%	0%	0%	0.6%	2.5%	0.2%	12.9%	0%	0%	1%	0%	50%	0%	0%	0%	11.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%						
Pedestrians	-	-	-	-	0	-	-	-	-	-	10	-	-	-	-	-	-	0	-	-	-	-	7	-	-	-	11	-	-	5	-	-	-						
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	25%	-	-	-	-	-	-	0%	-	-	-	-	17.5%	-	-	-	27.5%	-	-	12.5%	-	-	-						
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	-	0	-	-	-	-	0	-	-	-	3	-	-	0	-	-	-						
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	-	10%	-	-	-	-	-	-	0%	-	-	-	-	0%	-	-	-	7.5%	-	-	0%	-	-	-						
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	4	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0						
Bicycles on Road%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	-	0%	-	-	-	-	0%	-	-	-	0%	-	-	0%	-	-	-						



Turning Movement Count
 Location Name: LIVERPOOL RD & HWY 401 WB RAMPS
 Date: Wed, Jun 08, 2022 Deployment Lead: Tasos Issaakidis

BA Group
 300 45 ST. CLAIR AVE W
 TORONTO ONTARIO, M4V 1K9
 CANADA

Peak Hour: 04:45 PM - 05:45 PM Weather: Broken Clouds (22.35 °C)

Start Time	N Approach LIVERPOOL RD					E Approach WB 401 OFF RAMP					S Approach LIVERPOOL RD					W Approach WESTSIDE DRIVEWAY					SE Approach HWY 401 WB ON RAMP (NB LIVERPOOL)			SW Approach HWT 401 WB ON RAMP			Int. Total (15 min)						
	Right	Bear Right	Thru	UTurn	Peds	Approach Total	Right	Thru	Bear Left	Left	UTurn	Peds	Approach Total	Right	Thru	Left	Hard Left	UTurn	Peds	Approach Total	Hard Right	Right	Left	UTurn	Peds	Approach Total		UTurn	Peds	Approach Total	UTurn	Peds	Approach Total
16:45:00	0	102	193	0	0	295	99	1	0	52	0	3	152	113	268	6	0	0	0	387	2	1	7	0	4	10	0	3	0	0	0	0	844
17:00:00	0	120	212	0	0	332	107	2	0	76	0	4	185	105	298	3	0	0	0	366	5	7	8	0	5	20	0	4	0	0	0	903	
17:15:00	1	105	233	0	0	339	106	2	3	85	0	7	196	125	278	8	0	0	0	411	4	3	11	0	6	18	0	8	0	0	0	964	
17:30:00	1	102	249	0	0	352	93	3	0	65	0	1	161	86	251	8	0	0	0	345	4	5	10	0	2	19	0	1	0	0	0	877	
Grand Total	2	429	887	0	0	1318	405	8	3	278	0	15	694	429	1055	25	0	0	0	1509	15	16	36	0	17	67	0	16	0	0	0	3586	
Approach%	0.2%	32.5%	67.3%	0%	-	-	56.4%	1.2%	0.4%	40.1%	0%	-	-	28.4%	89.9%	1.7%	0%	0%	-	22.4%	23.9%	53.7%	0%	-	0%	-	0%	-	-	-	-		
Totals %	0.1%	12%	24.7%	0%	36.7%	11.3%	0.2%	0.1%	7.7%	0%	19.3%	12%	29.4%	0.7%	0%	0%	0%	0%	42.1%	0.4%	0.4%	1%	0%	1.9%	0%	0%	0%	0%	0%	0%	-		
PHF	0.5	0.89	0.89	0	0.94	0.95	0.67	0.25	0.82	0	0.89	0.86	0.95	0.78	0	0	0	0	0.92	0.75	0.57	0.82	0	0.84	0	0	0	0	0	0	0		
Heavy	0	7	10	0	17	4	0	0	0	0	4	14	9	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	-	
Heavy %	0%	1.6%	1.1%	0%	1.3%	1%	0%	0%	0%	0%	0.6%	3.3%	0.9%	0%	0%	0%	0%	0%	1.5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	
Lights	2	422	877	0	1301	401	8	3	278	0	690	415	1046	25	0	0	0	0	1486	15	16	36	0	67	0	0	0	0	0	0	0	-	
Lights %	100%	98.4%	98.9%	0%	98.7%	99%	100%	100%	100%	0%	99.4%	96.7%	99.1%	100%	0%	0%	0%	0%	98.5%	100%	100%	100%	0%	100%	0%	0%	0%	0%	0%	0%	0%	-	
Single-Unit Trucks	0	5	4	0	9	3	0	0	0	0	3	4	2	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	-	
Single-Unit Trucks %	0%	1.2%	0.5%	0%	0.7%	0.7%	0%	0%	0%	0%	0.4%	0.9%	0.2%	0%	0%	0%	0%	0%	0.4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	
Buses	0	1	6	0	7	0	0	0	0	0	0	1	7	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	-	
Buses %	0%	0.2%	0.7%	0%	0.5%	0%	0%	0%	0%	0%	0%	0.2%	0.7%	0%	0%	0%	0%	0%	0.5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	
Articulated Trucks	0	1	0	0	1	1	0	0	0	0	1	9	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	-	
Articulated Trucks %	0%	0.2%	0%	0%	0.1%	0.2%	0%	0%	0%	0%	0.1%	2.1%	0%	0%	0%	0%	0%	0%	0.6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	
Pedestrians	-	-	-	0	-	-	-	-	-	9	-	-	-	-	-	-	-	-	0	-	-	-	-	10	-	-	9	-	-	14	-	-	
Pedestrians%	-	-	-	0%	-	-	-	-	-	13%	-	-	-	-	-	-	-	-	0%	-	-	-	-	14.5%	-	-	13%	-	-	20.3%	-	-	
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	-	6	-	-	-	-	-	-	-	-	0	-	-	-	-	7	-	-	7	-	-	7	-	-	
Bicycles on Crosswalk%	-	-	-	0%	-	-	-	-	-	8.7%	-	-	-	-	-	-	-	-	0%	-	-	-	-	10.1%	-	-	10.1%	-	-	10.1%	-	-	
Bicycles on Road	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	
Bicycles on Road%	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	-	-	-	0%	-	-	-	-	0%	-	-	0%	-	-	0%	-	-	

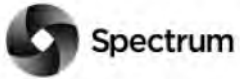
Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (15.24 °C)





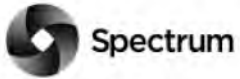
Turning Movement Count (2 . LIVERPOOL RD & KINGSTON RD)

Start Time	N Approach LIVERPOOL RD						E Approach KINGSTON RD						S Approach LIVERPOOL RD						W Approach KINGSTON RD						Int. Total (15 min)	Int. Total (1 hr)
	Right NW	Thru NS	Left NE	UTurn NN	Peds N:	Approach Total	Right EN	Thru EW	Left ES	UTurn EE	Peds E:	Approach Total	Right SE	Thru SN	Left SW	UTurn SS	Peds S:	Approach Total	Right WS	Thru WE	Left WN	UTurn WW	Peds W:	Approach Total		
07:30:00	23	145	14	0	3	182	9	70	23	0	8	102	12	80	36	0	5	128	36	48	14	0	5	98	510	
07:45:00	21	150	13	0	4	184	7	106	39	0	4	152	26	56	46	0	2	128	49	91	27	1	3	168	632	
08:00:00	21	131	13	0	3	165	5	89	37	0	3	131	32	85	60	0	4	177	58	80	17	0	6	155	628	
08:15:00	32	118	12	0	2	162	16	109	32	0	3	157	31	86	62	0	4	179	59	78	21	0	2	158	656	2426
08:30:00	30	118	19	0	4	167	11	95	36	0	6	142	35	92	59	0	2	186	42	96	26	0	0	164	659	2575
08:45:00	12	124	27	0	3	163	11	122	45	0	13	178	25	82	63	0	6	170	63	116	25	0	5	204	715	2658
09:00:00	16	131	11	0	9	158	5	89	32	0	3	127	34	91	65	1	5	191	57	156	46	1	6	260	736	2766
09:15:00	22	118	13	0	4	153	12	112	31	0	6	155	35	76	64	0	2	175	53	101	27	0	4	181	664	2774
BREAK																										
16:00:00	24	122	38	0	4	184	10	158	49	0	13	217	52	149	64	0	6	265	80	233	49	0	10	362	1028	
16:15:00	31	108	32	0	15	171	19	116	54	0	17	189	64	156	85	0	6	305	94	245	58	0	11	397	1062	
16:30:00	27	120	25	0	9	172	17	134	45	0	26	196	47	144	67	0	2	258	82	242	53	0	6	377	1003	
16:45:00	36	101	26	0	10	163	21	130	44	0	21	195	65	171	84	1	10	321	79	253	60	0	11	392	1071	4164
17:00:00	36	130	29	0	7	195	16	127	52	0	16	195	68	204	82	0	20	354	92	249	66	0	12	407	1151	4287
17:15:00	25	127	20	0	12	172	16	144	58	0	17	218	67	173	64	0	7	304	89	271	52	0	15	412	1106	4331
17:30:00	29	142	23	0	5	194	19	143	56	0	11	218	71	182	76	0	3	329	96	238	57	0	4	393	1134	4462
17:45:00	32	127	25	0	7	184	15	124	62	0	17	201	60	179	77	0	14	316	85	260	52	0	9	397	1098	4489
Grand Total	417	2012	340	0	101	2769	210	1868	695	0	184	2773	724	2006	1054	2	98	3786	1116	2757	650	2	109	4525	13853	-
Approach%	15.1%	72.7%	12.3%	0%	-	-	7.6%	67.4%	25.1%	0%	-	-	19.1%	53%	27.8%	0.1%	-	-	24.7%	60.9%	14.4%	0%	-	-	-	-
Totals %	3%	14.5%	2.5%	0%	20%	-	1.5%	13.5%	5%	0%	20%	-	5.2%	14.5%	7.6%	0%	27.3%	-	8.1%	19.9%	4.7%	0%	32.7%	-	-	-
Heavy	4	31	5	0	-	-	2	52	16	0	-	-	61	35	27	0	-	-	16	62	12	0	-	-	-	-
Heavy %	1%	1.5%	1.5%	0%	-	-	1%	2.8%	2.3%	0%	-	-	8.4%	1.7%	2.6%	0%	-	-	1.4%	2.2%	1.8%	0%	-	-	-	-
Bicycles	0	1	0	0	-	-	0	2	0	0	-	-	2	3	0	0	-	-	0	1	0	0	-	-	-	-
Bicycle %	0%	0%	0%	0%	-	-	0%	0.1%	0%	0%	-	-	0.3%	0.1%	0%	0%	-	-	0%	0%	0%	0%	-	-	-	-



Peak Hour: 08:30 AM - 09:30 AM Weather: Broken Clouds (15.24 °C)

Start Time	N Approach LIVERPOOL RD						E Approach KINGSTON RD						S Approach LIVERPOOL RD						W Approach KINGSTON RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:30:00	30	118	19	0	4	167	11	95	36	0	6	142	35	92	59	0	2	186	42	96	26	0	0	164	659
08:45:00	12	124	27	0	3	163	11	122	45	0	13	178	25	82	63	0	6	170	63	116	25	0	5	204	715
09:00:00	16	131	11	0	9	158	6	89	32	0	3	127	34	91	65	1	5	191	57	156	46	1	6	260	736
09:15:00	22	118	13	0	4	153	12	112	31	0	6	155	35	76	64	0	2	175	53	101	27	0	4	181	664
Grand Total	80	491	70	0	20	641	40	418	144	0	28	602	129	341	251	1	15	722	215	469	124	1	15	809	2774
Approach%	12.5%	76.6%	10.9%	0%	-	-	6.6%	69.4%	23.9%	0%	-	-	17.9%	47.2%	34.8%	0.1%	-	-	26.6%	58%	15.3%	0.1%	-	-	-
Totals %	2.9%	17.7%	2.5%	0%	23.1%	23.1%	1.4%	15.1%	5.2%	0%	21.7%	21.7%	4.7%	12.3%	9%	0%	26%	26%	7.8%	16.9%	4.5%	0%	29.2%	29.2%	-
PHF	0.67	0.94	0.65	0	0.96	0.96	0.83	0.86	0.8	0	0.85	0.85	0.92	0.93	0.97	0.25	0.95	0.95	0.85	0.75	0.67	0.25	0.78	0.78	-
Heavy	0	9	0	0	9	9	0	14	4	0	18	18	15	9	6	0	30	30	5	21	3	0	29	29	-
Heavy %	0%	1.8%	0%	0%	1.4%	1.4%	0%	3.3%	2.8%	0%	3%	3%	11.6%	2.6%	2.4%	0%	4.2%	4.2%	2.3%	4.5%	2.4%	0%	3.6%	3.6%	-
Lights	80	482	70	0	632	632	40	404	140	0	584	584	114	332	245	1	692	692	210	448	121	1	780	780	-
Lights %	100%	98.2%	100%	0%	98.6%	98.6%	100%	96.7%	97.2%	0%	97%	97%	88.4%	97.4%	97.8%	100%	95.8%	95.8%	97.7%	95.5%	97.6%	100%	96.4%	96.4%	-
Single-Unit Trucks	0	3	0	0	3	3	0	6	2	0	8	8	0	2	5	0	7	7	3	9	3	0	15	15	-
Single-Unit Trucks %	0%	0.6%	0%	0%	0.5%	0.5%	0%	1.4%	1.4%	0%	1.3%	1.3%	0%	0.6%	2%	0%	1%	1%	1.4%	1.9%	2.4%	0%	1.9%	1.9%	-
Buses	0	6	0	0	6	6	0	6	2	0	8	8	14	7	1	0	22	22	1	9	0	0	10	10	-
Buses %	0%	1.2%	0%	0%	0.9%	0.9%	0%	1.4%	1.4%	0%	1.3%	1.3%	10.9%	2.1%	0.4%	0%	3%	3%	0.5%	1.9%	0%	0%	1.2%	1.2%	-
Articulated Trucks	0	0	0	0	0	0	0	2	0	0	2	2	1	0	0	0	1	1	1	3	0	0	4	4	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	0%	0.5%	0%	0%	0.3%	0.3%	0.8%	0%	0%	0%	0.1%	0.1%	0.5%	0.6%	0%	0%	0.5%	0.5%	-
Pedestrians	-	-	-	-	19	19	-	-	-	-	28	28	-	-	-	-	15	15	-	-	-	-	15	15	-
Pedestrians%	-	-	-	-	24.4%	24.4%	-	-	-	-	35.9%	35.9%	-	-	-	-	19.2%	19.2%	-	-	-	-	19.2%	19.2%	-
Bicycles on Crosswalk	-	-	-	-	1	1	-	-	-	-	0	0	-	-	-	-	0	0	-	-	-	-	0	0	-
Bicycles on Crosswalk%	-	-	-	-	1.3%	1.3%	-	-	-	-	0%	0%	-	-	-	-	0%	0%	-	-	-	-	0%	0%	-
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	-
Bicycles on Road%	-	-	-	-	0%	0%	-	-	-	-	0%	0%	-	-	-	-	0%	0%	-	-	-	-	0%	0%	-



Peak Hour: 05:00 PM - 06:00 PM Weather: Broken Clouds (22.35 °C)

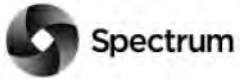
Start Time	N Approach LIVERPOOL RD						E Approach KINGSTON RD						S Approach LIVERPOOL RD						W Approach KINGSTON RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
17:00:00	36	130	29	0	7	195	16	127	52	0	16	195	68	204	82	0	20	354	92	249	66	0	12	407	1151
17:15:00	25	127	20	0	12	172	16	144	58	0	17	218	67	173	64	0	7	304	89	271	52	0	15	412	1106
17:30:00	29	142	23	0	5	194	19	143	56	0	11	218	71	182	76	0	3	329	98	238	57	0	4	393	1134
17:45:00	32	127	25	0	7	184	15	124	62	0	17	201	60	179	77	0	14	316	85	260	52	0	9	397	1098
Grand Total	122	526	97	0	31	745	66	538	228	0	61	832	266	738	299	0	44	1303	364	1018	227	0	40	1609	4489
Approach%	16.4%	70.6%	13%	0%	-	-	7.9%	64.7%	27.4%	0%	-	-	20.4%	56.6%	22.9%	0%	-	-	22.6%	63.3%	14.1%	0%	-	-	-
Totals %	2.7%	11.7%	2.2%	0%	16.6%	18.5%	1.5%	12%	5.1%	0%	18.5%	21.8%	5.9%	16.4%	6.7%	0%	29%	35.4%	8.1%	22.7%	5.1%	0%	35.8%	41.2%	35.8%
PHF	0.85	0.93	0.84	0	0.96	0.95	0.87	0.93	0.92	0	0.95	0.95	0.94	0.9	0.91	0	0.92	0.92	0.93	0.94	0.86	0	0.98	0.98	0.98
Heavy	1	3	0	0	4	11	0	7	4	0	11	12	4	5	0	0	21	21	3	14	1	0	18	18	18
Heavy %	0.8%	0.6%	0%	0%	0.5%	1.3%	0%	1.3%	1.8%	0%	1.3%	4.5%	0.5%	1.7%	0%	0%	1.6%	1.6%	0.8%	1.4%	0.4%	0%	1.1%	1.1%	1.1%
Lights	121	523	97	0	741	821	66	531	224	0	821	254	734	294	0	0	1282	1282	361	1004	226	0	1591	1591	1591
Lights %	99.2%	99.4%	100%	0%	99.5%	98.7%	100%	98.7%	98.2%	0%	98.7%	95.5%	99.5%	98.3%	0%	0%	98.4%	98.4%	99.2%	98.6%	99.6%	0%	98.9%	98.9%	98.9%
Single-Unit Trucks	1	3	0	0	4	4	0	2	2	0	4	1	0	4	0	0	5	5	1	7	1	0	9	9	9
Single-Unit Trucks %	0.8%	0.6%	0%	0%	0.5%	0.5%	0%	0.4%	0.9%	0%	0.5%	0.4%	0%	1.3%	0%	0%	0.4%	0.4%	0.3%	0.7%	0.4%	0%	0.6%	0.6%	0.6%
Buses	0	0	0	0	0	6	0	5	1	0	6	11	4	1	0	0	16	16	2	7	0	0	9	9	9
Buses %	0%	0%	0%	0%	0%	0.7%	0%	0.9%	0.4%	0%	0.7%	4.1%	0.5%	0.3%	0%	0%	1.2%	1.2%	0.5%	0.7%	0%	0%	0.6%	0.6%	0.6%
Articulated Trucks	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulated Trucks %	0%	0%	0%	0%	0%	0.1%	0%	0%	0.4%	0%	0.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Pedestrians	-	-	-	-	26	-	-	-	-	-	52	-	-	-	-	-	38	38	-	-	-	-	38	38	38
Pedestrians%	-	-	-	-	14.8%	-	-	-	-	-	29.5%	-	-	-	-	-	21.6%	21.6%	-	-	-	-	21.6%	21.6%	21.6%
Bicycles on Crosswalk	-	-	-	-	5	-	-	-	-	-	9	-	-	-	-	-	6	6	-	-	-	-	2	2	2
Bicycles on Crosswalk%	-	-	-	-	2.8%	-	-	-	-	-	5.1%	-	-	-	-	-	3.4%	3.4%	-	-	-	-	1.1%	1.1%	1.1%
Bicycles on Road	0	0	0	0	0	-	0	1	0	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles on Road%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	0%	-	-	-	-	0%	0%	0%

Peak Hour: 08:30 AM - 09:30 AM Weather: Broken Clouds (15.24 °C)



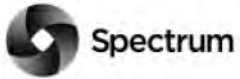
Peak Hour: 05:00 PM - 06:00 PM Weather: Broken Clouds (22.35 °C)





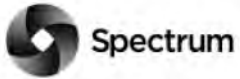
Turning Movement Count (3 . LIVERPOOL RD & PICKERING PKWY)

Start Time	N Approach LIVERPOOL RD						E Approach PICKERING PKWY						S Approach LIVERPOOL RD						W Approach LOBLAW ACCESS						Int. Total (15 min)	Int. Total (1 hr)
	Right NW	Thru NS	Left NE	UTurn NN	Peds N:	Approach Total	Right EN	Thru EW	Left ES	UTurn EE	Peds E:	Approach Total	Right SE	Thru SN	Left SW	UTurn SS	Peds S:	Approach Total	Right WS	Thru WE	Left WN	UTurn WW	Peds W:	Approach Total		
07:30:00	4	155	29	0	4	188	11	4	29	0	3	44	20	107	3	0	0	130	2	0	2	0	1	4	366	
07:45:00	4	218	36	0	3	258	15	1	61	0	2	77	36	123	8	0	0	167	4	1	2	0	1	7	509	
08:00:00	10	180	26	1	1	217	11	3	55	0	2	69	42	183	9	0	0	214	7	2	0	0	2	9	509	
08:15:00	5	176	33	1	2	215	16	1	57	2	3	76	71	179	9	0	0	259	5	1	4	0	5	10	560	1944
08:30:00	4	153	25	2	1	184	14	5	53	0	5	72	56	161	8	0	0	225	10	6	3	0	0	19	500	2078
08:45:00	11	165	47	3	4	226	13	6	46	1	2	66	87	182	17	0	0	266	12	4	2	0	3	18	596	2165
09:00:00	4	174	41	0	0	219	16	7	36	0	1	59	58	159	14	0	0	231	9	6	1	0	2	16	525	2181
09:15:00	11	161	31	0	4	203	16	6	42	0	4	64	53	155	18	0	0	226	15	6	6	0	4	27	520	2141
BREAK																										
16:00:00	15	192	29	0	4	236	34	15	77	0	8	126	78	196	26	2	0	302	36	8	20	0	6	64	728	
16:15:00	7	210	42	3	10	262	37	8	86	0	9	131	75	237	26	0	0	338	23	8	13	0	7	44	775	
16:30:00	14	189	40	1	4	244	26	10	106	0	3	142	72	230	27	0	0	329	33	5	21	0	3	59	774	
16:45:00	16	196	43	0	5	255	50	13	80	0	8	143	85	253	30	0	1	368	28	16	21	0	5	65	831	3108
17:00:00	9	195	44	1	7	249	53	17	112	0	3	182	91	253	25	0	0	369	40	10	22	0	4	72	872	3252
17:15:00	12	198	51	2	0	263	46	16	115	0	10	177	117	258	27	0	0	402	30	15	18	0	9	63	905	3382
17:30:00	12	238	44	0	6	294	42	13	82	0	5	137	94	232	30	0	0	356	34	23	24	0	7	81	868	3476
17:45:00	13	224	52	0	8	289	33	12	89	1	3	135	96	249	24	0	0	369	26	21	23	0	1	70	863	3508
Grand Total	151	3024	613	14	63	3802	433	137	1126	4	71	1700	1131	3137	301	2	1	4571	314	132	182	0	60	628	10701	-
Approach%	4%	79.5%	16.1%	0.4%	-	-	25.5%	8.1%	66.2%	0.2%	-	-	24.7%	68.6%	6.8%	0%	-	-	50%	21%	29%	0%	-	-	-	-
Totals%	1.4%	28.3%	5.7%	0.1%	-	35.5%	4%	1.3%	10.5%	0%	15.9%	15.9%	10.6%	29.3%	2.8%	0%	42.7%	42.7%	2.9%	1.2%	1.7%	0%	5.9%	5.9%	-	-
Heavy	2	51	10	0	-	-	51	2	30	0	-	-	19	65	1	0	-	-	1	2	0	0	-	-	-	-
Heavy%	1.3%	1.7%	1.6%	0%	-	-	11.8%	1.5%	2.7%	0%	-	-	1.7%	2.1%	0.3%	0%	-	-	0.3%	1.5%	0%	0%	-	-	-	-
Bicycles	0	2	0	0	-	-	0	0	1	0	-	-	1	10	2	0	-	-	0	0	0	0	-	-	-	-
Bicycle%	0%	0.1%	0%	0%	-	-	0%	0%	0.1%	0%	-	-	0.1%	0.3%	0.7%	0%	-	-	0%	0%	0%	0%	-	-	-	-



Peak Hour: 08:15 AM - 09:15 AM Weather: Broken Clouds (15.24 °C)

Start Time	N Approach LIVERPOOL RD						E Approach PICKERING PKWY						S Approach LIVERPOOL RD						W Approach LOBLAW ACCESS						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:15:00	5	176	33	1	2	215	16	1	57	2	3	76	71	179	9	0	0	259	5	1	4	0	5	10	560
08:30:00	4	153	25	2	1	184	14	5	53	0	5	72	56	161	8	0	0	225	10	6	3	0	0	19	500
08:45:00	11	165	47	3	4	226	13	6	46	1	2	66	87	182	17	0	0	286	12	4	2	0	3	18	596
09:00:00	4	174	41	0	0	219	16	7	36	0	1	59	58	159	14	0	0	231	9	6	1	0	2	16	525
Grand Total	24	668	146	6	7	844	59	19	192	3	11	273	272	681	48	0	0	1001	36	17	10	0	10	63	2181
Approach%	2.8%	79.1%	17.3%	0.7%	-	-	21.6%	7%	70.3%	1.1%	-	-	27.2%	68%	4.8%	0%	-	-	57.1%	27%	15.9%	0%	-	-	-
Totals %	1.1%	30.6%	6.7%	0.3%	38.7%	2.7%	0.9%	8.8%	0.1%	12.5%	12.5%	31.2%	2.2%	0%	45.9%	1.7%	0.8%	0.5%	0%	2.9%	-	-	-	-	-
PHF	0.55	0.95	0.78	0.5	0.93	0.92	0.68	0.84	0.38	0.9	0.78	0.94	0.71	0	0.88	0.75	0.71	0.63	0	0.83	-	-	-	-	-
Heavy	1	12	4	0	17	13	0	8	0	21	9	19	0	0	28	0	0	0	0	0	-	-	-	-	-
Heavy %	4.2%	1.8%	2.7%	0%	2%	22%	0%	4.2%	0%	7.7%	3.3%	2.8%	0%	0%	2.8%	0%	0%	0%	0%	0%	-	-	-	-	-
Lights	23	656	142	6	827	46	19	184	3	252	263	662	48	0	973	36	17	10	0	63	-	-	-	-	-
Lights %	95.8%	98.2%	97.3%	100%	98%	78%	100%	95.8%	100%	92.3%	96.7%	97.2%	100%	0%	97.2%	100%	100%	100%	0%	100%	-	-	-	-	-
Single-Unit Trucks	1	4	2	0	7	1	0	5	0	6	2	8	0	0	10	0	0	0	0	0	-	-	-	-	-
Single-Unit Trucks %	4.2%	0.6%	1.4%	0%	0.8%	1.7%	0%	2.6%	0%	2.2%	0.7%	1.2%	0%	0%	1%	0%	0%	0%	0%	0%	-	-	-	-	-
Buses	0	8	2	0	10	12	0	3	0	15	6	9	0	0	15	0	0	0	0	0	-	-	-	-	-
Buses %	0%	1.2%	1.4%	0%	1.2%	20.3%	0%	1.6%	0%	5.5%	2.2%	1.3%	0%	0%	1.5%	0%	0%	0%	0%	0%	-	-	-	-	-
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	-	-	-	-	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.4%	0.3%	0%	0%	0.3%	0%	0%	0%	0%	0%	-	-	-	-	-
Pedestrians	-	-	-	-	7	-	-	-	-	10	-	-	-	-	0	-	-	-	-	10	-	-	-	-	-
Pedestrians %	-	-	-	-	25%	-	-	-	-	35.7%	-	-	-	-	0%	-	-	-	-	35.7%	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-
Bicycles on Crosswalk %	-	-	-	-	0%	-	-	-	-	3.6%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-
Bicycles on Road	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	-	-	-	-	-
Bicycles on Road %	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-



Peak Hour: 05:00 PM - 06:00 PM Weather: Broken Clouds (22.35 °C)

Start Time	N Approach LIVERPOOL RD						E Approach PICKERING PKWY						S Approach LIVERPOOL RD						W Approach LOBLAW ACCESS						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
17:00:00	9	195	44	1	7	249	53	17	112	0	3	182	91	253	25	0	0	369	40	10	22	0	4	72	872
17:15:00	12	198	51	2	0	263	46	16	115	0	10	177	117	258	27	0	0	402	30	15	18	0	9	63	905
17:30:00	12	238	44	0	6	294	42	13	82	0	5	137	94	232	30	0	0	356	34	23	24	0	7	81	868
17:45:00	13	224	52	0	8	289	33	12	89	1	3	135	96	249	24	0	0	369	26	21	23	0	1	70	863
Grand Total	46	855	191	3	21	1095	174	58	398	1	21	631	398	992	106	0	0	1496	130	69	87	0	21	286	3508
Approach%	4.2%	78.1%	17.4%	0.3%	-	-	27.6%	9.2%	63.1%	0.2%	-	-	26.6%	66.3%	7.1%	0%	-	45.5%	24.1%	30.4%	0%	-	-	-	
Totals %	1.3%	24.4%	5.4%	0.1%	-	31.2%	5%	1.7%	11.3%	0%	-	18%	11.3%	28.3%	3%	0%	-	42.6%	3.7%	2%	2.5%	0%	-	8.2%	
PHF	0.88	0.9	0.92	0.38	-	0.93	0.82	0.85	0.87	0.25	-	0.87	0.85	0.96	0.88	0	-	0.93	0.81	0.75	0.91	0	-	0.88	
Heavy	0	8	1	0	-	9	8	0	7	0	-	15	2	11	0	0	-	13	0	0	0	0	-	0	
Heavy %	0%	0.9%	0.5%	0%	-	0.8%	4.6%	0%	1.8%	0%	-	2.4%	0.5%	1.1%	0%	0%	-	0.9%	0%	0%	0%	0%	-	0%	
Lights	46	847	190	3	-	1086	166	58	391	1	-	616	396	981	106	0	-	1483	130	69	87	0	-	286	
Lights %	100%	99.1%	99.5%	100%	-	99.2%	95.4%	100%	98.2%	100%	-	97.6%	99.5%	98.9%	100%	0%	-	99.1%	100%	100%	100%	0%	-	100%	
Single-Unit Trucks	0	5	0	0	-	5	0	0	2	0	-	2	1	6	0	0	-	7	0	0	0	0	-	0	
Single-Unit Trucks %	0%	0.6%	0%	0%	-	0.5%	0%	0%	0.5%	0%	-	0.3%	0.3%	0.6%	0%	0%	-	0.5%	0%	0%	0%	0%	-	0%	
Buses	0	2	1	0	-	3	8	0	5	0	-	13	0	5	0	0	-	5	0	0	0	0	-	0	
Buses %	0%	0.2%	0.5%	0%	-	0.3%	4.6%	0%	1.3%	0%	-	2.1%	0%	0.5%	0%	0%	-	0.3%	0%	0%	0%	0%	-	0%	
Articulated Trucks	0	1	0	0	-	1	0	0	0	0	-	0	1	0	0	0	-	1	0	0	0	0	-	0	
Articulated Trucks %	0%	0.1%	0%	0%	-	0.1%	0%	0%	0%	0%	-	0%	0.3%	0%	0%	0%	-	0.1%	0%	0%	0%	0%	-	0%	
Pedestrians	-	-	-	-	19	-	-	-	-	-	16	-	-	-	-	-	0	-	-	-	-	-	15	-	
Pedestrians %	-	-	-	-	30.2%	-	-	-	-	-	25.4%	-	-	-	-	-	0%	-	-	-	-	-	23.8%	-	
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	5	-	-	-	-	-	0	-	-	-	-	-	6	-	
Bicycles on Crosswalk %	-	-	-	-	3.2%	-	-	-	-	-	7.9%	-	-	-	-	-	0%	-	-	-	-	-	9.5%	-	
Bicycles on Road	0	1	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	
Bicycles on Road %	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	

Peak Hour: 08:15 AM - 09:15 AM Weather: Broken Clouds (15.24 °C)



Peak Hour: 05:00 PM - 06:00 PM Weather: Broken Clouds (22.35 °C)



APPENDIX

B LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS⁽¹⁾

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 and ≤ 20
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	> 20 and ≤ 35
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35 and ≤ 55
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	> 55 and ≤ 80
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS⁽¹⁾

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

APPENDIX

C EXISTING TRAFFIC CONDITIONS

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	20	762	19	143	523	30	52	6	77	14	6	29
Future Volume (vph)	20	762	19	143	523	30	52	6	77	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96	0.99	1.00		0.99	0.99		1.00	0.98	
Frt			0.850		0.992			0.860			0.875	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3471	1470	1652	3390	0	1745	1551	0	1725	1596	0
Fit Permitted	0.435			0.342			0.734			0.701		
Satd. Flow (perm)	768	3471	1414	592	3390	0	1334	1551	0	1270	1596	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			32		8		80		30		30	
Link Speed (k/h)		60			60		40		40		40	
Link Distance (m)		129.3			694.6		124.5		224.5		224.5	
Travel Time (s)		7.8			41.7		11.2		20.2		20.2	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	21	794	20	149	545	31	54	6	80	15	6	30
Shared Lane Traffic (%)												
Lane Group Flow (vph)	21	794	20	149	576	0	54	86	0	15	36	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.05	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0	0	0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0	0.0	0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6			8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

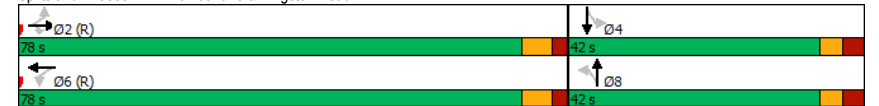
<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	2	2	2	6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	33.0	33.0	33.0	33.0	33.0		36.0	36.0		36.0	36.0	
Total Split (s)	78.0	78.0	78.0	78.0	78.0		42.0	42.0		42.0	42.0	
Total Split (%)	65.0%	65.0%	65.0%	65.0%	65.0%		35.0%	35.0%		35.0%	35.0%	
Maximum Green (s)	71.4	71.4	71.4	71.4	71.4		35.5	35.5		35.5	35.5	
Yellow Time (s)	4.4	4.4	4.4	4.4	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2	2.2	2.2	2.2		3.2	3.2		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	
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6		6.5	6.5		6.5	6.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0	19.0	19.0	19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)	7	7	7	5	5		5	5		14	14	
Act Effect Green (s)	89.9	89.9	89.9	89.9	89.9		17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.75		0.14	0.14		0.14	0.14	
v/c Ratio	0.04	0.31	0.02	0.34	0.23		0.29	0.30		0.08	0.14	
Control Delay	4.8	4.7	0.7	5.9	3.4		46.0	12.0		39.8	16.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.8	4.7	0.7	5.9	3.4		46.0	12.0		39.8	16.3	
LOS	A	A	A	A	A		D	B		D	B	
Approach Delay		4.6			3.9			25.1			23.2	
Approach LOS		A			A			C			C	

Intersection Summary

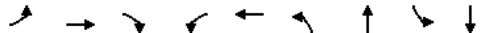
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 116.4 (97%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.34
 Intersection Signal Delay: 6.5 Intersection LOS: A
 Intersection Capacity Utilization 66.5% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues
1: Walnut Lane & Kingston Road

<Existing>AM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	21	794	20	149	576	54	86	15	36
w/c Ratio	0.04	0.31	0.02	0.34	0.23	0.29	0.30	0.08	0.14
Control Delay	4.8	4.7	0.7	5.9	3.4	46.0	12.0	39.8	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.8	4.7	0.7	5.9	3.4	46.0	12.0	39.8	16.3
Queue Length 50th (m)	0.9	20.2	0.0	5.0	9.1	12.3	1.3	3.3	1.3
Queue Length 95th (m)	2.6	24.5	0.6	m10.9	m18.2	21.1	13.8	8.4	9.5
Internal Link Dist (m)		105.3			670.6		100.5		200.5
Turn Bay Length (m)	26.0		25.8	37.0		63.2		18.5	
Base Capacity (vph)	575	2601	1067	443	2542	394	515	375	493
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 w/c Ratio	0.04	0.31	0.02	0.34	0.23	0.14	0.17	0.04	0.07

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Walnut Lane & Kingston Road

<Existing>AM
09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	762	19	143	523	30	52	6	77	14	6	29
Future Volume (vph)	20	762	19	143	523	30	52	6	77	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	6.6	6.6	6.6	6.6	6.6		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	0.99		1.00	0.98	
Fipb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.86		1.00	0.88	
Fit Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1678	3471	1414	1642	3389		1726	1552		1721	1596	
Fit Permitted	0.44	1.00	1.00	0.34	1.00		0.73	1.00		0.70	1.00	
Satd. Flow (perm)	769	3471	1414	591	3389		1333	1552		1270	1596	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	21	794	20	149	545	31	54	6	80	15	6	30
RTOR Reduction (vph)	0	0	5	0	2	0	69	0	0	26	0	0
Lane Group Flow (vph)	21	794	15	149	574	0	54	17	0	15	10	0
Confl. Peds. (#/hr)	4		8	8		4	9		2	2		9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	89.9	89.9	89.9	89.9	89.9		17.0	17.0		17.0	17.0	
Effective Green, g (s)	89.9	89.9	89.9	89.9	89.9		17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.75	0.75	0.75	0.75	0.75		0.14	0.14		0.14	0.14	
Clearance Time (s)	6.6	6.6	6.6	6.6	6.6		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	576	2600	1059	442	2538		188	219		179	226	
v/s Ratio Prot		0.23			0.17			0.01			0.01	
v/s Ratio Perm	0.03		0.01	c0.25			c0.04			0.01		
w/c Ratio	0.04	0.31	0.01	0.34	0.23		0.29	0.08		0.08	0.05	
Uniform Delay, d1	3.9	4.9	3.8	5.1	4.5		46.1	44.7		44.7	44.5	
Progression Factor	0.72	0.71	0.47	0.55	0.57		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3	0.0	1.7	0.2		0.8	0.2		0.2	0.1	
Delay (s)	2.9	3.8	1.8	4.5	2.8		46.9	44.9		44.9	44.6	
Level of Service	A	A	A	A	A		D	D		D	D	
Approach Delay (s)		3.7			3.1			45.7			44.7	
Approach LOS		A			A			D			D	

Intersection Summary

HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.1
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	80	727	81	78	469	61	37	15	29	117	35	144
Future Volume (vph)	80	727	81	78	469	61	37	15	29	117	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	66.4		48.0			18.0			25.0			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.97	1.00		0.96	1.00	0.99		1.00	0.99	
Frt		0.850			0.850		0.901			0.879		
Flt Protected	0.950		0.950			0.950			0.950			
Satd. Flow (prot)	1564	3367	1466	1645	3368	1459	1752	1771	0	1827	1760	0
Flt Permitted	0.468		0.334			0.463			0.726			
Satd. Flow (perm)	764	3367	1420	577	3368	1406	852	1771	0	1393	1760	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			92			65			31			153
Link Speed (k/h)	60		60		60		40		60		60	
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4	6	3		2	2			3
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	85	773	86	83	499	65	39	16	31	124	37	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	773	86	83	499	65	39	47	0	124	190	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane			Yes									
Headway Factor	1.17	1.04	1.10	1.13	1.01	1.11	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0	0	0	0	0	0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8		8		4	
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6	27.6	8.0	27.6	27.6	40.1	40.1		40.1	40.1	
Total Split (s)	10.8	66.0	66.0	14.4	69.6	69.6	39.6	39.6		39.6	39.6	
Maximum Green (s)	7.8	59.4	59.4	11.4	63.0	63.0	32.5	32.5		32.5	32.5	
Total Split (%)	9.0%	55.0%	55.0%	12.0%	58.0%	58.0%	33.0%	33.0%		33.0%	33.0%	
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4	2.4	2.7	2.7		2.7	2.7	
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	6.6	6.6	3.0	6.6	6.6	7.1	7.1		7.1	7.1	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0	14.0	14.0	14.0	14.0	26.0	26.0		26.0	26.0	
Pedestrian Calls (#/hr)	6	6	6	1	1	7	7	7		4	4	
Act Effect Green (s)	89.3	79.9	79.9	89.8	80.1	80.1	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.74	0.67	0.67	0.75	0.67	0.67	0.15	0.15		0.15	0.15	
v/c Ratio	0.14	0.34	0.09	0.17	0.22	0.07	0.31	0.16		0.60	0.48	
Control Delay	7.0	19.4	7.3	4.3	6.7	1.9	48.1	19.9		57.5	14.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	7.0	19.4	7.3	4.3	6.7	1.9	48.1	19.9		57.5	14.5	
LOS	A	B	A	A	A	A	D	B		E	B	
Approach Delay	17.1		5.9		32.7		31.5					
Approach LOS	B		A		C		C					

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 112.8 (94%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 16.4
 Intersection LOS: B
 Intersection Capacity Utilization 64.3%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 3: Dixie Road & Kingston Road



Queues
3: Dixie Road & Kingston Road

<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	85	773	86	83	499	65	39	47	124	190
v/c Ratio	0.14	0.34	0.09	0.17	0.22	0.07	0.31	0.16	0.60	0.48
Control Delay	7.0	19.4	7.3	4.3	6.7	1.9	48.1	19.9	57.5	14.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	19.4	7.3	4.3	6.7	1.9	48.1	19.9	57.5	14.5
Queue Length 50th (m)	4.4	67.5	5.0	3.0	14.9	0.2	8.5	3.3	28.2	7.8
Queue Length 95th (m)	21.6	116.2	24.6	8.4	27.6	3.1	16.5	12.0	40.7	24.4
Internal Link Dist (m)		872.3			167.2			99.5		212.2
Turn Bay Length (m)	145.4		64.5	51.0		79.5	13.0		16.0	
Base Capacity (vph)	623	2241	976	543	2249	960	230	502	377	588
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	0.14	0.34	0.09	0.15	0.22	0.07	0.17	0.09	0.33	0.32

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<Existing>AM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↑	↘	↓	↖	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	80	727	81	78	469	61	37	15	29	117	35	144
Future Volume (vph)	80	727	81	78	469	61	37	15	29	117	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%							
Total Lost time (s)	3.0	6.6	6.6	3.0	6.6	6.6	7.1	7.1		7.1	7.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	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	0.85	1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1558	3367	1420	1643	3368	1406	1748	1771		1823	1760	
Flt Permitted	0.47	1.00	1.00	0.33	1.00	1.00	0.46	1.00		0.73	1.00	
Satd. Flow (perm)	768	3367	1420	578	3368	1406	852	1771		1394	1760	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	85	773	86	83	499	65	39	16	31	124	37	153
RTOR Reduction (vph)	0	0	29	0	22	0	26	0	0	130	0	0
Lane Group Flow (vph)	85	773	57	83	499	43	39	21	0	124	60	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases	2		2	6		6	8					
Actuated Green, G (s)	85.1	79.3	79.3	85.5	79.5	79.5	18.0	18.0		18.0	18.0	
Effective Green, g (s)	85.1	79.3	79.3	85.5	79.5	79.5	18.0	18.0		18.0	18.0	
Actuated g/C Ratio	0.71	0.66	0.66	0.71	0.66	0.66	0.15	0.15		0.15	0.15	
Clearance Time (s)	3.0	6.6	6.6	3.0	6.6	6.6	7.1	7.1		7.1	7.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	582	2225	938	465	2231	931	127	265		209	264	
v/s Ratio Prot	0.01	c0.23		c0.01	0.15			0.01				0.03
v/s Ratio Perm	0.10		0.04	0.12		0.03	0.05				c0.09	
v/c Ratio	0.15	0.35	0.06	0.18	0.22	0.05	0.31	0.08		0.59	0.23	
Uniform Delay, d1	5.4	9.0	7.2	5.4	8.0	7.1	45.4	43.9		47.6	44.9	
Progression Factor	1.31	1.78	2.92	0.72	0.68	0.57	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.1	0.2	0.2	0.1	1.4	0.1		4.5	0.4	
Delay (s)	7.1	16.3	21.1	4.0	5.7	4.1	46.8	44.0		52.0	45.3	
Level of Service	A	B	C	A	A	A	D	D		D	D	
Approach Delay (s)		15.9			5.3			45.3			48.0	
Approach LOS		B			A			D			D	

Intersection Summary

HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<Existing>AM

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	124	469	215	144	418	40	251	341	129	70	491	80
Future Volume (vph)	124	469	215	144	418	40	251	341	129	70	491	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8	97.9	170.7		117.0	185.5		52.0	49.0		60.5	
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	0.99		0.95	0.98		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.362			0.305			0.317			0.459		
Satd. Flow (perm)	626	3362	1510	539	3510	1530	594	3700	1513	964	3618	1518
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			272			91			163			101
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.1			257.7			350.8	
Travel Time (s)		41.7			23.8			18.6			25.3	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	157	594	272	182	529	51	318	432	163	89	622	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	594	272	182	529	51	318	432	163	89	622	101
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

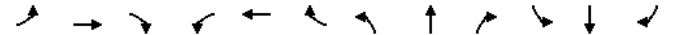
Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<Existing>AM

09-29-2023

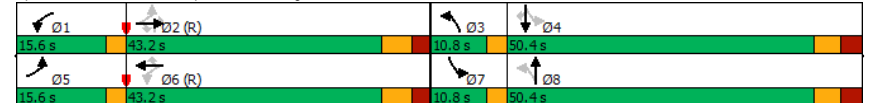


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	41.0	35.1	8.0	41.0	41.0
Total Split (s)	15.6	43.2	43.2	15.6	43.2	43.2	10.8	50.4	43.2	10.8	50.4	50.4
Total Split (%)	13.0%	36.0%	36.0%	13.0%	36.0%	36.0%	9.0%	42.0%	36.0%	9.0%	42.0%	42.0%
Maximum Green (s)	12.6	36.1	36.1	12.6	36.1	36.1	7.8	43.4	36.1	7.8	43.4	43.4
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	3.2	2.8	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	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		27.0	21.0		27.0	27.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	52.4	37.1	37.1	53.2	37.5	37.5	55.6	43.8	37.1	54.8	43.4	43.4
Actuated g/C Ratio	0.44	0.31	0.31	0.44	0.31	0.31	0.46	0.36	0.31	0.46	0.36	0.36
v/c Ratio	0.43	0.57	0.42	0.52	0.48	0.09	0.90	0.32	0.28	0.18	0.48	0.16
Control Delay	23.8	40.3	14.4	25.0	35.5	1.5	54.4	28.3	6.0	17.6	31.0	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	40.3	14.4	25.0	35.5	1.5	54.4	28.3	6.0	17.6	31.0	5.6
LOS	C	D	B	C	D	A	D	C	A	B	C	A
Approach Delay		30.9			30.8			33.4			26.4	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	80.4 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	30.5
Intersection Capacity Utilization:	92.0%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	F

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

6: Liverpool Road & Kingston Road

<Existing>AM

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	157	594	272	182	529	51	318	432	163	89	622	101
w/c Ratio	0.43	0.57	0.42	0.52	0.48	0.09	0.90	0.32	0.28	0.18	0.48	0.16
Control Delay	23.8	40.3	14.4	25.0	35.5	1.5	54.4	28.3	6.0	17.6	31.0	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.8	40.3	14.4	25.0	35.5	1.5	54.4	28.3	6.0	17.6	31.0	5.6
Queue Length 50th (m)	28.1	61.7	22.7	25.1	53.6	0.0	45.6	38.3	0.0	11.0	59.0	0.0
Queue Length 95th (m)	29.5	82.1	43.3	34.3	60.2	0.0	#64.3	44.2	9.7	17.3	64.4	7.9
Internal Link Dist (m)		670.6		372.1			233.7				326.8	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	387	1039	654	363	1096	540	353	1350	580	512	1308	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.41	0.57	0.42	0.50	0.48	0.09	0.90	0.32	0.28	0.17	0.48	0.16

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

6: Liverpool Road & Kingston Road

<Existing>AM

09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	124	469	215	144	418	40	251	341	129	70	491	80
Future Volume (vph)	124	469	215	144	418	40	251	341	129	70	491	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1651	3362	1511	1690	3510	1530	1789	3700	1513	2012	3618	1518
Fit Permitted	0.36	1.00	1.00	0.31	1.00	1.00	0.32	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	630	3362	1511	543	3510	1530	597	3700	1513	972	3618	1518
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	157	594	272	182	529	51	318	432	163	89	622	101
RTOR Reduction (vph)	0	0	188	0	0	35	0	0	113	0	0	64
Lane Group Flow (vph)	157	594	84	182	529	16	318	432	50	89	622	37
Confl. Peds. (#/hr)	15	19	19	15	15	15	15	15	28	28	15	15
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Actuated Green, G (s)	48.3	37.1	37.1	49.1	37.5	37.5	51.6	43.8	37.1	50.8	43.4	43.4
Effective Green, g (s)	48.3	37.1	37.1	49.1	37.5	37.5	51.6	43.8	37.1	50.8	43.4	43.4
Actuated g/C Ratio	0.40	0.31	0.31	0.41	0.31	0.31	0.43	0.36	0.31	0.42	0.36	0.36
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	348	1039	467	333	1096	478	334	1350	467	475	1308	549
v/s Ratio Prot	0.04	c0.18		c0.05	0.15		c0.06	0.12		0.01	0.17	
v/s Ratio Perm	0.14		0.06	0.17		0.01	c0.35		0.03	0.07		0.02
w/c Ratio	0.45	0.57	0.18	0.55	0.48	0.03	0.95	0.32	0.11	0.19	0.48	0.07
Uniform Delay, d1	24.0	34.8	30.3	24.1	33.4	28.7	31.2	27.4	29.6	20.9	29.5	25.1
Progression Factor	1.05	1.07	3.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	2.2	0.8	1.8	1.5	0.1	36.6	0.6	0.5	0.2	1.2	0.2
Delay (s)	26.0	39.6	100.4	25.9	34.9	28.8	67.8	28.0	30.1	21.1	30.8	25.3
Level of Service	C	D	F	C	C	C	E	C	C	C	C	C
Approach Delay (s)		53.7			32.4			42.2			29.0	
Approach LOS		D			C			D			C	

Intersection Summary

HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.1
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<Existing>AM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	192	19	59	48	681	272	146	668	24
Future Volume (vph)	10	17	36	192	19	59	48	681	272	146	668	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0	62.1	54.4	75.7	132.5	35.5				
Storage Lanes	1	0	1			1	1		1	1		1
Taper Length (m)	2.5		12.0			29.5			28.9			
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99					0.98	0.99		0.97	1.00		0.96
Frt	0.898					0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3062	0	3113	1858	1204	1645	3505	1523	1675	3500	1521
Fit Permitted	0.000			0.000			0.353			0.296		
Satd. Flow (perm)	0	3062	0	0	1858	1181	607	3505	1483	520	3500	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		40				141			299			144
Link Speed (k/h)		30			50			50				50
Link Distance (m)		82.8			328.5			162.3				257.7
Travel Time (s)		9.9			23.7			11.7				18.6
Conf. Peds. (#/hr)	7					7	10		11	11		10
Conf. Bikes (#/hr)								1				
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	19	40	211	21	65	53	748	299	160	734	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	59	0	211	21	65	53	748	299	160	734	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8				3.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<Existing>AM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023

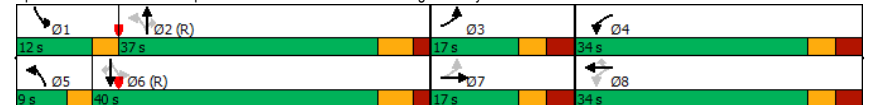


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	
Detector Phase	3	7		4	8	8	5	2		2	1	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)							19.0	19.0		17.0	17.0	
Flash Dont Walk (s)							8.0	8.0		6.0	6.0	
Pedestrian Calls (#/hr)							0	0		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.2	52.0	52.0	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.21		0.56	0.09	0.24	0.12	0.41	0.33	0.36	0.37	0.03
Control Delay	44.1	22.2		46.9	38.5	2.2	7.7	14.3	1.7	9.9	14.8	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.2		46.9	38.5	2.2	7.7	14.3	1.7	9.9	14.8	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.6			36.5			10.6			13.5	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.56
Intersection Signal Delay:	15.4
Intersection Capacity Utilization:	55.6%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues <Existing>AM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	59	211	21	65	53	748	299	160	734	26
v/c Ratio	0.08	0.21	0.56	0.09	0.24	0.12	0.41	0.33	0.36	0.37	0.03
Control Delay	44.1	22.2	46.9	38.5	2.2	7.7	14.3	1.7	9.9	14.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.2	46.9	38.5	2.2	7.7	14.3	1.7	9.9	14.8	0.0
Queue Length 50th (m)	2.0	1.8	20.2	3.7	0.0	3.5	37.6	0.0	11.3	43.8	0.0
Queue Length 95th (m)	7.4	8.0	30.3	10.1	0.0	m6.7	43.6	5.3	21.7	62.3	0.0
Internal Link Dist (m)		58.8	304.5			138.3			233.7		
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	354	852	509	425	434	1823	915	450	1963	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.17	0.25	0.04	0.15	0.12	0.41	0.33	0.36	0.37	0.03

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <Existing>AM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑	↑↑	↑	↑↑	↑
Traffic Volume (vph)	10	17	36	192	19	59	48	681	272	146	668	24
Future Volume (vph)	10	17	36	192	19	59	48	681	272	146	668	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3063		3113	1858	1181	1641	3505	1483	1673	3500	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.35	1.00	1.00	0.30	1.00	1.00
Satd. Flow (perm)	0	3063		0	1858	1181	609	3505	1483	521	3500	1458
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	11	19	40	211	21	65	53	748	299	160	734	26
RTOR Reduction (vph)	0	37	0	0	0	57	0	0	147	0	0	12
Lane Group Flow (vph)	11	22	0	211	21	8	53	748	152	160	734	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.5	50.7	50.7	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.5	50.7	50.7	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	196		376	224	142	387	1777	751	418	1897	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	c0.21		c0.03	0.21	
v/s Ratio Perm							0.01	0.07		0.10	0.21	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.06	0.14	0.42	0.20	0.38	0.39	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.3	15.4	13.5	8.7	13.3	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.91	0.84	0.40	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.7	0.6	0.6	0.6	0.6	0.0
Delay (s)	44.5	44.4		43.4	39.3	39.1	9.5	13.6	5.9	9.3	13.9	10.6
Level of Service	D	D		D	D	D	A	B	A	A	B	B
Approach Delay (s)		44.4			42.1			11.3			13.0	
Approach LOS		D			D			B			B	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<Existing>AM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	6	0	2	188	2	338	8	630	0	0	580	0
Future Volume (vph)	6	0	2	188	2	338	8	630	0	0	580	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.5	3.7	4.5	3.7	3.7	3.5	3.0	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0		0.0	0.0		125.0	26.5		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (m)	2.5			2.5			52.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95		1.00	0.95		1.00	1.00	0.95	0.95
Ped Bike Factor							0.99					
Frt		0.850				0.850						
Fit Protected	0.950			0.950	0.953		0.950					
Satd. Flow (prot)	1986	0	1184	1700	1706	1551	1348	3433	0	0	3394	0
Fit Permitted	0.950			0.950	0.953		0.420					
Satd. Flow (perm)	1986	0	1184	1700	1706	1551	591	3433	0	0	3394	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			101			329						
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		75.1			226.7			371.5			162.3	
Travel Time (s)		9.0			16.3			26.7			11.7	
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	0%
Adj. Flow (vph)	6	0	2	196	2	352	8	656	0	0	604	0
Shared Lane Traffic (%)				50%								
Lane Group Flow (vph)	6	0	2	98	100	352	8	656	0	0	604	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.5			4.5			3.0			3.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.88	0.99	0.88	0.99	0.99	1.01	1.09	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1		1	1	2	1	1	2			2	
Detector Template	Left		Right	Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0		2.0	2.0	10.0	2.0	2.0	10.0			10.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Size(m)	2.0		2.0	2.0	0.6	2.0	2.0	0.6			0.6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 2 Position(m)						9.4		9.4			9.4	
Detector 2 Size(m)						0.6		0.6			0.6	
Detector 2 Type						Cl+Ex		Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings

<Existing>AM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type	Prot		Prot	Split	NA	Perm	Perm	NA			NA	
Protected Phases	7		7	8	8						2	6
Permitted Phases						8	2					
Detector Phase	7		7	8	8	8	2	2				6
Switch Phase												
Minimum Initial (s)	8.0		8.0	8.0	8.0	8.0	15.0	15.0				15.0
Minimum Split (s)	14.0		14.0	25.0	25.0	25.0	25.0	25.0				25.0
Total Split (s)	16.0		16.0	26.0	26.0	26.0	58.0	58.0				58.0
Total Split (%)	16.0%		16.0%	26.0%	26.0%	26.0%	58.0%	58.0%				58.0%
Maximum Green (s)	10.3		10.3	20.0	20.0	20.0	51.7	51.7				51.7
Yellow Time (s)	3.0		3.0	3.3	3.3	3.3	3.3	3.3				3.3
All-Red Time (s)	2.7		2.7	2.7	2.7	2.7	3.0	3.0				3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0				0.0
Total Lost Time (s)	5.7		5.7	6.0	6.0	6.0	6.3	6.3				6.3
Lead/Lag	Lead		Lead	Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	3.0				3.0
Recall Mode	None		None	None	None	None	C-Max	C-Max				C-Max
Walk Time (s)				14.0	14.0	14.0	13.0	13.0				13.0
Flash Dont Walk (s)				5.0	5.0	5.0	5.0	5.0				5.0
Pedestrian Calls (#/hr)				0	0	0	15	15				17
Act Effct Green (s)	8.0		8.0	12.2	12.2	12.2	72.7	72.7				72.7
Actuated g/C Ratio	0.08		0.08	0.12	0.12	0.12	0.73	0.73				0.73
v/c Ratio	0.04		0.01	0.47	0.48	0.74	0.02	0.26				0.24
Control Delay	43.2		0.0	47.2	47.5	15.7	7.5	6.3				5.8
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0				0.0
Total Delay	43.2		0.0	47.2	47.5	15.7	7.5	6.3				5.8
LOS	D		A	D	D	B	A	A				A
Approach Delay		32.4				27.1		6.3				5.8
Approach LOS		C				C		A				A

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 12.5
 Intersection LOS: B
 Intersection Capacity Utilization 55.3%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

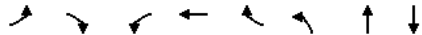


Queues

<Existing>AM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	6	2	98	100	352	8	656	604
w/c Ratio	0.04	0.01	0.47	0.48	0.74	0.02	0.26	0.24
Control Delay	43.2	0.0	47.2	47.5	15.7	7.5	6.3	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	0.0	47.2	47.5	15.7	7.5	6.3	5.8
Queue Length 50th (m)	1.1	0.0	19.1	19.5	4.1	0.3	15.7	14.8
Queue Length 95th (m)	5.0	0.0	32.4	33.0	29.1	2.9	47.2	54.1
Internal Link Dist (m)			202.7				347.5	138.3
Turn Bay Length (m)					125.0	26.5		
Base Capacity (vph)	204	212	340	341	573	429	2496	2468
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 w/c Ratio	0.03	0.01	0.29	0.29	0.61	0.02	0.26	0.24

Intersection Summary

HCM Signalized Intersection Capacity Analysis

<Existing>AM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	6	0	2	188	2	338	8	630	0	0	580	0
Future Volume (vph)	6	0	2	188	2	338	8	630	0	0	580	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	4.5	3.7	4.5	3.7	3.7	3.5	3.0	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)	5.7		5.7	6.0	6.0	6.0	6.3	6.3			6.3	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frbp, ped/bikes	1.00		1.00	1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00			1.00	
Fit Protected	0.95		1.00	0.95	0.95	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1986		1184	1700	1706	1551	1337	3433			3394	
Fit Permitted	0.95		1.00	0.95	0.95	1.00	0.42	1.00			1.00	
Satd. Flow (perm)	1986		1184	1700	1706	1551	591	3433			3394	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	6	0	2	196	2	352	8	656	0	0	604	0
RTOR Reduction (vph)	0	0	2	0	0	289	0	0	0	0	0	0
Lane Group Flow (vph)	6	0	0	98	100	63	8	656	0	0	604	0
Confl. Peds. (#/hr)							7	14	14			
Confl. Bikes (#/hr)							4					
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	0%
Turn Type	Prot		Prot	Split	NA	Perm	Perm	NA			NA	
Protected Phases	7		7	8	8			2			6	
Permitted Phases							8	2				
Actuated Green, G (s)	1.6		1.6	12.2	12.2	12.2	68.2	68.2			68.2	
Effective Green, g (s)	1.6		1.6	12.2	12.2	12.2	68.2	68.2			68.2	
Actuated g/C Ratio	0.02		0.02	0.12	0.12	0.12	0.68	0.68			0.68	
Clearance Time (s)	5.7		5.7	6.0	6.0	6.0	6.3	6.3			6.3	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)	31		18	207	208	189	403	2341			2314	
v/s Ratio Prot	c0.00		0.00	0.06	c0.06			c0.19			0.18	
v/s Ratio Perm							0.04	0.01				
w/c Ratio	0.19		0.00	0.47	0.48	0.33	0.02	0.28			0.26	
Uniform Delay, d1	48.6		48.4	40.9	40.9	40.2	5.1	6.3			6.2	
Progression Factor	1.00		1.00	1.00	1.00	1.00	1.00	1.00			0.93	
Incremental Delay, d2	3.0		0.0	1.7	1.7	1.0	0.1	0.3			0.3	
Delay (s)	51.6		48.5	42.6	42.7	41.2	5.2	6.5			6.0	
Level of Service	D		D	D	D	D	A	A			A	
Approach Delay (s)				50.8				41.7	6.5			
Approach LOS				D				D	A			

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

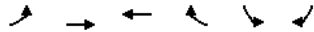
c Critical Lane Group

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<Existing>AM

09-29-2023



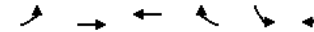
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↔
Traffic Volume (vph)	96	681	563	99	182	229
Future Volume (vph)	96	681	563	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			0%
Storage Length (m)	75.0			18.5	15.5	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	2.5				31.3	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1602	3335	3466	1471	1736	1708
Fit Permitted	0.382				0.950	
Satd. Flow (perm)	644	3335	3466	1471	1736	1708
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				57		254
Link Speed (k/h)		60	60		40	
Link Distance (m)		424.0	896.3		284.9	
Travel Time (s)		25.4	53.8		25.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Adj. Flow (vph)	107	757	626	110	202	254
Shared Lane Traffic (%)						
Lane Group Flow (vph)	107	757	626	110	202	254
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.0	3.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane		Yes				
Headway Factor	1.14	1.04	1.01	1.03	1.00	0.88
Turning Speed (k/h)	24			14	24	14
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (m)	2.0	10.0	10.0	2.0	2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6	2.0	2.0	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		CI+Ex	CI+Ex			
Detector 2 Channel						

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<Existing>AM

09-29-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	8.0	32.3	32.3	32.3	29.0	29.0
Total Split (s)	16.8	70.8	54.0	54.0	49.2	49.2
Total Split (%)	14.0%	59.0%	45.0%	45.0%	41.0%	41.0%
Maximum Green (s)	13.8	64.5	47.7	47.7	43.2	43.2
Yellow Time (s)	3.0	4.3	4.3	4.3	3.3	3.3
All-Red Time (s)	0.0	2.0	2.0	2.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	0.2	0.2	0.2	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)		19.0	19.0	19.0	16.0	16.0
Pedestrian Calls (#/hr)		0	1	1	2	2
Act Effect Green (s)	91.5	88.2	77.6	77.6	19.5	19.5
Actuated g/C Ratio	0.76	0.74	0.65	0.65	0.16	0.16
v/c Ratio	0.19	0.31	0.28	0.11	0.72	0.52
Control Delay	8.1	12.2	7.4	3.4	61.5	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	12.2	7.4	3.4	61.5	8.9
LOS	A	B	A	A	E	A
Approach Delay		11.7	6.8		32.2	
Approach LOS		B	A		C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 60 (50%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 14.5

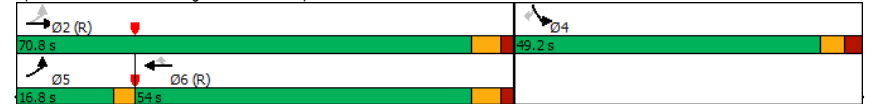
Intersection LOS: B

Intersection Capacity Utilization 45.7%

ICU Level of Service A

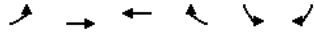
Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

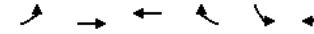
<Existing>AM
09-29-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	107	757	626	110	202	254
w/c Ratio	0.19	0.31	0.28	0.11	0.72	0.52
Control Delay	8.1	12.2	7.4	3.4	61.5	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	12.2	7.4	3.4	61.5	8.9
Queue Length 50th (m)	3.1	51.2	32.7	0.0	45.6	0.0
Queue Length 95th (m)	27.4	112.5	22.9	5.2	66.3	20.5
Internal Link Dist (m)		400.0	872.3		260.9	
Turn Bay Length (m)	75.0			18.5	15.5	
Base Capacity (vph)	601	2452	2240	970	624	777
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced w/c Ratio	0.18	0.31	0.28	0.11	0.32	0.33
Intersection Summary						

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<Existing>AM
09-29-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔	↔	↔	↔
Traffic Volume (vph)	96	681	563	99	182	229
Future Volume (vph)	96	681	563	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Fit Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1602	3335	3466	1471	1736	1708
Fit Permitted	0.38	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	645	3335	3466	1471	1736	1708
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	107	757	626	110	202	254
RTOR Reduction (vph)	0	0	0	20	0	213
Lane Group Flow (vph)	107	757	626	90	202	41
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	88.2	88.2	77.5	77.5	19.5	19.5
Effective Green, g (s)	88.2	88.2	77.5	77.5	19.5	19.5
Actuated g/C Ratio	0.74	0.74	0.65	0.65	0.16	0.16
Clearance Time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Vehicle Extension (s)	3.0	0.2	0.2	0.2	3.0	3.0
Lane Grp Cap (vph)	535	2451	2238	950	282	277
v/s Ratio Prot	0.01	c0.23	0.18		c0.12	
v/s Ratio Perm	0.13			0.06		0.02
v/c Ratio	0.20	0.31	0.28	0.09	0.72	0.15
Uniform Delay, d1	4.7	5.5	9.2	8.0	47.6	43.1
Progression Factor	1.68	1.98	0.70	0.60	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.3	0.2	8.4	0.3
Delay (s)	8.1	11.1	6.8	5.0	56.0	43.4
Level of Service	A	B	A	A	E	D
Approach Delay (s)		10.7	6.5		49.0	
Approach LOS		B	A		D	
Intersection Summary						
HCM 2000 Control Delay		17.7		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.39				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		15.3
Intersection Capacity Utilization		45.7%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<Existing>AM
09-29-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	715	12	284	527	461	65
Future Volume (vph)	715	12	284	527	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.295		0.950	
Satd. Flow (perm)	3479	0	495	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	777	13	309	573	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	790	0	309	573	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<Existing>AM
09-29-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	31.4	31.4
Total Split (s)	52.8		25.2	78.0	42.0	42.0
Total Split (%)	44.0%		21.0%	65.0%	35.0%	35.0%
Maximum Green (s)	45.6		22.2	70.8	36.6	36.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	1.7	1.7
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	5.4	5.4
Lead/Lag			Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	19.0	19.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effct Green (s)	67.4		88.7	84.5	22.9	22.9
Actuated g/C Ratio	0.56		0.74	0.70	0.19	0.19
v/c Ratio	0.40		0.63	0.23	0.76	0.19
Control Delay	18.3		8.8	3.0	53.8	9.8
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	18.3		8.8	3.0	53.8	9.8
LOS	B		A	A	D	A
Approach Delay	18.3			5.0	48.4	
Approach LOS	B			A	D	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 96 (80%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 20.7
 Intersection Capacity Utilization 62.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service B

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<Existing>AM
09-29-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	790	309	573	501	71
w/c Ratio	0.40	0.63	0.23	0.76	0.19
Control Delay	18.3	8.8	3.0	53.8	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	8.8	3.0	53.8	9.8
Queue Length 50th (m)	47.7	5.1	5.7	58.1	0.0
Queue Length 95th (m)	60.2	9.9	12.4	72.3	11.5
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1955	569	2499	1049	547
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 w/c Ratio	0.40	0.54	0.23	0.48	0.13
Intersection Summary					

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<Existing>AM
09-29-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕	↕↕	↕↔	↕
Traffic Volume (vph)	715	12	284	527	461	65
Future Volume (vph)	715	12	284	527	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%	0%	
Total Lost time (s)	7.2		3.0	7.2	5.4	5.4
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3477		1593	3548	3442	1633
Fit Permitted	1.00		0.29	1.00	0.95	1.00
Satd. Flow (perm)	3477		494	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	777	13	309	573	501	71
RTOR Reduction (vph)	1	0	0	0	0	57
Lane Group Flow (vph)	789	0	309	573	501	14
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Actuated Green, G (s)	67.4		84.5	84.5	22.9	22.9
Effective Green, g (s)	67.4		84.5	84.5	22.9	22.9
Actuated g/C Ratio	0.56		0.70	0.70	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	5.4	5.4
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1952		476	2498	656	311
v/s Ratio Prot	0.23		c0.08	0.16	c0.15	
v/s Ratio Perm			c0.38			0.01
w/c Ratio	0.40		0.65	0.23	0.76	0.04
Uniform Delay, d1	14.9		7.7	6.3	46.0	39.6
Progression Factor	1.08		0.54	0.41	1.00	1.00
Incremental Delay, d2	0.6		3.0	0.2	5.3	0.1
Delay (s)	16.7		7.1	2.8	51.3	39.7
Level of Service	B		A	A	D	D
Approach Delay (s)	16.7			4.3	49.8	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay		20.3		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.69				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		15.6
Intersection Capacity Utilization		62.9%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings

12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>AM

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	76	942	37	96	895	74	140	6	92	42	13	124
Future Volume (vph)	76	942	37	96	895	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8	148.5		100.0	18.0		0.0	0.0		0.0	0.0	
Storage Lanes	1	1		1	1		1	0		1	0	
Taper Length (m)	35.3	2.5		2.5		2.5		2.5		2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.95		0.99	0.99		0.99		1.00	0.98	
Frt	0.850		0.850		0.850		0.860		0.865		0.865	
Fit Protected	0.950	0.950		0.950		0.950		0.950		0.950		
Satd. Flow (prot)	1673	3292	1549	1671	3427	1533	1805	1756	0	1643	1472	0
Fit Permitted	0.239		0.229		0.578		0.686		0.686			
Satd. Flow (perm)	419	3292	1549	403	3427	1456	1092	1756	0	1183	1472	0
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	60		87		103		139		139			
Link Speed (k/h)	60		60		30		40		40			
Link Distance (m)	222.7		268.7		130.9		169.9		169.9			
Travel Time (s)	13.4		16.1		15.7		15.3		15.3			
Confl. Peds. (#/hr)	13	6		3		3		6		6		
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	85	1058	42	108	1006	83	157	7	103	47	15	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	1058	42	108	1006	83	157	110	0	47	154	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6		3.6			
Link Offset(m)	0.0		0.0		0.0		0.0		0.0			
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6			
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24	14		24	14		24	14		24	14	
Number of Detectors	1	2	1	1	2	1	1	2	1		2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Left		Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0		10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0		0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4			
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6			
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex			

1105-1163 Kingston Road
WSP

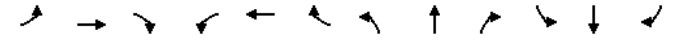
Synchro 11 Report
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Lanes, Volumes, Timings

12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>AM

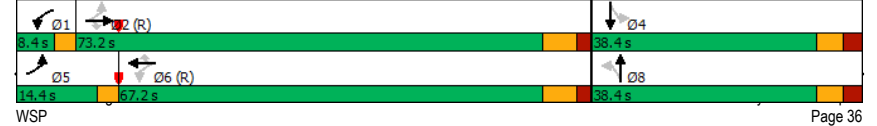
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0			
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm		NA	
Protected Phases	5	2	1		6	8		8		4		
Permitted Phases	2	2		6	6		8	8		4		
Detector Phase	5	2	2	1	6	6	8	8	4		4	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	8.0	8.0	8.0		8.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9	31.9	37.6	37.6	37.6		37.6	
Total Split (s)	14.4	73.2	73.2	8.4	67.2	67.2	38.4	38.4	38.4		38.4	
Total Split (%)	12.0%	61.0%	61.0%	7.0%	56.0%	56.0%	32.0%	32.0%	32.0%		32.0%	
Maximum Green (s)	11.4	66.3	66.3	5.4	60.3	60.3	31.8	31.8	31.8		31.8	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.8	3.8	3.8		3.8	
All-Red Time (s)	0.0	2.2	2.2	0.0	2.2	2.2	2.8	2.8	2.8		2.8	
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	6.9	6.9	3.0	6.9	6.9	6.6	6.6	6.6		6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	3.0	3.0		3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None		None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	18.0		18.0		18.0		24.0		24.0		24.0	
Pedestrian Calls (#/hr)	1		1		16		16		0		1	
Act Effct Green (s)	87.7	76.7	76.7	84.7	76.5	76.5	21.4	21.4	21.4		21.4	
Actuated g/C Ratio	0.73	0.64	0.64	0.71	0.64	0.64	0.18	0.18	0.18		0.18	
v/c Ratio	0.22	0.50	0.04	0.32	0.46	0.09	0.81	0.28	0.22		0.41	
Control Delay	6.6	12.6	2.1	14.9	29.1	12.4	75.2	9.9	41.8		11.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Total Delay	6.6	12.6	2.1	14.9	29.1	12.4	75.2	9.9	41.8		11.4	
LOS	A	B	A	B	C	B	E	A	D		B	
Approach Delay	11.8		26.7		48.3		18.5					
Approach LOS	B		C		D		B					

Intersection Summary	
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	105.6 (88%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.81
Intersection Signal Delay:	21.9
Intersection Capacity Utilization:	71.2%
Intersection LOS:	C
ICU Level of Service:	C
Analysis Period (min):	15

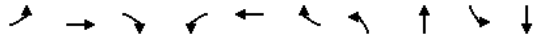
Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



WSP

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Queues <Existing>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	85	1058	42	108	1006	83	157	110	47	154
w/c Ratio	0.22	0.50	0.04	0.32	0.46	0.09	0.81	0.28	0.22	0.41
Control Delay	6.6	12.6	2.1	14.9	29.1	12.4	75.2	9.9	41.8	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.6	12.6	2.1	14.9	29.1	12.4	75.2	9.9	41.8	11.4
Queue Length 50th (m)	5.3	59.7	0.3	12.3	106.6	3.7	35.9	1.4	9.6	3.0
Queue Length 95th (m)	13.4	87.1	m3.5	26.5	136.4	16.6	53.9	14.5	18.5	18.4
Internal Link Dist (m)		198.7		244.7			106.9		145.9	
Turn Bay Length (m)	51.8		148.5	100.0		18.0				
Base Capacity (vph)	430	2103	1011	341	2185	959	289	541	313	492
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 w/c Ratio	0.20	0.50	0.04	0.32	0.46	0.09	0.54	0.20	0.15	0.31

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

HCM Signalized Intersection Capacity Analysis <Existing>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	76	942	37	96	895	74	140	6	92	42	13	124
Future Volume (vph)	76	942	37	96	895	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.6	6.6		6.6	6.6	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3292	1549	1671	3427	1456	1795	1756		1638	1471	
Flt Permitted	0.24	1.00	1.00	0.23	1.00	1.00	0.58	1.00		0.69	1.00	
Satd. Flow (perm)	421	3292	1549	403	3427	1456	1093	1756		1183	1471	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	85	1058	42	108	1006	83	157	7	103	47	15	139
RTOR Reduction (vph)	0	0	15	0	0	31	0	85	0	0	114	0
Lane Group Flow (vph)	85	1058	27	108	1006	52	157	25	0	47	40	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	82.9	76.7	76.7	81.3	75.9	75.9	21.4	21.4		21.4	21.4	
Effective Green, g (s)	82.9	76.7	76.7	81.3	75.9	75.9	21.4	21.4		21.4	21.4	
Actuated g/C Ratio	0.69	0.64	0.64	0.68	0.63	0.63	0.18	0.18		0.18	0.18	
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.6	6.6		6.6	6.6	
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	355	2104	990	330	2167	920	194	313		210	262	
v/s Ratio Prot	c0.01	c0.32		c0.01	0.29			0.01				0.03
v/s Ratio Perm	0.15		0.02	0.21		0.04	c0.14			0.04		
w/c Ratio	0.24	0.50	0.03	0.33	0.46	0.06	0.81	0.08		0.22	0.15	
Uniform Delay, d1	6.8	11.5	7.9	7.4	11.5	8.4	47.3	41.1		42.2	41.6	
Progression Factor	0.97	0.92	1.25	2.24	2.19	4.71	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8	0.0	0.6	0.7	0.1	21.4	0.1		0.5	0.3	
Delay (s)	6.9	11.5	10.0	17.1	25.8	39.7	68.8	41.2		42.7	41.9	
Level of Service	A	B	A	B	C	D	E	D		D	D	
Approach Delay (s)		11.1			26.0		57.4				42.1	
Approach LOS		B			C		E				D	

Intersection Summary
HCM 2000 Control Delay 23.9 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.56
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 16.5
Intersection Capacity Utilization 71.2% ICU Level of Service C
Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<Existing>AM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	311	294	234	478	281	146	390	390	156	796	175
Future Volume (vph)	78	311	294	234	478	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0		39.6			66.8			32.6			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.98	0.99		0.95	1.00		0.97	0.99		0.97
Frt		0.850				0.850			0.850			0.850
Flt Protected	0.950		0.950			0.950			0.950			0.950
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.418		0.483			0.232			0.495			0.495
Satd. Flow (perm)	706	3335	1567	892	3510	1527	413	5057	1509	902	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			218		284		288		288		190	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	286.1		222.7		158.6		385.2					
Travel Time (s)	17.2		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13	38	20	20	20	20	20	20	20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	338	320	254	520	305	159	424	424	170	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	338	320	254	520	305	159	424	424	170	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

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WSP

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Lanes, Volumes, Timings
13: Whites Road & Kingston Road

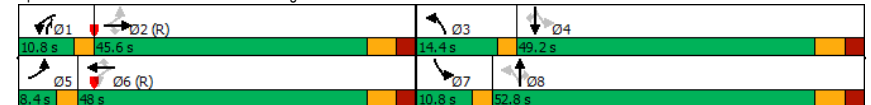
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09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7		4
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	44.1	8.0	8.0	44.1	44.1
Total Split (s)	8.4	45.6	45.6	10.8	48.0	48.0	14.4	52.8	10.8	10.8	49.2	49.2
Total Split (%)	7.0%	38.0%	38.0%	9.0%	40.0%	40.0%	12.0%	44.0%	9.0%	9.0%	41.0%	41.0%
Maximum Green (s)	5.4	38.6	38.6	7.8	41.0	41.0	11.4	45.7	7.8	7.8	42.1	42.1
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	2.8	0.0	0.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	29.0	29.0	29.0	29.0	29.0	29.0	30.0				30.0	30.0
Pedestrian Calls (#/hr)	31	31	31	75	75	75	65				37	37
Act Effect Green (s)	48.0	38.6	38.6	52.9	42.7	42.7	59.9	45.7	57.6	54.9	43.0	43.0
Actuated g/C Ratio	0.40	0.32	0.32	0.44	0.36	0.36	0.50	0.38	0.48	0.46	0.36	0.36
v/c Ratio	0.26	0.32	0.49	0.56	0.42	0.42	0.50	0.22	0.48	0.36	0.48	0.28
Control Delay	22.2	31.7	13.2	16.6	18.6	4.3	22.0	25.5	7.7	19.4	31.0	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	31.7	13.2	16.6	18.6	4.3	22.0	25.5	7.7	19.4	31.0	4.9
LOS	C	C	B	B	B	A	C	C	A	B	C	A
Approach Delay	22.7			14.1			17.4				25.4	
Approach LOS	C			B			B				C	


Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 1.2 (1%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 19.9
 Intersection Capacity Utilization 100.9%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service G

Splits and Phases: 13: Whites Road & Kingston Road



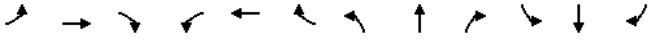
Queues <Existing>AM
13: Whites Road & Kingston Road 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	338	320	254	520	305	159	424	424	170	865	190
w/c Ratio	0.26	0.32	0.49	0.56	0.42	0.42	0.50	0.22	0.48	0.36	0.48	0.28
Control Delay	22.2	31.7	13.2	16.6	18.6	4.3	22.0	25.5	7.7	19.4	31.0	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.2	31.7	13.2	16.6	18.6	4.3	22.0	25.5	7.7	19.4	31.0	4.9
Queue Length 50th (m)	11.5	31.4	17.4	23.5	49.2	15.6	19.8	24.4	16.8	21.2	58.0	0.0
Queue Length 95th (m)	21.3	44.0	43.5	21.4	27.7	0.7	32.5	32.5	39.9	34.1	70.8	15.0
Internal Link Dist (m)		262.1			198.7			134.6			361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	324	1072	651	450	1248	725	330	1925	877	468	1813	686
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.26	0.32	0.49	0.56	0.42	0.42	0.48	0.22	0.48	0.36	0.48	0.28

Intersection Summary

HCM Signalized Intersection Capacity Analysis <Existing>AM
13: Whites Road & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑	↑	↑	↑↑	↑	↑	↑↑	↑
Traffic Volume (vph)	78	311	294	234	478	281	146	390	390	156	796	175
Future Volume (vph)	78	311	294	234	478	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.95	1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1622	3335	1567	1761	3510	1527	1698	5057	1516	1741	5057	1574
Flt Permitted	0.42	1.00	1.00	0.48	1.00	1.00	0.23	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	714	3335	1567	896	3510	1527	415	5057	1516	908	5057	1574
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)	85	338	320	254	520	305	159	424	424	170	865	190
RTOR Reduction (vph)	0	0	148	0	0	184	0	0	160	0	0	122
Lane Group Flow (vph)	85	338	172	254	520	121	159	424	264	170	865	68
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	42.9	38.6	38.6	49.4	42.1	42.1	56.2	45.7	53.5	50.8	43.0	43.0
Effective Green, g (s)	42.9	38.6	38.6	49.4	42.1	42.1	56.2	45.7	53.5	50.8	43.0	43.0
Actuated g/C Ratio	0.36	0.32	0.32	0.41	0.35	0.35	0.47	0.38	0.45	0.42	0.36	0.36
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	0.2	3.0	0.2
Lane Grp Cap (vph)	287	1072	504	425	1231	535	306	1925	675	438	1812	564
v/s Ratio Prot	0.01	0.10		c0.04	0.15		c0.05	0.08	0.03	0.03	0.17	
v/s Ratio Perm	0.09		0.11	c0.21		0.08	c0.20		0.15	0.14		0.04
w/c Ratio	0.30	0.32	0.34	0.60	0.42	0.23	0.52	0.22	0.39	0.39	0.48	0.12
Uniform Delay, d1	26.2	30.7	31.0	26.1	29.7	27.5	19.6	25.1	22.3	22.1	29.8	25.8
Progression Factor	1.00	1.00	1.00	0.52	0.59	0.60	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.8	1.8	2.1	1.0	0.9	1.5	0.3	0.4	0.6	0.9	0.4
Delay (s)	26.8	31.5	32.9	15.6	18.4	17.4	21.0	25.4	22.7	22.7	30.7	26.3
Level of Service	C	C	C	B	B	B	C	C	C	C	C	C
Approach Delay (s)		31.5			17.5			23.6			28.9	
Approach LOS		C			B			C			C	

Intersection Summary

HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.1
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<Existing>AM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↕↕	↕↕	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3387	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3387	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	256				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	622	285	0	737	444	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	651	256	0	737	444	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<Existing>AM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

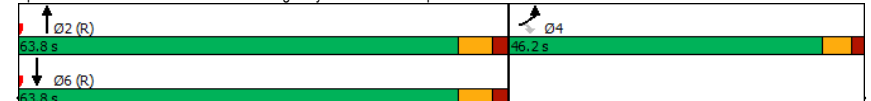


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	27.3	27.3		70.5	70.5	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
v/c Ratio	0.77	0.47		0.34	0.20	
Control Delay	44.5	6.8		10.2	9.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.5	6.8		10.2	9.0	
LOS	D	A		B	A	
Approach Delay	33.8			10.2	9.0	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 20.2
 Intersection Capacity Utilization 48.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<Existing>AM
09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	651	256	737	444
w/c Ratio	0.77	0.47	0.34	0.20
Control Delay	44.5	6.8	10.2	9.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.5	6.8	10.2	9.0
Queue Length 50th (m)	66.5	0.0	35.3	19.0
Queue Length 95th (m)	79.4	19.3	54.4	31.0
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1256	679	2163	2232
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced w/c Ratio	0.52	0.38	0.34	0.20
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<Existing>AM
09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	←←←	→		←←	←←	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3390	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3390	1400		3374	3481	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	622	285	0	737	444	0
RTOR Reduction (vph)	4	192	0	0	0	0
Lane Group Flow (vph)	647	64	0	737	444	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	27.3	27.3		70.5	70.5	
Effective Green, g (s)	27.3	27.3		70.5	70.5	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	841	347		2162	2231	
v/s Ratio Prot	c0.19			c0.22	0.13	
v/s Ratio Perm		0.05				
w/c Ratio	0.77	0.18		0.34	0.20	
Uniform Delay, d1	38.4	32.6		9.1	8.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	0.3		0.4	0.2	
Delay (s)	42.7	32.8		9.5	8.3	
Level of Service	D	C		A	A	
Approach Delay (s)	39.9			9.5	8.3	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay		22.5		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.46				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		48.8%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<Existing>PM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↗	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖	↖	↖	↖↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	38	1402	45	166	761	40	117	19	180	24	16	26
Future Volume (vph)	38	1402	45	166	761	40	117	19	180	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96		1.00		0.98	0.98		1.00	0.98	
Frt			0.850		0.993			0.865			0.906	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3539	1578	1685	3512	0	1745	1599	0	1725	1709	0
Fit Permitted	0.341			0.121			0.729			0.386		
Satd. Flow (perm)	602	3539	1520	215	3512	0	1317	1599	0	698	1709	0
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)			59		9			158			27	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			224.5	
Travel Time (s)		7.8			41.7			11.2			20.2	
Conf. Peds. (#/hr)	5		7	7		5	14		5	5		14
Conf. Bikes (#/hr)			1									
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	39	1445	46	171	785	41	121	20	186	25	16	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	1445	46	171	826	0	121	206	0	25	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.03	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0	0	0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0	0.0	0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	

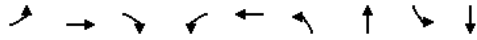
Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<Existing>PM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↗	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6			8		8		4	
Detector Phase	2	2	2	1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	33.0	33.0	33.0	8.0	33.0		36.0	36.0		36.0	36.0	
Total Split (s)	70.8	70.8	70.8	12.0	82.8		37.2	37.2		37.2	37.2	
Total Split (%)	59.0%	59.0%	59.0%	10.0%	69.0%		31.0%	31.0%		31.0%	31.0%	
Maximum Green (s)	64.2	64.2	64.2	9.0	76.2		30.7	30.7		30.7	30.7	
Yellow Time (s)	4.4	4.4	4.4	3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	2.2	2.2	2.2	0.0	2.2		3.2	3.2		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	
Total Lost Time (s)	6.6	6.6	6.6	3.0	6.6		6.5	6.5		6.5	6.5	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	None	C-Max		None	None		None	None	
Walk Time (s)	7.0	7.0	7.0		7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	19.0	19.0	19.0		19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)	8	8	8		4		2	2		9	9	
Act Effect Green (s)	77.6	77.6	77.6	93.0	89.4		17.5	17.5		17.5	17.5	
Actuated g/C Ratio	0.65	0.65	0.65	0.78	0.74		0.15	0.15		0.15	0.15	
v/c Ratio	0.10	0.63	0.05	0.63	0.32		0.63	0.56		0.25	0.16	
Control Delay	9.3	9.0	3.4	30.7	5.2		61.2	18.0		47.9	21.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	9.3	9.0	3.4	30.7	5.2		61.2	18.0		47.9	21.6	
LOS	A	A	A	C	A		E	B		D	C	
Approach Delay		8.9			9.6			33.9			31.3	
Approach LOS		A			A			C			C	
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle:	90											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.63											
Intersection Signal Delay:	12.4						Intersection LOS: B					
Intersection Capacity Utilization:	83.7%						ICU Level of Service E					
Analysis Period (min):	15											
Splits and Phases:	1: Walnut Lane & Kingston Road											

Queues
1: Walnut Lane & Kingston Road

<Existing>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	1445	46	171	826	121	206	25	43
w/c Ratio	0.10	0.63	0.05	0.63	0.32	0.63	0.56	0.25	0.16
Control Delay	9.3	9.0	3.4	30.7	5.2	61.2	18.0	47.9	21.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	9.0	3.4	30.7	5.2	61.2	18.0	47.9	21.6
Queue Length 50th (m)	1.4	40.8	0.1	13.3	23.0	27.5	10.2	5.4	3.3
Queue Length 95th (m)	m7.9	99.5	m2.4	m34.6	39.0	41.9	29.4	12.4	12.1
Internal Link Dist (m)		105.3			670.6		100.5		200.5
Turn Bay Length (m)	26.0		25.8	37.0		63.2		18.5	
Base Capacity (vph)	389	2289	1004	276	2617	336	526	178	457
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 w/c Ratio	0.10	0.63	0.05	0.62	0.32	0.36	0.39	0.14	0.09

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
1: Walnut Lane & Kingston Road

<Existing>PM
09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	38	1402	45	166	761	40	117	19	180	24	16	26
Future Volume (vph)	38	1402	45	166	761	40	117	19	180	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	6.6	6.6	6.6	3.0	6.6		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00		1.00	0.98		1.00	0.98	
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.98	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.86		1.00	0.91	
Fit Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1678	3539	1520	1685	3511		1716	1598		1718	1708	
Fit Permitted	0.34	1.00	1.00	0.12	1.00		0.73	1.00		0.39	1.00	
Satd. Flow (perm)	602	3539	1520	215	3511		1317	1598		699	1708	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	1445	46	171	785	41	121	20	186	25	16	27
RTOR Reduction (vph)	0	0	16	0	2	0	135	0	0	23	0	0
Lane Group Flow (vph)	39	1445	30	171	824	0	121	71	0	25	20	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Actuated Green, G (s)	77.7	77.7	77.7	89.4	89.4		17.5	17.5		17.5	17.5	
Effective Green, g (s)	77.7	77.7	77.7	89.4	89.4		17.5	17.5		17.5	17.5	
Actuated g/C Ratio	0.65	0.65	0.65	0.75	0.75		0.15	0.15		0.15	0.15	
Clearance Time (s)	6.6	6.6	6.6	3.0	6.6		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	389	2291	984	266	2615		192	233		101	249	
v/s Ratio Prot		0.41		c0.05	0.23			0.04			0.01	
v/s Ratio Perm	0.06		0.02	c0.43			c0.09			0.04		
w/c Ratio	0.10	0.63	0.03	0.64	0.31		0.63	0.30		0.25	0.08	
Uniform Delay, d1	8.0	12.6	7.6	10.9	5.1		48.2	45.8		45.4	44.3	
Progression Factor	0.83	0.56	1.55	3.17	0.84		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.2	0.0	4.6	0.3		6.6	0.7		1.3	0.1	
Delay (s)	7.1	8.2	11.9	39.1	4.6		54.8	46.6		46.7	44.4	
Level of Service	A	A	B	D	A		D	D		D	D	
Approach Delay (s)		8.3			10.5			49.6			45.3	
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	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.1
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	1290	100	40	731	135	111	54	63	119	28	92
Future Volume (vph)	204	1290	100	40	731	135	111	54	63	119	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%			0%			0%			0%		
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.96		0.98	1.00	0.99		0.99	0.99		0.99
Frt		0.850			0.850			0.920			0.885	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3433	1472	1597	3500	1495	1770	1787	0	1827	1731	0
Flt Permitted	0.316			0.158			0.658			0.666		
Satd. Flow (perm)	525	3433	1416	266	3500	1461	1221	1787	0	1272	1731	0
Right Turn on Red			Yes		Yes		Yes		Yes			Yes
Satd. Flow (RTOR)			75		142		54			97		
Link Speed (k/h)	60			60			40			60		
Link Distance (m)	896.3			191.2			123.5			236.2		
Travel Time (s)	53.8			11.5			11.1			14.2		
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)		1										
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	215	1358	105	42	769	142	117	57	66	125	29	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	1358	105	42	769	142	117	123	0	125	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8			2.8			3.8			3.8		
Link Offset(m)	0.0			0.0			0.0			0.0		
Crosswalk Width(m)	4.9			4.9			4.9			4.9		
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.10	1.13	1.01	1.10	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0	0	0	0	0	0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8	6.1	6.1	1.8	6.1	6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6						8	4
Permitted Phases	2		2	6		6	8				4	4
Detector Phase	5	2	2	1	6	6	8	8			4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	8.0	8.0			8.0	8.0
Minimum Split (s)	8.0	27.6	27.6	8.0	27.6	27.6	40.1	40.1			40.1	40.1
Total Split (s)	14.4	60.0	60.0	10.8	56.4	56.4	49.2	49.2			49.2	49.2
Total Split (%)	12.0%	50.0%	50.0%	9.0%	47.0%	47.0%	41.0%	41.0%			41.0%	41.0%
Maximum Green (s)	11.4	53.4	53.4	7.8	49.8	49.8	42.1	42.1			42.1	42.1
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	4.4	4.4			4.4	4.4
All-Red Time (s)	0.0	2.4	2.4	0.0	2.4	2.4	2.7	2.7			2.7	2.7
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	6.6	6.6	3.0	6.6	6.6	7.1	7.1			7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None			None	None
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0			7.0	7.0
Flash Dont Walk (s)		14.0	14.0		14.0	14.0	26.0	26.0			26.0	26.0
Pedestrian Calls (#/hr)		4	4		6	6	2	2			3	3
Act Effct Green (s)	91.1	79.9	79.9	85.0	75.0	75.0	18.8	18.8			18.8	18.8
Actuated g/C Ratio	0.76	0.67	0.67	0.71	0.62	0.62	0.16	0.16			0.16	0.16
v/c Ratio	0.45	0.59	0.11	0.16	0.35	0.15	0.62	0.38			0.63	0.36
Control Delay	7.0	20.1	4.2	6.1	9.4	1.4	59.2	26.9			59.6	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay	7.0	20.1	4.2	6.1	9.4	1.4	59.2	26.9			59.6	14.9
LOS	A	C	A	A	A	A	E	C			E	B
Approach Delay		17.4			8.1			42.6			37.1	
Approach LOS		B			A			D			D	

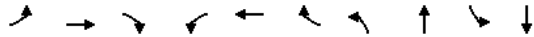
Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	28.8 (24%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	18.1
Intersection LOS:	B
Intersection Capacity Utilization:	70.4%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 3: Dixie Road & Kingston Road



Queues <Existing>PM
3: Dixie Road & Kingston Road 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	215	1358	105	42	769	142	117	123	125	126
w/c Ratio	0.45	0.59	0.11	0.16	0.35	0.15	0.62	0.38	0.63	0.36
Control Delay	7.0	20.1	4.2	6.1	9.4	1.4	59.2	26.9	59.6	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	20.1	4.2	6.1	9.4	1.4	59.2	26.9	59.6	14.9
Queue Length 50th (m)	10.0	158.9	4.9	1.8	43.0	1.0	26.5	14.7	28.4	6.0
Queue Length 95th (m)	32.6	188.1	14.1	4.6	61.4	3.4	39.2	27.5	41.3	19.5
Internal Link Dist (m)		872.3			167.2			99.5		212.2
Turn Bay Length (m)	145.4		64.5	51.0		79.5	13.0		16.0	
Base Capacity (vph)	498	2284	967	278	2186	966	428	661	446	670
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 w/c Ratio	0.43	0.59	0.11	0.15	0.35	0.15	0.27	0.19	0.28	0.19

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

HCM Signalized Intersection Capacity Analysis <Existing>PM
3: Dixie Road & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑		↑	↑	↑
Traffic Volume (vph)	204	1290	100	40	731	135	111	54	63	119	28	92
Future Volume (vph)	204	1290	100	40	731	135	111	54	63	119	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6	6.6	3.0	6.6	6.6	7.1	7.1		7.1	7.1	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.98	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3433	1417	1596	3500	1461	1763	1786		1815	1730	
Flt Permitted	0.32	1.00	1.00	0.16	1.00	1.00	0.66	1.00		0.67	1.00	
Satd. Flow (perm)	526	3433	1417	265	3500	1461	1220	1786		1273	1730	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	215	1358	105	42	769	142	117	57	66	125	29	97
RTOR Reduction (vph)	0	0	26	0	53	0	46	0	0	82	0	0
Lane Group Flow (vph)	215	1358	80	42	769	89	117	77	0	125	44	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	87.5	79.2	79.2	80.2	74.9	74.9	18.8	18.8		18.8	18.8	
Effective Green, g (s)	87.5	79.2	79.2	80.2	74.9	74.9	18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.73	0.66	0.66	0.67	0.62	0.62	0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6	6.6	3.0	6.6	6.6	7.1	7.1		7.1	7.1	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	467	2265	935	235	2184	911	191	279		199	271	
v/s Ratio Prot	c0.04	c0.40		0.01	0.22			0.04			0.03	
v/s Ratio Perm	0.30		0.06	0.11		0.06	0.10			c0.10		
w/c Ratio	0.46	0.60	0.09	0.18	0.35	0.10	0.61	0.28		0.63	0.16	
Uniform Delay, d1	5.7	11.5	7.3	8.0	10.9	9.0	47.2	44.6		47.3	43.8	
Progression Factor	0.87	1.42	0.94	0.85	0.72	0.46	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.0	0.1	0.4	0.4	0.2	5.7	0.5		6.1	0.3	
Delay (s)	5.5	17.2	7.1	7.2	8.2	4.3	52.9	45.2		53.4	44.1	
Level of Service	A	B	A	A	A	A	D	D		D	D	
Approach Delay (s)		15.1			7.6		48.9				48.7	
Approach LOS		B			A		D				D	

Intersection Summary
HCM 2000 Control Delay 18.1 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.61
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 16.7
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<Existing>PM
09-29-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Future Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93			0.95	0.98		0.91	0.98		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.365			0.101			0.374			0.246		
Satd. Flow (perm)	638	3461	1486	182	3579	1493	699	3773	1554	515	3654	1461
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			237			91			237			124
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.1			257.7				350.8
Travel Time (s)		41.7			23.8			18.6				25.3
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<Existing>PM

6: Liverpool Road & Kingston Road

09-29-2023

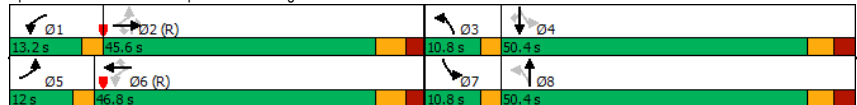


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	41.0	35.1	8.0	41.0	41.0
Total Split (s)	12.0	45.6	45.6	13.2	46.8	46.8	10.8	50.4	45.6	10.8	50.4	50.4
Total Split (%)	10.0%	38.0%	38.0%	11.0%	39.0%	39.0%	9.0%	42.0%	38.0%	9.0%	42.0%	42.0%
Maximum Green (s)	9.0	38.5	38.5	10.2	39.7	39.7	7.8	43.4	38.5	7.8	43.4	43.4
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	3.2	2.8	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	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)	21.0	21.0		21.0	21.0		27.0	21.0		27.0	27.0	27.0
Pedestrian Calls (#/hr)	15	15		20	20		28	15		15	15	15
Act Effect Green (s)	51.6	38.5	38.5	54.0	39.7	39.7	55.5	43.7	38.5	54.9	43.4	43.4
Actuated g/C Ratio	0.43	0.32	0.32	0.45	0.33	0.33	0.46	0.36	0.32	0.46	0.36	0.36
v/c Ratio	0.66	0.94	0.58	1.10	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20
Control Delay	33.4	57.0	23.2	120.8	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	57.0	23.2	120.8	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
LOS	C	E	C	F	C	A	D	C	A	B	C	A
Approach Delay	46.0			54.9			28.4			24.5		
Approach LOS	D			D			C			C		

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 98.4 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.10
 Intersection Signal Delay: 39.0
 Intersection Capacity Utilization 104.1%
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<Existing>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
v/c Ratio	0.66	0.94	0.58	1.10	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20
Control Delay	33.4	57.0	23.2	120.8	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	57.0	23.2	120.8	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Length 50th (m)	44.6	137.4	54.5	-45.6	53.5	0.0	43.2	73.7	5.6	12.3	49.3	0.0
Queue Length 95th (m)	58.7	#170.5	88.2	#96.0	69.7	5.8	#70.2	92.7	25.5	21.9	64.5	12.3
Internal Link Dist (m)	670.6			372.1			233.7			326.8		
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	353	1110	637	211	1184	554	395	1374	659	335	1321	607
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.94	0.58	1.10	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<Existing>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Future Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.95
Fipb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1679	3461	1486	1711	3579	1493	1798	3773	1554	2018	3654	1461
Flt Permitted	0.36	1.00	1.00	0.10	1.00	1.00	0.37	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	645	3461	1486	181	3579	1493	707	3773	1554	522	3654	1461
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
RTOR Reduction (vph)	0	0	161	0	0	45	0	0	161	0	0	79
Lane Group Flow (vph)	232	1039	210	233	549	22	305	753	110	99	537	45
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	custm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Actuated Green, G (s)	47.5	38.5	38.5	49.9	39.7	39.7	51.5	43.7	38.5	50.9	43.4	43.4
Effective Green, g (s)	47.5	38.5	38.5	49.9	39.7	39.7	51.5	43.7	38.5	50.9	43.4	43.4
Actuated g/C Ratio	0.40	0.32	0.32	0.42	0.33	0.33	0.43	0.36	0.32	0.42	0.36	0.36
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	332	1110	476	205	1184	493	374	1374	498	314	1321	528
v/s Ratio Prot	0.05	0.30		c0.10	0.15		c0.05	0.20		0.02	0.15	
v/s Ratio Perm	0.22		0.14	c0.37		0.01	c0.30		0.07	0.11		0.03
v/c Ratio	0.70	0.94	0.44	1.14	0.46	0.04	0.82	0.55	0.22	0.32	0.41	0.08
Uniform Delay, d1	27.4	39.6	32.2	31.4	31.7	27.3	28.2	30.3	29.8	21.9	28.7	25.2
Progression Factor	1.15	1.10	1.69	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	13.1	2.4	104.5	1.3	0.2	12.8	1.6	1.0	0.6	0.9	0.3
Delay (s)	36.7	56.7	56.8	135.9	33.0	27.4	41.1	31.9	30.8	22.5	29.6	25.5
Level of Service	D	E	E	F	C	C	D	C	C	C	C	C
Approach Delay (s)		53.9			60.8			33.8			28.0	
Approach LOS		D			E			C			C	
Intersection Summary												
HCM 2000 Control Delay		45.0										D
HCM 2000 Volume to Capacity ratio		0.99										
Actuated Cycle Length (s)		120.0							20.1			
Intersection Capacity Utilization		104.1%							G			
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings

8: Liverpool Road & Private Access/Pickering Parkway

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	398	58	174	106	992	396	191	855	46
Future Volume (vph)	87	69	130	398	58	174	106	992	396	191	855	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5			35.5
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0				29.5			28.9	
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor		0.96		0.97				0.99		0.96		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	3539	1569	1708	3535	1597
Flt Permitted	0.000			0.000			0.208			0.147		
Satd. Flow (perm)	0	2959	0	0	1858	1399	357	3539	1502	264	3535	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		134				179			408			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2						5			6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	90	71	134	410	60	179	109	1023	408	197	881	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	205	0	410	60	179	109	1023	408	197	881	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

<Existing>PM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023

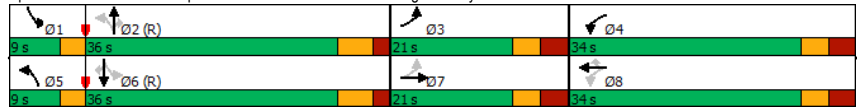


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	3	7	4	8	8	5	2	2	6	1	6	6
Permitted Phases	7	8	8	8	8	2	2	2	6	6	6	6
Detector Phase	3	7	4	8	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0	30.0
Total Split (s)	21.0	21.0	34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0	36.0
Total Split (%)	21.0%	21.0%	34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4	27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7	29.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2	4.2
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max	C-Max
Walk Time (s)			19.0		19.0		17.0		17.0		17.0	
Flash Dont Walk (s)			8.0		8.0		6.0		6.0		6.0	
Pedestrian Calls (#/hr)			20		20		28		28		15	
Act Effect Green (s)	10.8	10.8	20.3	20.3	20.3	49.7	40.4	40.4	49.7	40.4	40.4	40.4
Actuated g/C Ratio	0.11	0.11	0.20	0.20	0.20	0.50	0.40	0.40	0.50	0.40	0.40	0.40
v/c Ratio	0.49	0.47	0.63	0.16	0.42	0.43	0.72	0.48	0.91	0.62	0.07	0.07
Control Delay	50.5	18.9	40.2	31.3	7.7	13.9	22.2	2.4	63.1	28.0	0.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	18.9	40.2	31.3	7.7	13.9	22.2	2.4	63.1	28.0	0.2	0.2
LOS	D	B	D	C	A	B	C	A	E	C	A	A
Approach Delay	28.5		30.4		16.4		33.0					
Approach LOS	C		C		B		C					

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.91
Intersection Signal Delay:	25.1
Intersection Capacity Utilization:	76.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	D

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<Existing>PM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	90	205	410	60	179	109	1023	408	197	881	47	
v/c Ratio	0.49	0.47	0.63	0.16	0.42	0.43	0.72	0.48	0.91	0.62	0.07	
Control Delay	50.5	18.9	40.2	31.3	7.7	13.9	22.2	2.4	63.1	28.0	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.5	18.9	40.2	31.3	7.7	13.9	22.2	2.4	63.1	28.0	0.2	
Queue Length 50th (m)	16.7	6.7	38.8	10.0	0.0	5.3	48.1	0.0	18.3	66.7	0.0	
Queue Length 95th (m)	30.9	16.6	48.2	18.5	15.4	m12.7 m#129.8	m6.4	#66.1	107.1	0.0	0.0	
Internal Link Dist (m)	58.8		304.5		138.3		233.7					
Turn Bay Length (m)			57.0		62.1		54.4		75.7		132.5	
Base Capacity (vph)	245	540	877	509	513	254	1428	849	217	1426	683	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38	0.47	0.12	0.35	0.43	0.72	0.48	0.91	0.62	0.07	

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.

HCM Signalized Intersection Capacity Analysis
 8: Liverpool Road & Private Access/Pickering Parkway

<Existing>PM
 09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	87	69	130	398	58	174	106	992	396	191	855	46
Future Volume (vph)	87	69	130	398	58	174	106	992	396	191	855	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6	6.6	6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93	1.00
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	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	1.00
Satd. Flow (prot)	1705	2929		3204	1858	1399	1642	3539	1504	1707	3535	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.21	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	0	2929		0	1858	1399	359	3539	1504	265	3535	1485
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	71	134	410	60	179	109	1023	408	197	881	47
RTOR Reduction (vph)	0	120	0	0	0	143	0	0	243	0	0	28
Lane Group Flow (vph)	90	85	0	410	60	36	109	1023	165	197	881	19
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			8	2		2	6	
Actuated Green, G (s)	10.8	10.8		20.3	20.3	20.3	46.4	40.4	40.4	46.4	40.4	40.4
Effective Green, g (s)	10.8	10.8		20.3	20.3	20.3	46.4	40.4	40.4	46.4	40.4	40.4
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	184	316		650	377	283	243	1429	607	209	1428	599
v/s Ratio Prot	c0.05	0.03		c0.13	0.03		0.03	0.29		c0.06	0.25	
v/s Ratio Perm						0.03	0.18		0.11	c0.38		0.01
v/c Ratio	0.49	0.27		0.63	0.16	0.13	0.45	0.72	0.27	0.94	0.62	0.03
Uniform Delay, d1	42.0	41.0		36.4	32.8	32.6	16.7	25.0	19.9	21.8	23.7	18.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.65	0.70	0.31	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.5		2.0	0.2	0.2	1.0	2.3	0.8	46.0	2.0	0.1
Delay (s)	44.0	41.4		38.4	33.0	32.8	11.9	19.7	7.0	67.8	25.7	18.1
Level of Service	D	D		D	C	C	B	B	A	E	C	B
Approach Delay (s)		42.2			36.4			15.8			32.7	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay	26.9		HCM 2000 Level of Service				C					
HCM 2000 Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)				22.5					
Intersection Capacity Utilization	76.4%		ICU Level of Service				D					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
 9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

<Existing>PM
 09-29-2023

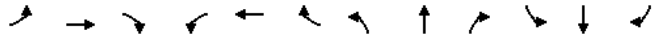
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Traffic Volume (vph)	36	0	16	278	8	405	25	1055	0	0	887	2
Future Volume (vph)	36	0	16	278	8	405	25	1055	0	0	887	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.5	3.7	4.5	3.7	3.7	3.5	3.0	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0		0.0	0.0		125.0	26.5		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	0		0
Taper Length (m)	2.5			2.5			52.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor							0.99					1.00
Frt			0.850			0.850						
Flt Protected	0.950			0.950	0.955		0.950					
Satd. Flow (prot)	1986	0	1777	1734	1743	1581	1685	3535	0	0	3460	0
Flt Permitted	0.950			0.950	0.955		0.244					
Satd. Flow (perm)	1986	0	1777	1734	1743	1581	429	3535	0	0	3460	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			101			156						
Link Speed (k/h)		30			50		50				50	
Link Distance (m)		75.1			226.7		371.5				162.3	
Travel Time (s)		9.0			16.3		26.7				11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	39	0	17	299	9	435	27	1134	0	0	954	2
Shared Lane Traffic (%)				49%								
Lane Group Flow (vph)	39	0	17	152	156	435	27	1134	0	0	956	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.5			4.5		3.0				3.0	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.88	0.99	0.88	0.99	0.99	1.01	1.09	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1		1	1	2	1	1	2			2	
Detector Template	Left		Right	Left	Thru	Right	Left	Thru			Thru	
Leading Detector (m)	2.0		2.0	2.0	10.0	2.0	2.0	10.0			10.0	
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Size(m)	2.0		2.0	2.0	0.6	2.0	2.0	0.6			0.6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<Existing>PM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023

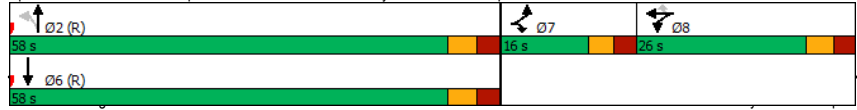


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type	Prot		Prot	Split	NA	Perm	Perm	NA			NA	
Protected Phases	7		7	8	8				2			6
Permitted Phases						8	2					
Detector Phase	7		7	8	8	8	2	2				6
Switch Phase												
Minimum Initial (s)	8.0		8.0	8.0	8.0	15.0	15.0				15.0	
Minimum Split (s)	14.0		14.0	25.0	25.0	25.0	25.0	25.0			25.0	
Total Split (s)	16.0		16.0	26.0	26.0	26.0	58.0	58.0			58.0	
Total Split (%)	16.0%		16.0%	26.0%	26.0%	26.0%	58.0%	58.0%			58.0%	
Maximum Green (s)	10.3		10.3	20.0	20.0	20.0	51.7	51.7			51.7	
Yellow Time (s)	3.0		3.0	3.3	3.3	3.3	3.3	3.3			3.3	
All-Red Time (s)	2.7		2.7	2.7	2.7	2.7	3.0	3.0			3.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	5.7		5.7	6.0	6.0	6.0	6.3	6.3			6.3	
Lead/Lag	Lead		Lead	Lag	Lag	Lag						
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Recall Mode	None		None	None	None	None	C-Max	C-Max			C-Max	
Walk Time (s)				14.0	14.0	14.0	13.0	13.0			13.0	
Flash Dont Walk (s)				5.0	5.0	5.0	5.0	5.0			5.0	
Pedestrian Calls (#/hr)				0	0	0	14	14			14	
Act Effct Green (s)	8.4		8.4	20.0	20.0	20.0	59.1	59.1			59.1	
Actuated g/C Ratio	0.08		0.08	0.20	0.20	0.20	0.59	0.59			0.59	
v/c Ratio	0.23		0.07	0.44	0.45	0.99	0.11	0.54			0.47	
Control Delay	46.2		0.6	39.7	39.9	66.7	12.9	14.8			8.3	
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Delay	46.2		0.6	39.7	39.9	66.7	12.9	14.8			8.3	
LOS	D		A	D	D	E	B	B			A	
Approach Delay		32.4				55.6		14.7			8.3	
Approach LOS		C				E		B			A	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 23.4 Intersection LOS: C
 Intersection Capacity Utilization 71.2% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

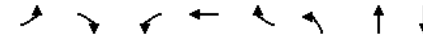


Queues

<Existing>PM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBL	EBR	WBL	WBT	WBR	NBL	NBT	SBT
Lane Group Flow (vph)	39	17	152	156	435	27	1134	956
v/c Ratio	0.23	0.07	0.44	0.45	0.99	0.11	0.54	0.47
Control Delay	46.2	0.6	39.7	39.9	66.7	12.9	14.8	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	0.6	39.7	39.9	66.7	12.9	14.8	8.3
Queue Length 50th (m)	7.2	0.0	27.3	28.2	57.5	2.4	74.2	37.3
Queue Length 95th (m)	17.0	0.0	47.3	48.2	#119.4	7.4	97.5	45.8
Internal Link Dist (m)				202.7			347.5	138.3
Turn Bay Length (m)					125.0	26.5		
Base Capacity (vph)	204	273	346	348	441	253	2088	2044
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	0.19	0.06	0.44	0.45	0.99	0.11	0.54	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<Existing>PM

9: Liverpool Road & Private Access/Hwy 401 WB Off-Ramp

09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	36	0	16	278	8	405	25	1055	0	0	887	2
Future Volume (vph)	36	0	16	278	8	405	25	1055	0	0	887	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.5	3.7	4.5	3.7	3.7	3.5	3.0	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)	5.7	5.7	6.0	6.0	6.0	6.3	6.3				6.3	
Lane Util. Factor	1.00		1.00	0.95	0.95	1.00	1.00	0.95			0.95	
Frb, ped/bikes	1.00		1.00	1.00	1.00	1.00	1.00	1.00			1.00	
Frb, ped/bikes	1.00		1.00	1.00	1.00	0.99	1.00	1.00			1.00	
Fit Protected	0.95		1.00	0.95	0.96	1.00	0.95	1.00			1.00	
Satd. Flow (prot)	1986		1776	1734	1743	1581	1670	3535			3459	
Fit Permitted	0.95		1.00	0.95	0.96	1.00	0.24	1.00			1.00	
Satd. Flow (perm)	1986		1776	1734	1743	1581	429	3535			3459	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	39	0	17	299	9	435	27	1134	0	0	954	2
RTOR Reduction (vph)	0	0	16	0	0	125	0	0	0	0	0	0
Lane Group Flow (vph)	39	0	1	152	156	310	27	1134	0	0	956	0
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)									6			7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type	Prot		Prot	Split	NA	Perm	Perm	NA			NA	
Protected Phases	7		7	8	8			2				6
Permitted Phases						8	2					
Actuated Green, G (s)	5.2		5.2	20.0	20.0	20.0	56.8	56.8			56.8	
Effective Green, g (s)	5.2		5.2	20.0	20.0	20.0	56.8	56.8			56.8	
Actuated g/C Ratio	0.05		0.05	0.20	0.20	0.20	0.57	0.57			0.57	
Clearance Time (s)	5.7		5.7	6.0	6.0	6.0	6.3	6.3			6.3	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	3.0			3.0	
Lane Grp Cap (vph)	103		92	346	348	316	243	2007			1964	
v/s Ratio Prot	c0.02		0.00	0.09	0.09			c0.32			0.28	
v/s Ratio Perm						c0.20	0.06					
v/c Ratio	0.38		0.01	0.44	0.45	0.98	0.11	0.57			0.49	
Uniform Delay, d1	45.8		45.0	35.1	35.2	39.8	10.0	13.7			12.9	
Progression Factor	1.00		1.00	1.00	1.00	1.00	1.00	1.00			0.59	
Incremental Delay, d2	2.3		0.0	0.9	0.9	45.4	0.9	1.2			0.7	
Delay (s)	48.2		45.0	36.0	36.1	85.2	10.9	14.9			8.4	
Level of Service	D		D	D	D	F	B	B			A	
Approach Delay (s)		47.2				64.8		14.8			8.4	
Approach LOS		D				E		B			A	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

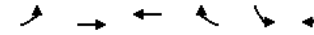
c Critical Lane Group

Lanes, Volumes, Timings

<Existing>PM

10: Kingston Road & Fairport Road

09-29-2023



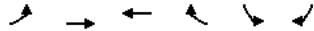
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	205	1371	718	223	271	137
Future Volume (vph)	205	1371	718	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			0%
Storage Length (m)	75.0			18.5	15.5	0.0
Storage Lanes	1			1	1	1
Taper Length (m)	2.5				31.3	
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Ped Bike Factor	1.00			0.98		0.98
Frnt				0.850		0.850
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1618	3433	3466	1559	1805	1777
Fit Permitted	0.315				0.950	
Satd. Flow (perm)	536	3433	3466	1524	1805	1750
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				112		143
Link Speed (k/h)		60	60		40	
Link Distance (m)		424.0	896.3		284.9	
Travel Time (s)		25.4	53.8		25.6	
Confl. Peds. (#/hr)	1			1		2
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Adj. Flow (vph)	214	1428	748	232	282	143
Shared Lane Traffic (%)						
Lane Group Flow (vph)	214	1428	748	232	282	143
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.0	3.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		1.6	1.6		1.6	
Two way Left Turn Lane		Yes				
Headway Factor	1.14	1.04	1.01	1.03	1.00	0.88
Turning Speed (k/h)	24			14	24	14
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (m)	2.0	10.0	10.0	2.0	2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6	2.0	2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			

Lanes, Volumes, Timings

<Existing>PM

10: Kingston Road & Fairport Road

09-29-2023

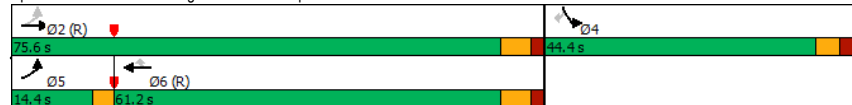


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector 2 Type	CI+Ex		CI+Ex			
Detector 2 Channel						
Detector 2 Extend (s)	0.0		0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2		6		4	4
Detector Phase	5	2	6	6	4	4
Switch Phase						
Minimum Initial (s)	5.0	20.0	20.0	20.0	8.0	8.0
Minimum Split (s)	8.0	32.3	32.3	32.3	29.0	29.0
Total Split (s)	14.4	75.6	61.2	61.2	44.4	44.4
Total Split (%)	12.0%	63.0%	51.0%	51.0%	37.0%	37.0%
Maximum Green (s)	11.4	69.3	54.9	54.9	38.4	38.4
Yellow Time (s)	3.0	4.3	4.3	4.3	3.3	3.3
All-Red Time (s)	0.0	2.0	2.0	2.0	2.7	2.7
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	0.2	0.2	0.2	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	None	None
Walk Time (s)	7.0		7.0		7.0	
Flash Dont Walk (s)	19.0		19.0		16.0	
Pedestrian Calls (#/hr)	0		0		0	
Act Effect Green (s)	86.8	83.5	70.6	70.6	24.2	24.2
Actuated g/C Ratio	0.72	0.70	0.59	0.59	0.20	0.20
v/c Ratio	0.45	0.60	0.37	0.25	0.78	0.31
Control Delay	4.9	11.2	8.6	3.2	59.5	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	11.2	8.6	3.2	59.5	7.4
LOS	A	B	A	A	E	A
Approach Delay	10.4		7.3		42.0	
Approach LOS	B		A		D	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 72 (60%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
 Natural Cycle: 70
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 13.8 Intersection LOS: B
 Intersection Capacity Utilization 63.4% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road

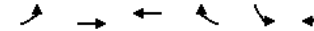


Queues

<Existing>PM

10: Kingston Road & Fairport Road

09-29-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	214	1428	748	232	282	143
v/c Ratio	0.45	0.60	0.37	0.25	0.78	0.31
Control Delay	4.9	11.2	8.6	3.2	59.5	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.9	11.2	8.6	3.2	59.5	7.4
Queue Length 50th (m)	6.6	175.0	21.2	3.7	63.4	0.0
Queue Length 95th (m)	m19.8	203.4	25.3	7.8	86.2	15.1
Internal Link Dist (m)	400.0		872.3		260.9	
Turn Bay Length (m)	75.0		18.5		15.5	
Base Capacity (vph)	490	2389	2039	942	577	657
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.60	0.37	0.25	0.49	0.22

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<Existing>PM
09-29-2023

	↖	→	←	↗	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↗↘	↗↘	↗	↘	↗
Traffic Volume (vph)	205	1371	718	223	271	137
Future Volume (vph)	205	1371	718	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1618	3433	3466	1524	1805	1750
Fit Permitted	0.32	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	537	3433	3466	1524	1805	1750
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1428	748	232	282	143
RTOR Reduction (vph)	0	0	0	46	0	114
Lane Group Flow (vph)	214	1428	748	186	282	29
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases	2			6		4
Actuated Green, G (s)	83.5	83.5	70.6	70.6	24.2	24.2
Effective Green, g (s)	83.5	83.5	70.6	70.6	24.2	24.2
Actuated g/C Ratio	0.70	0.70	0.59	0.59	0.20	0.20
Clearance Time (s)	3.0	6.3	6.3	6.3	6.0	6.0
Vehicle Extension (s)	3.0	0.2	0.2	0.2	3.0	3.0
Lane Grp Cap (vph)	462	2388	2039	896	364	352
v/s Ratio Prot	0.04	c0.42	0.22		c0.16	
v/s Ratio Perm	0.28			0.12		0.02
v/c Ratio	0.46	0.60	0.37	0.21	0.77	0.08
Uniform Delay, d1	7.1	9.5	13.0	11.6	45.3	38.9
Progression Factor	0.46	0.99	0.57	0.37	1.00	1.00
Incremental Delay, d2	0.5	0.8	0.5	0.5	9.9	0.1
Delay (s)	3.8	10.2	7.9	4.8	55.2	39.0
Level of Service	A	B	A	A	E	D
Approach Delay (s)		9.4	7.2		49.7	
Approach LOS		A	A		D	
Intersection Summary						
HCM 2000 Control Delay			14.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	15.3
Intersection Capacity Utilization			63.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

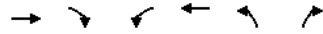
Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<Existing>PM
09-29-2023

	→	↗	↘	←	↖	↙
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗↘		↗	↗↘	↗↘	↗
Traffic Volume (vph)	1473	23	184	670	662	100
Future Volume (vph)	1473	23	184	670	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.073		0.950	
Satd. Flow (perm)	3577	0	121	3618	3536	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					90
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1503	23	188	684	676	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1526	0	188	684	676	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<Existing>PM
09-29-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6			8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	31.4	31.4
Total Split (s)	70.8		15.6	86.4	33.6	33.6
Total Split (%)	59.0%		13.0%	72.0%	28.0%	28.0%
Maximum Green (s)	63.6		12.6	79.2	28.2	28.2
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	1.7	1.7
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	5.4	5.4
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	19.0	19.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	66.1		85.2	81.0	26.4	26.4
Actuated g/C Ratio	0.55		0.71	0.68	0.22	0.22
v/c Ratio	0.77		0.82	0.28	0.87	0.24
Control Delay	13.9		45.4	15.2	57.5	11.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	13.9		45.4	15.2	57.5	11.2
LOS	B		D	B	E	B
Approach Delay	13.9			21.7	51.5	
Approach LOS	B			C	D	

Intersection Summary

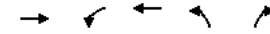
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 8.4 (7%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 25.2
 Intersection LOS: C
 Intersection Capacity Utilization 84.6%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<Existing>PM
09-29-2023



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1526	188	684	676	102
v/c Ratio	0.77	0.82	0.28	0.87	0.24
Control Delay	13.9	45.4	15.2	57.5	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	45.4	15.2	57.5	11.2
Queue Length 50th (m)	124.2	26.2	57.8	78.1	2.2
Queue Length 95th (m)	139.8	#60.4	74.0	99.4	16.1
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1972	238	2441	832	442
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	0.77	0.79	0.28	0.81	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<Existing>PM
09-29-2023

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑	↑
Traffic Volume (vph)	1473	23	184	670	662	100
Future Volume (vph)	1473	23	184	670	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	5.4	5.4
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3576		1577	3618	3544	1591
Fit Permitted	1.00		0.07	1.00	0.95	1.00
Satd. Flow (perm)	3576		122	3618	3544	1591
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1503	23	188	684	676	102
RTOR Reduction (vph)	1	0	0	0	0	70
Lane Group Flow (vph)	1525	0	188	684	676	32
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases			6		8	
Actuated Green, G (s)	66.2		81.0	81.0	26.4	26.4
Effective Green, g (s)	66.2		81.0	81.0	26.4	26.4
Actuated g/C Ratio	0.55		0.68	0.68	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	5.4	5.4
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1972		225	2442	779	350
v/s Ratio Prot	0.43		c0.08	0.19	c0.19	
v/s Ratio Perm			c0.48		0.02	
v/c Ratio	0.77		0.84	0.28	0.87	0.09
Uniform Delay, d1	21.0		30.9	7.8	45.1	37.2
Progression Factor	0.52		0.75	1.84	1.00	1.00
Incremental Delay, d2	2.4		21.8	0.3	10.1	0.1
Delay (s)	13.3		45.0	14.7	55.2	37.4
Level of Service	B		D	B	E	D
Approach Delay (s)	13.3			21.2	52.8	
Approach LOS	B			C	D	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑↑	↑	↑	↑↑	↑	↑	↑	↑	↑	↑	↑
Traffic Volume (vph)	130	1344	38	89	1129	121	198	15	138	82	13	143
Future Volume (vph)	130	1344	38	89	1129	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98			0.94	1.00					0.99
Frt			0.850			0.850		0.864				0.862
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3357	1549	1705	3461	1579	1770	1824	0	1725	1474	0
Fit Permitted	0.175			0.132			0.589			0.596		
Satd. Flow (perm)	305	3357	1515	237	3461	1488	1096	1824	0	1082	1474	0
Right Turn on Red			Yes		Yes			Yes		Yes		Yes
Satd. Flow (RTOR)			60		87			137				146
Link Speed (k/h)		60			60			30				40
Link Distance (m)		222.7			268.7			130.9				169.9
Travel Time (s)		13.4			16.1			15.7				15.3
Confl. Peds. (#/hr)	16		1	1		16	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	133	1371	39	91	1152	123	202	15	141	84	13	146
Shared Lane Traffic (%)												
Lane Group Flow (vph)	133	1371	39	91	1152	123	202	156	0	84	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane					Yes							
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>PM

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9	31.9	8.0	31.9	31.9	37.6	37.6		37.6	37.6	
Total Split (s)	13.2	72.0	72.0	9.6	68.4	68.4	38.4	38.4		38.4	38.4	
Total Split (%)	11.0%	60.0%	60.0%	8.0%	57.0%	57.0%	32.0%	32.0%		32.0%	32.0%	
Maximum Green (s)	10.2	65.1	65.1	6.6	61.5	61.5	31.8	31.8		31.8	31.8	
Yellow Time (s)	3.0	4.7	4.7	3.0	4.7	4.7	3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2	2.2	0.0	2.2	2.2	2.8	2.8		2.8	2.8	
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	6.9	6.9	3.0	6.9	6.9	6.6	6.6		6.6	6.6	
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0	18.0		18.0	18.0	24.0	24.0		24.0	24.0	
Pedestrian Calls (#/hr)		0	0		13	13	3	3		6	6	
Act Effct Green (s)	83.9	71.7	71.7	80.0	69.7	69.7	25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.70	0.60	0.60	0.67	0.58	0.58	0.21	0.21		0.21	0.21	
v/c Ratio	0.43	0.68	0.04	0.39	0.57	0.14	0.87	0.32		0.37	0.37	
Control Delay	8.5	13.8	0.9	9.5	7.9	1.8	79.0	9.8		43.4	9.7	
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	8.5	13.8	0.9	9.5	7.9	1.8	79.0	9.8		43.4	9.7	
LOS	A	B	A	A	A	A	E	A		D	A	
Approach Delay		13.1			7.5		48.9				21.4	
Approach LOS		B			A		D				C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 111.6 (93%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 15.1

Intersection LOS: B

Intersection Capacity Utilization 83.3%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



WSP

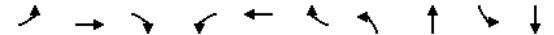
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Queues

12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>PM

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	1371	39	91	1152	123	202	156	84	159
v/c Ratio	0.43	0.68	0.04	0.39	0.57	0.14	0.87	0.32	0.37	0.37
Control Delay	8.5	13.8	0.9	9.5	7.9	1.8	79.0	9.8	43.4	9.7
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	13.8	0.9	9.5	7.9	1.8	79.0	9.8	43.4	9.7
Queue Length 50th (m)	8.4	88.9	0.0	2.5	77.1	1.9	45.9	3.6	16.9	2.5
Queue Length 95th (m)	m12.3	106.5	m0.0	m4.9	116.1	m7.7	#74.4	19.3	30.2	18.6
Internal Link Dist (m)		198.7			244.7			106.9		145.9
Turn Bay Length (m)	51.8		148.5	100.0		18.0				
Base Capacity (vph)	331	2006	929	238	2008	900	290	584	286	497
Starvation Cap Reductn	0	49	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	0.40	0.70	0.04	0.38	0.57	0.14	0.70	0.27	0.29	0.32

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.

1105-1163 Kingston Road

WSP

Synchro 11 Report

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HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<Existing>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1344	38	89	1129	121	198	15	138	82	13	143
Future Volume (vph)	130	1344	38	89	1129	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.6	6.6	6.6	6.6	6.6	6.6
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.94	1.00	1.00	1.00	1.00	0.99	1.00
Flpb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	0.86	1.00	0.86	1.00	0.86
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1655	3357	1515	1705	3461	1488	1768	1825	1725	1475	1725	1475
Flt Permitted	0.18	1.00	1.00	0.13	1.00	1.00	0.59	1.00	0.60	1.00	0.60	1.00
Satd. Flow (perm)	305	3357	1515	236	3461	1488	1097	1825	1082	1475	1082	1475
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	1371	39	91	1152	123	202	15	141	84	13	146
RTOR Reduction (vph)	0	0	16	0	0	36	0	108	0	0	115	0
Lane Group Flow (vph)	133	1371	23	91	1152	87	202	48	0	84	44	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	80.3	71.8	71.8	76.1	69.7	69.7	25.3	25.3	25.3	25.3	25.3	25.3
Effective Green, g (s)	80.3	71.8	71.8	76.1	69.7	69.7	25.3	25.3	25.3	25.3	25.3	25.3
Actuated g/C Ratio	0.67	0.60	0.60	0.63	0.58	0.58	0.21	0.21	0.21	0.21	0.21	0.21
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.6	6.6	6.6	6.6	6.6	6.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	2008	906	228	2010	864	231	384	228	310	310	310
v/s Ratio Prot	c0.03	c0.41		0.02	0.33		0.03		0.03		0.03	
v/s Ratio Perm	0.27		0.02	0.23		0.06	c0.18		0.08		0.08	
v/c Ratio	0.44	0.68	0.03	0.40	0.57	0.10	0.87	0.12	0.37	0.14	0.37	0.14
Uniform Delay, d1	9.7	16.4	9.8	11.5	15.8	11.2	45.8	38.4	40.5	38.5	40.5	38.5
Progression Factor	0.86	0.70	0.56	0.81	0.40	0.29	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.2	0.0	1.0	1.0	0.2	28.6	0.1	1.0	0.2	1.0	0.2
Delay (s)	9.1	12.7	5.6	10.3	7.3	3.4	74.4	38.5	41.5	38.7	41.5	38.7
Level of Service	A	B	A	B	A	A	E	D	D	D	D	D
Approach Delay (s)	12.2				7.2		58.7		39.7			
Approach LOS	B				A		E		D			

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<Existing>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	722	358	231	724	490	228	684	655	189	617	186
Future Volume (vph)	155	722	358	231	724	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Flt Permitted	0.284			0.213			0.337			0.322		
Satd. Flow (perm)	491	3400	1554	385	3579	1512	618	5255	1471	580	5105	1550
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)			216			216		68		68		192
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	286.1			222.7			158.6			385.2		
Travel Time (s)	17.2			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Adj. Flow (vph)	160	744	369	238	746	505	235	705	675	195	636	192
Shared Lane Traffic (%)												
Lane Group Flow (vph)	160	744	369	238	746	505	235	705	675	195	636	192
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5				3.5				3.5			
Link Offset(m)	0.0				0.0				0.0			
Crosswalk Width(m)	1.6				1.6				1.6			
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)												
Detector 2 Delay (s)	9.4				9.4				9.4			
Detector 2 Size(m)	0.6				0.6				0.6			

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<Existing>PM
09-29-2023

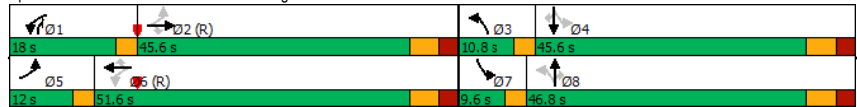


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	44.1	8.0	8.0	44.1	44.1
Total Split (s)	12.0	45.6	45.6	18.0	51.6	51.6	10.8	46.8	18.0	9.6	45.6	45.6
Total Split (%)	10.0%	38.0%	38.0%	15.0%	43.0%	43.0%	9.0%	39.0%	15.0%	8.0%	38.0%	38.0%
Maximum Green (s)	9.0	38.6	38.6	15.0	44.6	44.6	7.8	39.7	15.0	6.6	38.5	38.5
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	2.8	0.0	0.0	2.8	2.8
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	29.0		29.0	29.0		29.0	30.0		30.0		30.0	30.0
Pedestrian Calls (#/hr)	13		13	38		38	20		20		20	20
Act Effect Green (s)	52.8	40.0	40.0	60.4	44.8	44.8	51.6	39.7	57.4	49.2	38.5	38.5
Actuated g/C Ratio	0.44	0.33	0.33	0.50	0.37	0.37	0.43	0.33	0.48	0.41	0.32	0.32
v/c Ratio	0.53	0.66	0.56	0.69	0.56	0.72	0.69	0.41	0.90	0.65	0.39	0.31
Control Delay	23.9	37.9	16.9	33.9	18.0	11.6	35.2	31.9	40.1	34.2	32.5	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.9	37.9	16.9	33.9	18.0	11.6	35.2	31.9	40.1	34.2	32.5	5.5
LOS	C	D	B	C	B	B	D	C	D	C	C	A
Approach Delay	30.0			18.4			35.8			27.7		
Approach LOS	C			B			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 1.2 (1%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 28.1
 Intersection Capacity Utilization 104.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service G

Splits and Phases: 13: Whites Road & Kingston Road



Queues
13: Whites Road & Kingston Road

<Existing>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	744	369	238	746	505	235	705	675	195	636	192
v/c Ratio	0.53	0.66	0.56	0.69	0.56	0.72	0.69	0.41	0.90	0.65	0.39	0.31
Control Delay	23.9	37.9	16.9	33.9	18.0	11.6	35.2	31.9	40.1	34.2	32.5	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.9	37.9	16.9	33.9	18.0	11.6	35.2	31.9	40.1	34.2	32.5	5.5
Queue Length 50th (m)	20.0	79.7	28.5	22.2	26.5	8.4	34.7	46.8	114.8	28.1	42.4	0.0
Queue Length 95th (m)	32.7	101.2	59.2	53.8	50.9	38.4	53.1	58.2	#193.8	44.3	53.5	15.8
Internal Link Dist (m)	262.1			198.7			134.6			361.2		
Turn Bay Length (m)	127.0			123.0	87.1			35.0	72.0			47.0
Base Capacity (vph)	305	1132	661	362	1335	699	340	1738	770	302	1637	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.66	0.56	0.66	0.56	0.72	0.69	0.41	0.88	0.65	0.39	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<Existing>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	722	358	231	724	490	228	684	655	189	617	186
Future Volume (vph)	155	722	358	231	724	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.94	1.00	1.00	0.95
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1671	3400	1554	1731	3579	1512	1760	5255	1501	1739	5105	1550
Fit Permitted	0.28	1.00	1.00	0.21	1.00	1.00	0.34	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)	499	3400	1554	387	3579	1512	624	5255	1501	590	5105	1550
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	160	744	369	238	746	505	235	705	675	195	636	192
RTOR Reduction (vph)	0	0	144	0	0	135	0	0	38	0	0	130
Lane Group Flow (vph)	160	744	225	238	746	370	235	705	637	195	636	62
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	48.8	40.0	40.0	56.6	44.8	44.8	47.5	39.7	53.3	45.1	38.5	38.5
Effective Green, g (s)	48.8	40.0	40.0	56.6	44.8	44.8	47.5	39.7	53.3	45.1	38.5	38.5
Actuated g/C Ratio	0.41	0.33	0.33	0.47	0.37	0.37	0.40	0.33	0.44	0.38	0.32	0.32
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	7.1	3.0	3.0	7.1	7.1
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	288	1133	518	334	1336	564	320	1738	666	284	1637	497
v/s Ratio Prot	0.04	0.22		0.08	0.21		0.05	0.13	0.11	0.04	0.12	
v/s Ratio Perm	0.18		0.14	0.25		0.24	0.24		0.32	0.22		0.04
v/c Ratio	0.56	0.66	0.43	0.71	0.56	0.66	0.73	0.41	0.96	0.69	0.39	0.12
Uniform Delay, d1	23.8	34.1	31.2	21.6	29.8	31.2	27.8	31.0	32.2	28.4	31.6	28.8
Progression Factor	1.00	1.00	1.00	1.44	0.55	0.34	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	3.0	2.6	5.9	1.4	4.9	8.5	0.7	24.4	6.7	0.7	0.5
Delay (s)	26.1	37.1	33.8	36.9	17.8	15.5	36.2	31.7	56.6	35.2	32.3	29.3
Level of Service	C	D	C	D	B	B	D	C	E	D	C	C
Approach Delay (s)	34.8			20.1			42.8			32.3		
Approach LOS	C			C			D			C		
Intersection Summary												
HCM 2000 Control Delay	32.7			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			20.1					
Intersection Capacity Utilization	104.7%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
14: Whites Road & Highway 401 EB Off Ramp

<Existing>PM
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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.955					
Satd. Flow (prot)	3453	1427	0	3539	3618	0
Fit Permitted	0.955					
Satd. Flow (perm)	3453	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	138				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1245	620	0	885	576	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1307	558	0	885	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<Existing>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

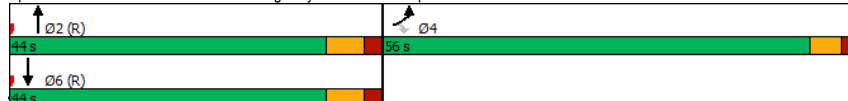


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
v/c Ratio	0.82	0.78		0.60	0.38	
Control Delay	27.9	24.5		25.6	21.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	27.9	24.5		25.6	21.9	
LOS	C	C		C	C	
Approach Delay	26.9			25.6	21.9	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.7 Intersection LOS: C
 Intersection Capacity Utilization 73.4% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<Existing>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1307	558	885	576
v/c Ratio	0.82	0.78	0.60	0.38
Control Delay	27.9	24.5	25.6	21.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.5	25.6	21.9
Queue Length 50th (m)	106.7	72.7	69.8	40.6
Queue Length 95th (m)	124.5	113.7	95.5	57.8
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1747	777	1478	1511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.72	0.60	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<Existing>PM
 09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑↑	↑		↑↑	↑↑	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3451	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3451	1404		3539	3618	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1245	620	0	885	576	0
RTOR Reduction (vph)	4	75	0	0	0	0
Lane Group Flow (vph)	1303	483	0	885	576	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	46.0	46.0		41.8	41.8	
Effective Green, g (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1587	645		1479	1512	
v/s Ratio Prot	c0.38			c0.25	0.16	
v/s Ratio Perm		0.34				
v/c Ratio	0.82	0.75		0.60	0.38	
Uniform Delay, d1	23.4	22.3		22.6	20.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	4.8		1.8	0.7	
Delay (s)	27.0	27.0		24.4	20.9	
Level of Service	C	C		C	C	
Approach Delay (s)	27.0			24.4	20.9	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		25.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<Existing_Adjusted>PM

10-30-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Future Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93			0.95	0.98		0.91	0.98		0.95
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Fit Permitted	0.365			0.096			0.374			0.246		
Satd. Flow (perm)	638	3461	1486	173	3579	1493	699	3773	1554	515	3654	1461
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242			91			237			124
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.1			257.7				350.8
Travel Time (s)		41.7			23.8			18.6				25.3
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<Existing_Adjusted>PM

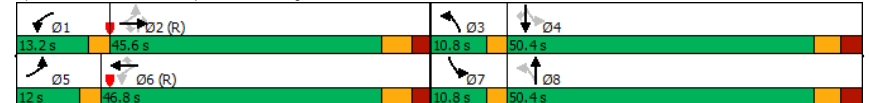
10-30-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	41.0	35.1	8.0	41.0	41.0
Total Split (s)	12.0	45.6	45.6	13.2	46.8	46.8	10.8	50.4	45.6	10.8	50.4	50.4
Total Split (%)	10.0%	38.0%	38.0%	11.0%	39.0%	39.0%	9.0%	42.0%	38.0%	9.0%	42.0%	42.0%
Maximum Green (s)	9.0	38.5	38.5	10.2	39.7	39.7	7.8	43.4	38.5	7.8	43.4	43.4
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	3.2	2.8	0.0	3.2	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	1.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Flash Dont Walk (s)	21.0	21.0	21.0	21.0	21.0	21.0	27.0	21.0	27.0	21.0	27.0	27.0
Pedestrian Calls (#/hr)		15	15		20	20		28	15		15	15
Act Effect Green (s)	51.6	38.5	38.5	57.8	39.7	39.7	55.5	43.7	38.5	54.9	43.4	43.4
Actuated g/C Ratio	0.43	0.32	0.32	0.48	0.33	0.33	0.46	0.36	0.32	0.46	0.36	0.36
v/c Ratio	0.66	0.94	0.58	0.97	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20
Control Delay	33.4	57.0	22.8	82.0	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	57.0	22.8	82.0	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
LOS	C	E	C	F	C	A	D	C	A	B	C	A
Approach Delay		45.9			44.3			28.4				24.5
Approach LOS		D			D			C				C

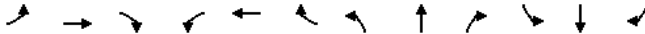
Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 98.4 (82%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 37.0 Intersection LOS: D
 Intersection Capacity Utilization 104.1% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road




Queues <Existing_Adjusted>PM
6: Liverpool Road & Kingston Road 10-30-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
w/c Ratio	0.66	0.94	0.58	0.97	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20
Control Delay	33.4	57.0	22.8	82.0	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	57.0	22.8	82.0	33.3	3.2	37.3	32.2	7.8	19.3	29.8	5.3
Queue Length 50th (m)	44.6	137.4	53.8	38.7	53.5	0.0	43.2	73.7	5.6	12.3	49.3	0.0
Queue Length 95th (m)	58.7	#170.5	87.5	#89.1	69.7	5.8	#70.2	92.7	25.5	21.9	64.5	12.3
Internal Link Dist (m)		670.6			372.1			233.7			326.8	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	353	1110	641	239	1184	554	395	1374	659	335	1321	607
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.66	0.94	0.58	0.97	0.46	0.12	0.77	0.55	0.41	0.30	0.41	0.20

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <Existing_Adjusted>PM
6: Liverpool Road & Kingston Road 10-30-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Future Volume (vph)	227	1018	364	228	538	66	299	738	266	97	526	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	1.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.95
Fipb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1679	3461	1486	1711	3579	1493	1798	3773	1554	2018	3654	1461
Fit Permitted	0.36	1.00	1.00	0.10	1.00	1.00	0.37	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	645	3461	1486	174	3579	1493	707	3773	1554	522	3654	1461
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	232	1039	371	233	549	67	305	753	271	99	537	124
RTOR Reduction (vph)	0	0	164	0	0	45	0	0	161	0	0	79
Lane Group Flow (vph)	232	1039	207	233	549	22	305	753	110	99	537	45
Confl. Peds. (#/hr)	31	44	44		31	40	61	61		61	40	
Confl. Bikes (#/hr)			5			6		9				2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	0	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases	2		2	6		6	8		2	4		4
Actuated Green, G (s)	47.5	38.5	38.5	49.9	39.7	39.7	51.5	43.7	38.5	50.9	43.4	43.4
Effective Green, g (s)	47.5	38.5	38.5	53.7	39.7	39.7	51.5	43.7	38.5	50.9	43.4	43.4
Actuated g/C Ratio	0.40	0.32	0.32	0.45	0.33	0.33	0.43	0.36	0.32	0.42	0.36	0.36
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	7.0	7.1	3.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	332	1110	476	234	1184	493	374	1374	498	314	1321	528
v/s Ratio Prot	0.05	c0.30		c0.10	0.15		c0.05	0.20		0.02	0.15	
v/s Ratio Perm	0.22		0.14	0.35		0.01	c0.30		0.07	0.11		0.03
w/c Ratio	0.70	0.94	0.43	1.00	0.46	0.04	0.82	0.55	0.22	0.32	0.41	0.08
Uniform Delay, d1	27.4	39.6	32.2	33.7	31.7	27.3	28.2	30.3	29.8	21.9	28.7	25.2
Progression Factor	1.15	1.10	1.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	13.1	2.3	57.3	1.3	0.2	12.8	1.6	1.0	0.6	0.9	0.3
Delay (s)	36.7	56.7	57.4	91.0	33.0	27.4	41.1	31.9	30.8	22.5	29.6	25.5
Level of Service	D	E	E	F	C	C	D	C	C	C	C	C
Approach Delay (s)		54.0			48.5			33.8			28.0	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			42.8								D	
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			120.0						20.1			
Intersection Capacity Utilization			104.1%						ICU Level of Service		G	
Analysis Period (min)			15									
c Critical Lane Group												

APPENDIX

D BACKGROUND DEVELOPMENTS VOLUMES



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Background Development Volume 1
1294 Kingston Road, 1848 & 1852 Liverpool Road



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Background Development Volume 3

Expansion of 1355 King Road



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Background Development Volume 4

Home Life Care Services at 1234 Kingston Road



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Background Development Volume 5

Tribute-Liverpool & Highway 401



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

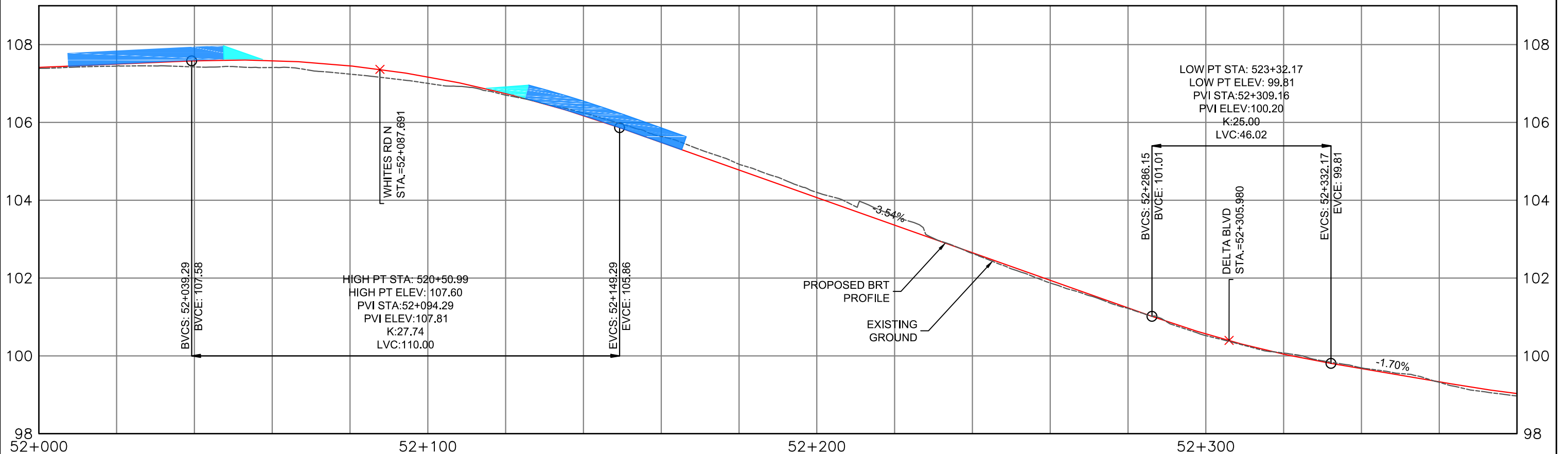
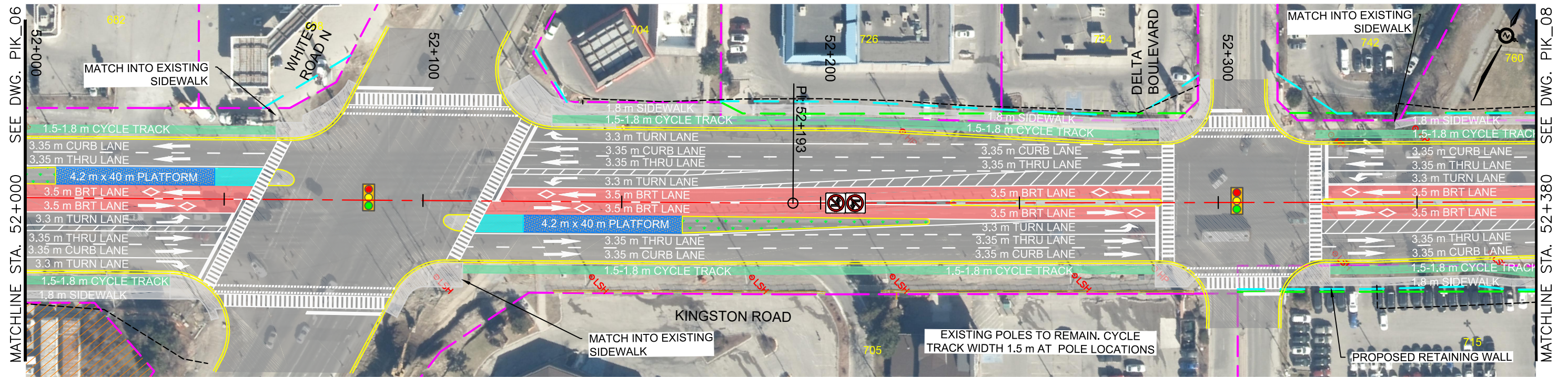
Background Development Volume 6

1790 Liverpool Road

APPENDIX

E KINGSTON BRT PRELIMINARY DESIGNS

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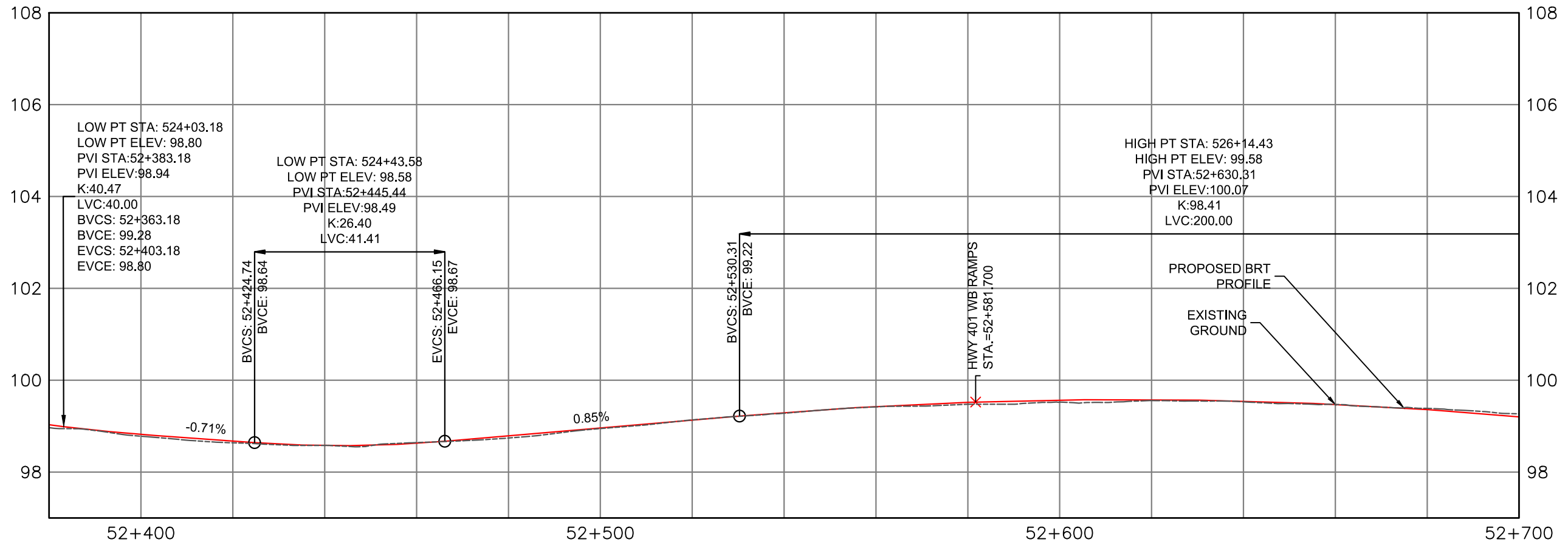
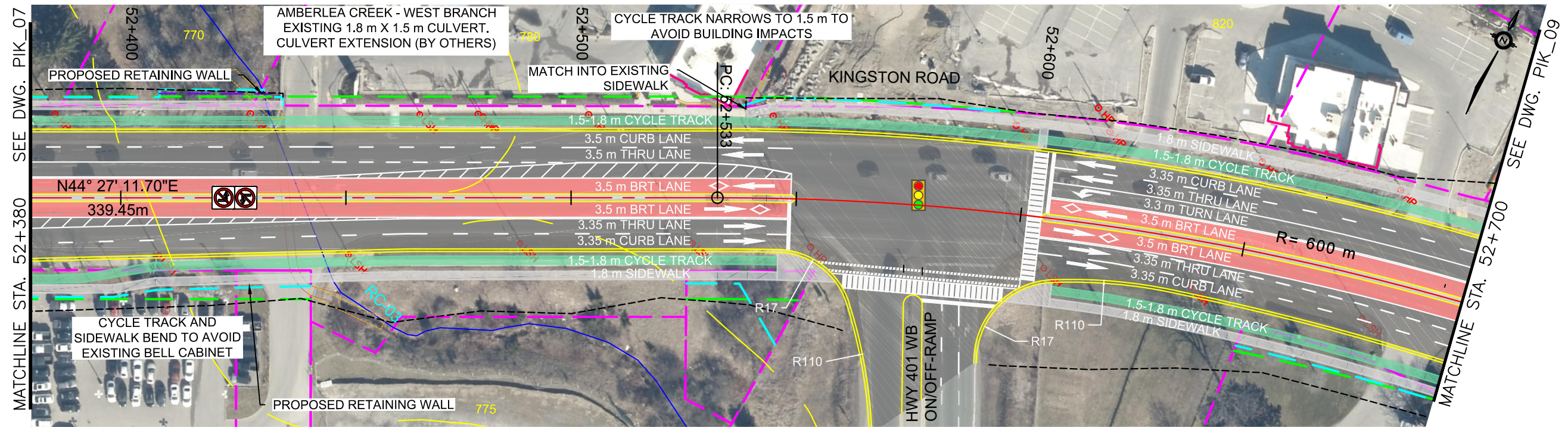


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CHECKED BY: M.H 08/17/21	APPROVED BY: M.P 08/17/21
SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 20m 2m

DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 52+000 TO STA. 52+380			
CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_07

January 14, 2022, 4:19 PM Login name: adrian.chiu
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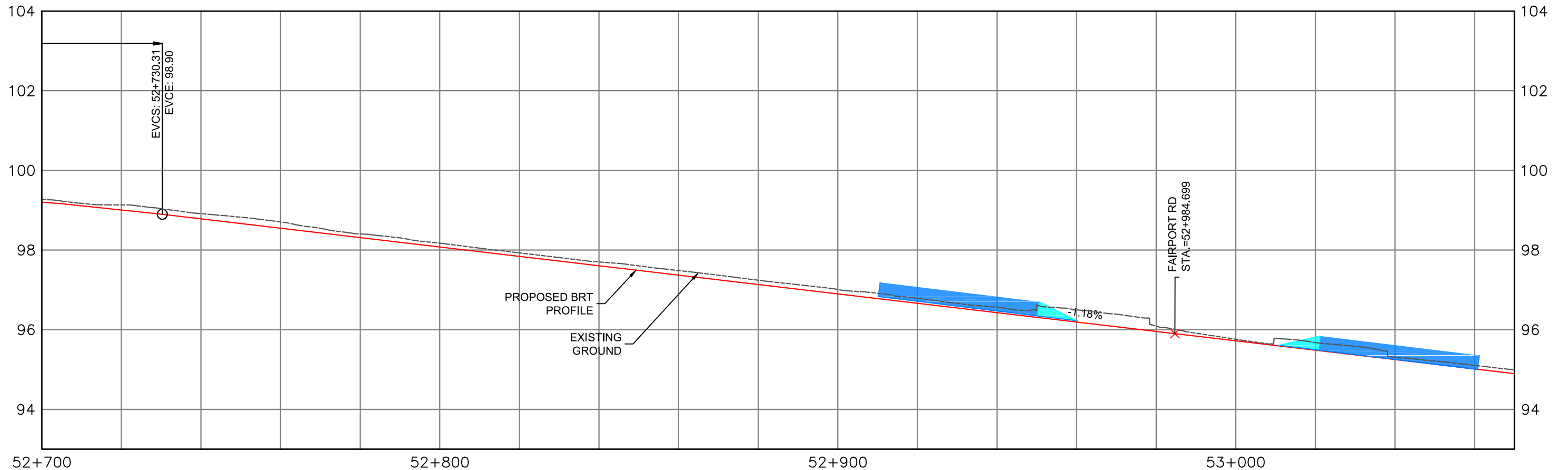
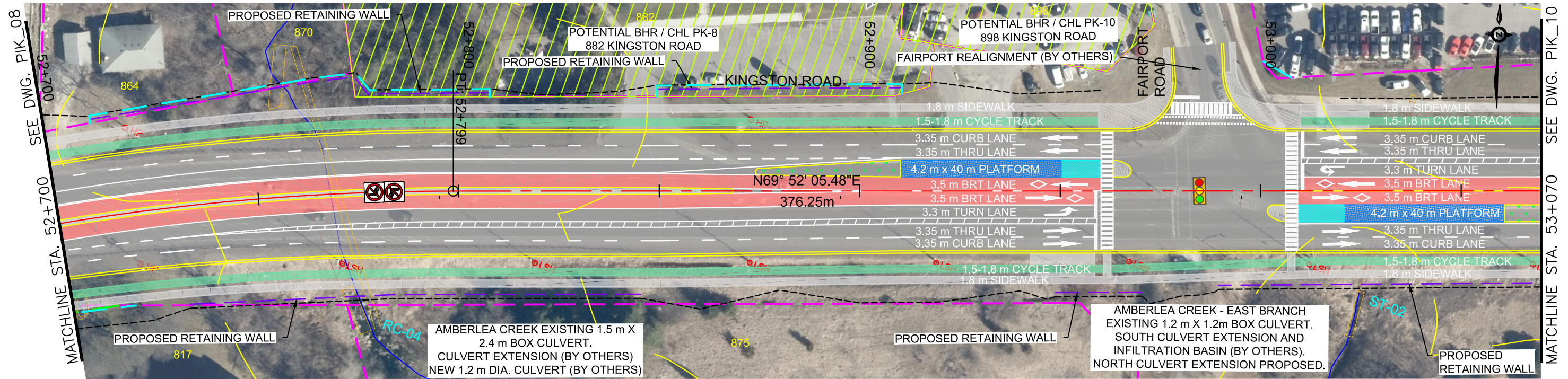
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CHECKED BY: M.H 08/17/21	APPROVED BY: M.P 08/17/21
SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 20m 2m

DURHAM - SCARBOROUGH				
Bus Rapid Transit				

DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 52+380 TO STA. 52+700			
CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRTO_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_08

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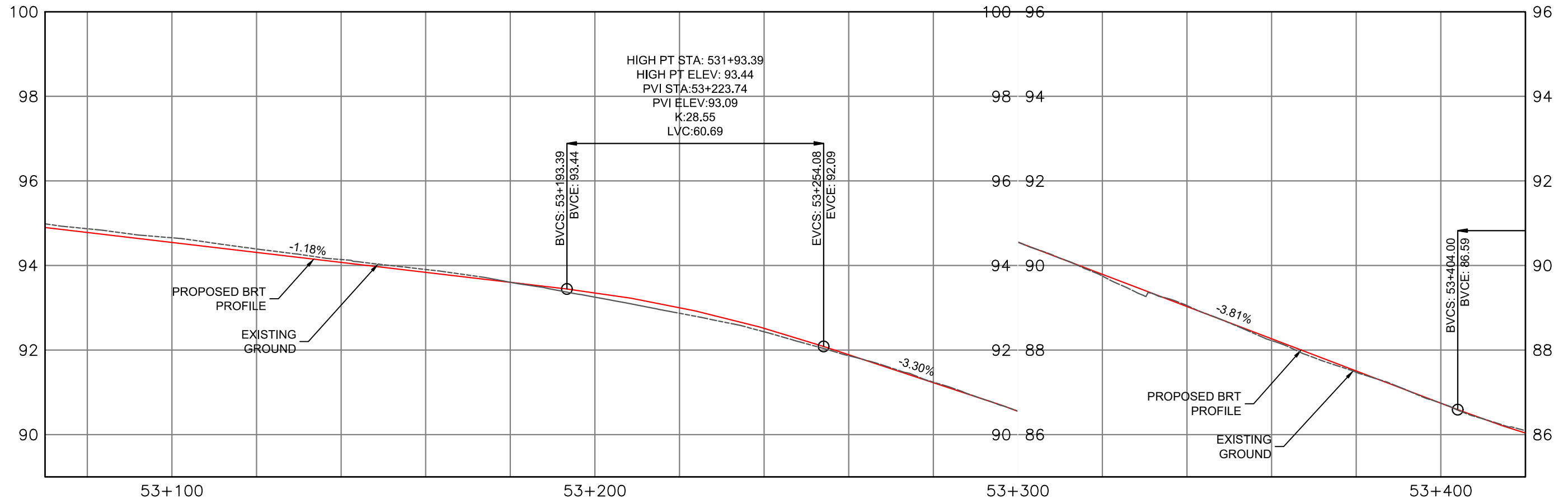
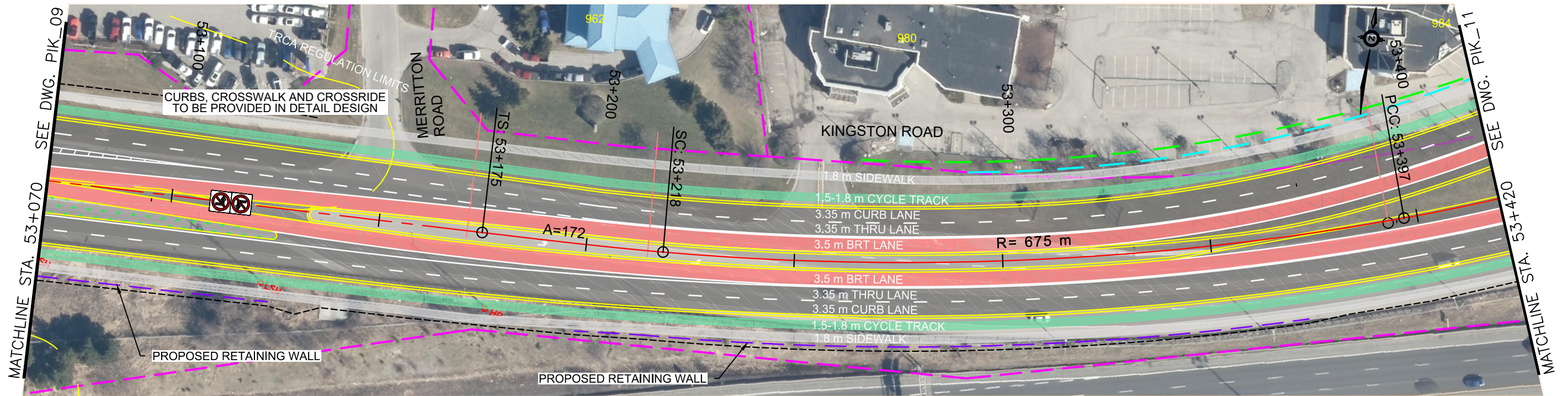
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CHECKED BY: M.H 08/17/21	APPROVED BY: M.P 08/17/21
SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 0 10 20m



DURHAM-SCARBOROUGH BUS RAPID TRANSIT
 ENVIRONMENTAL ASSESSMENT
 PLAN AND PROFILE
 STA. 52+700 TO STA. 53+070

CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_09
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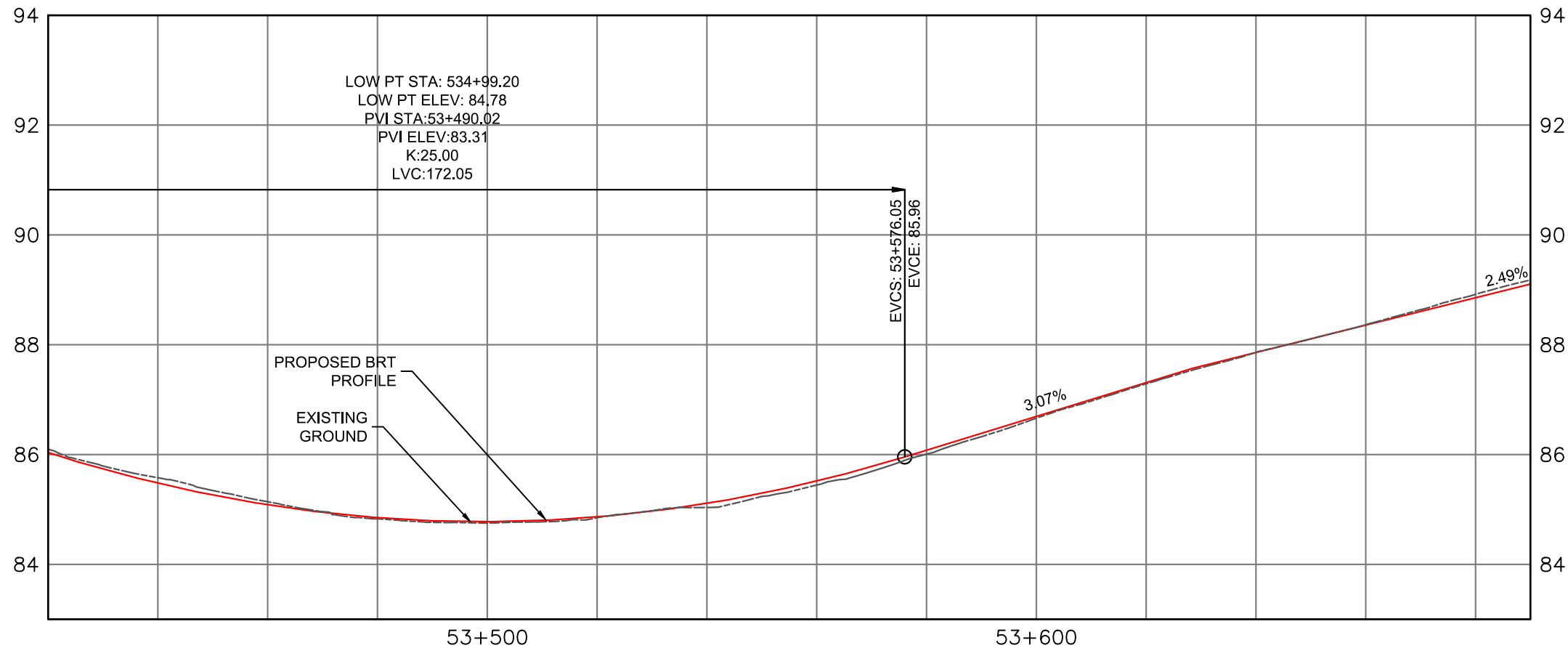
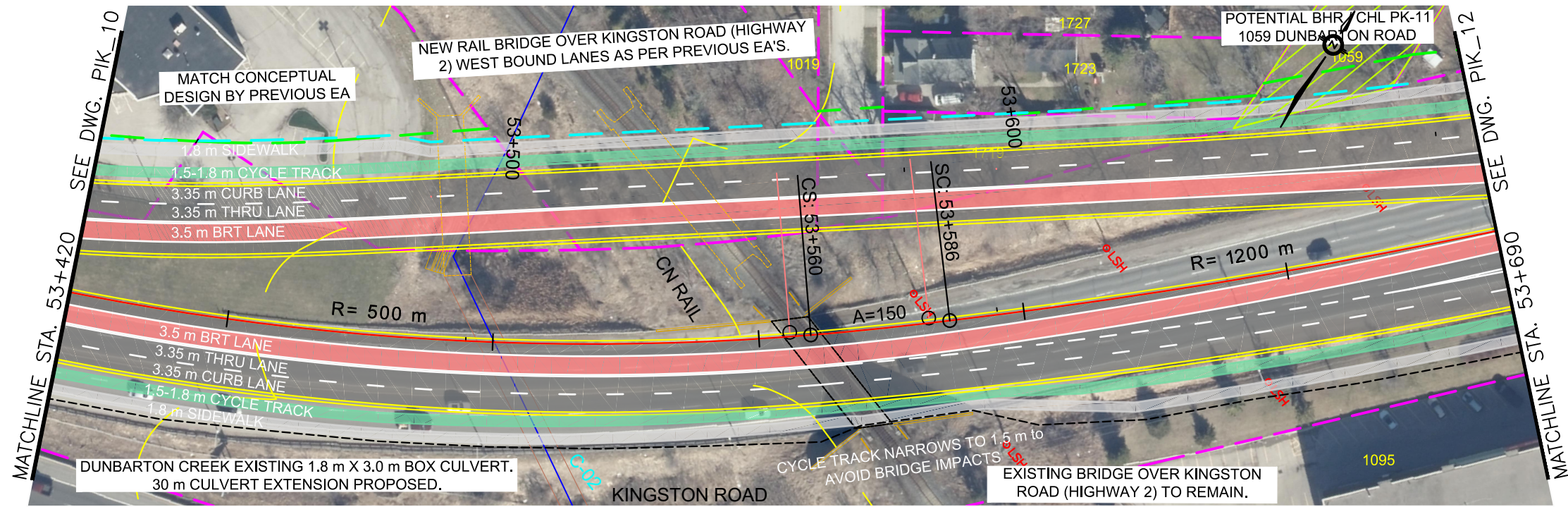
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SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 20m 2m



DURHAM - SCARBOROUGH
 Bus Rapid Transit

DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 53+070 TO STA. 53+420			
CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_10

January 14, 2022, 4:19 PM Login name: adrian.chiu Drawing Name: J:\119887_Mx_DS_BRT\5.9 Drawings\59civil\layouts\CPG_DSBRT_CO-200_PLAN&PROFILE_PIK.dwg



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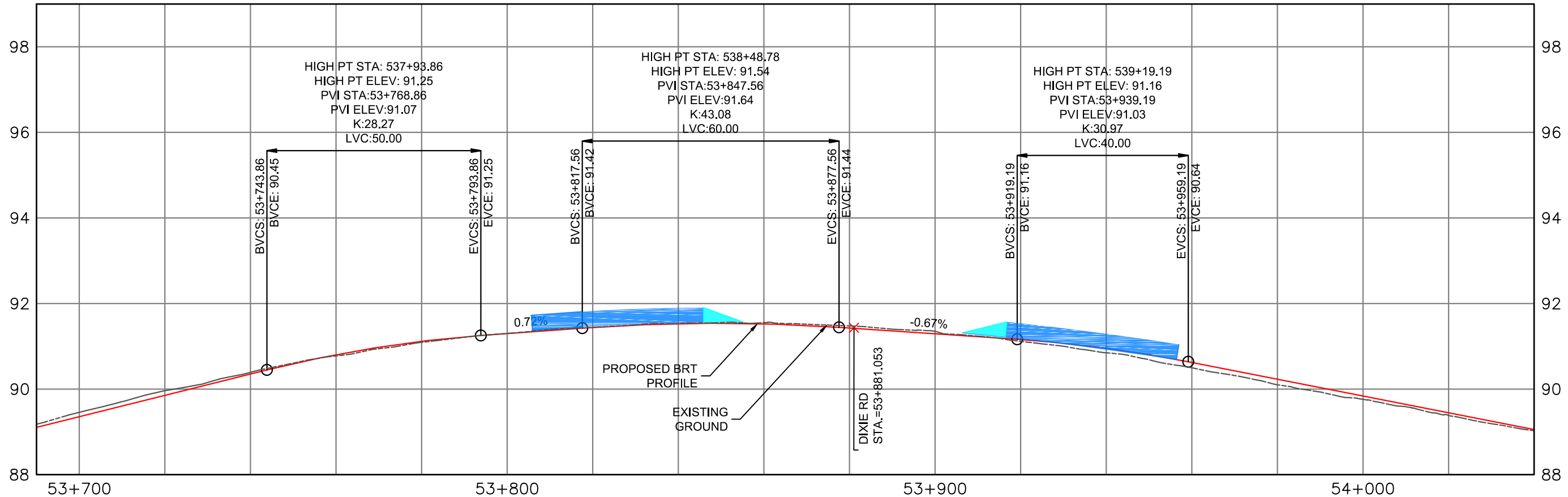
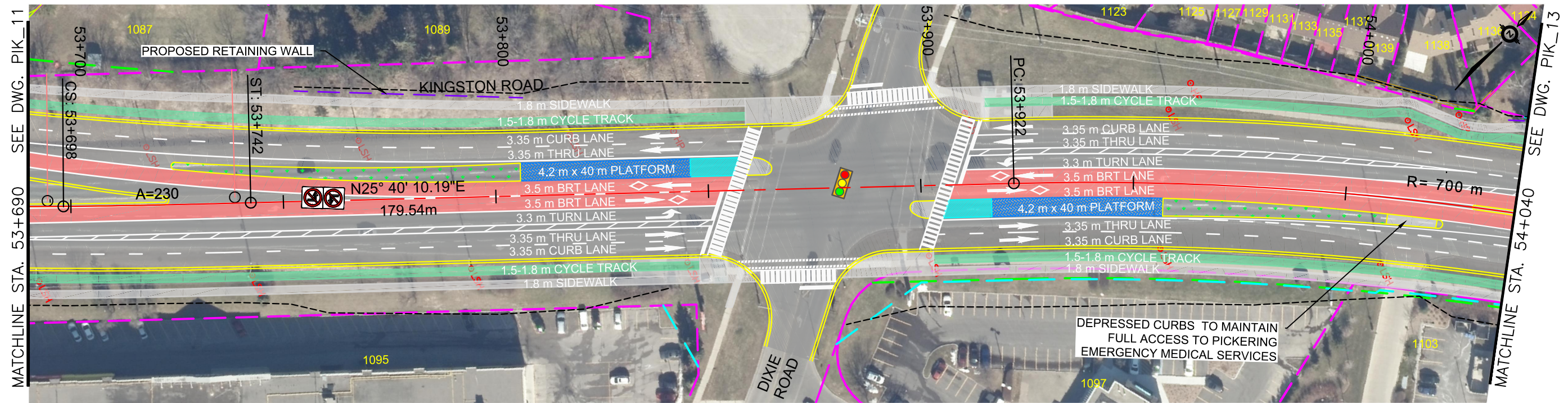
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CHECKED BY: M.H 08/17/21	APPROVED BY: M.P 08/17/21
SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 1p 20m 2m



DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 53+420 TO STA. 53+690			
CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_11

DURHAM - SCARBOROUGH
Bus Rapid Transit

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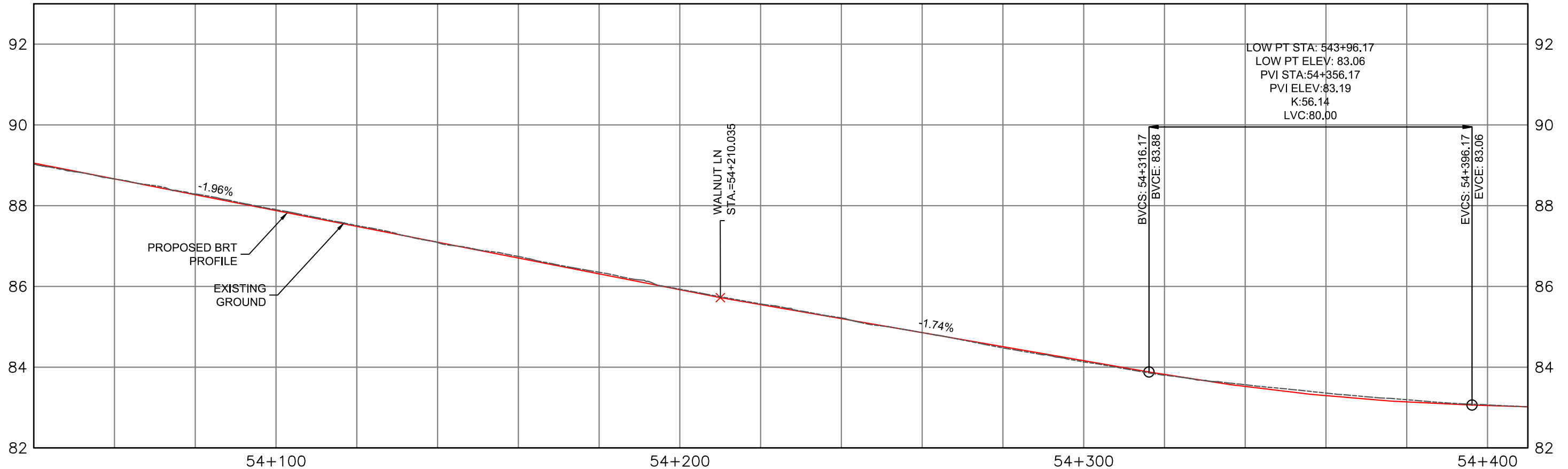
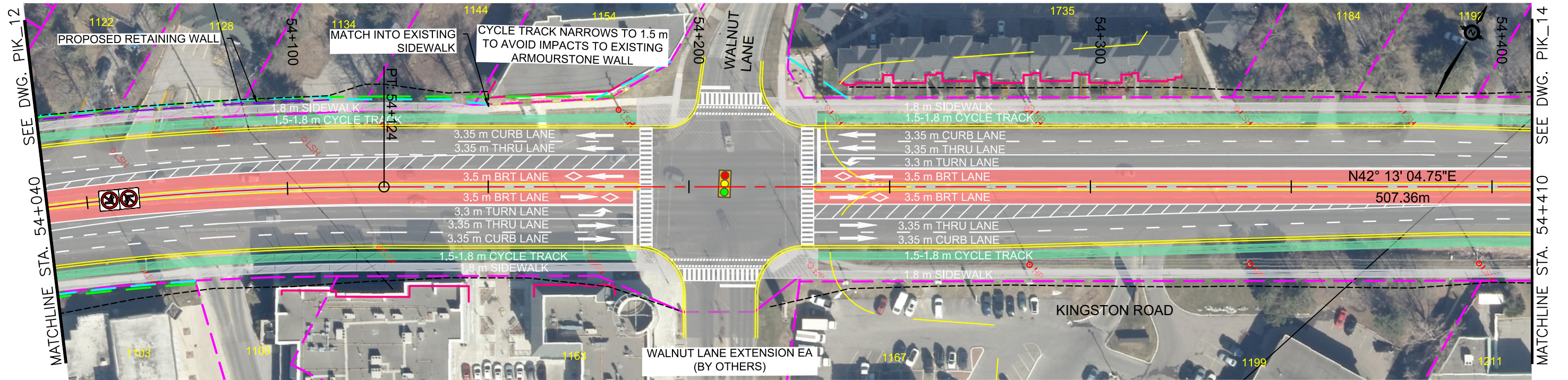
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DURHAM - SCARBOROUGH
Bus Rapid Transit

DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 53+690 TO STA. 54+040			
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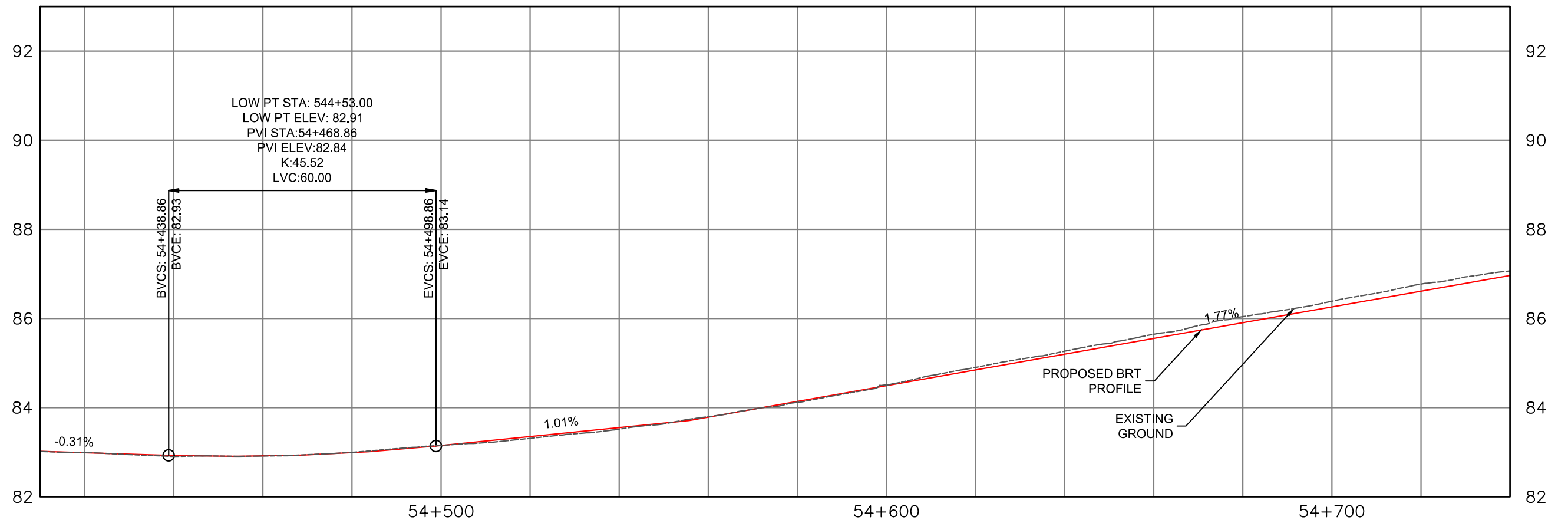
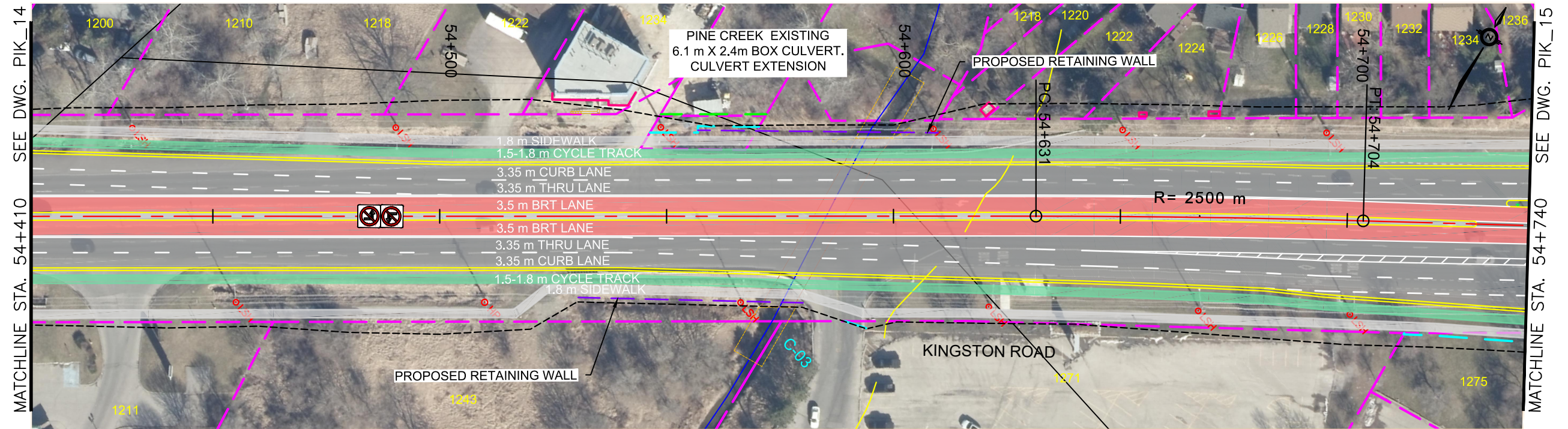
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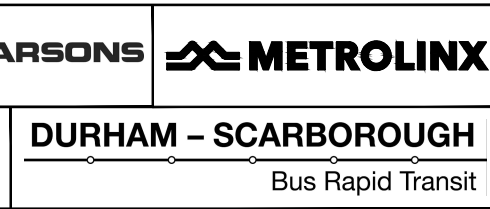
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CONTRACT NO. RQQ-2018-PPDD-244		DWG. NO. CPG_DSBR_T_CO-200_PLAN&PROFILE_PIK	REV. 01 SHEET PIK_13

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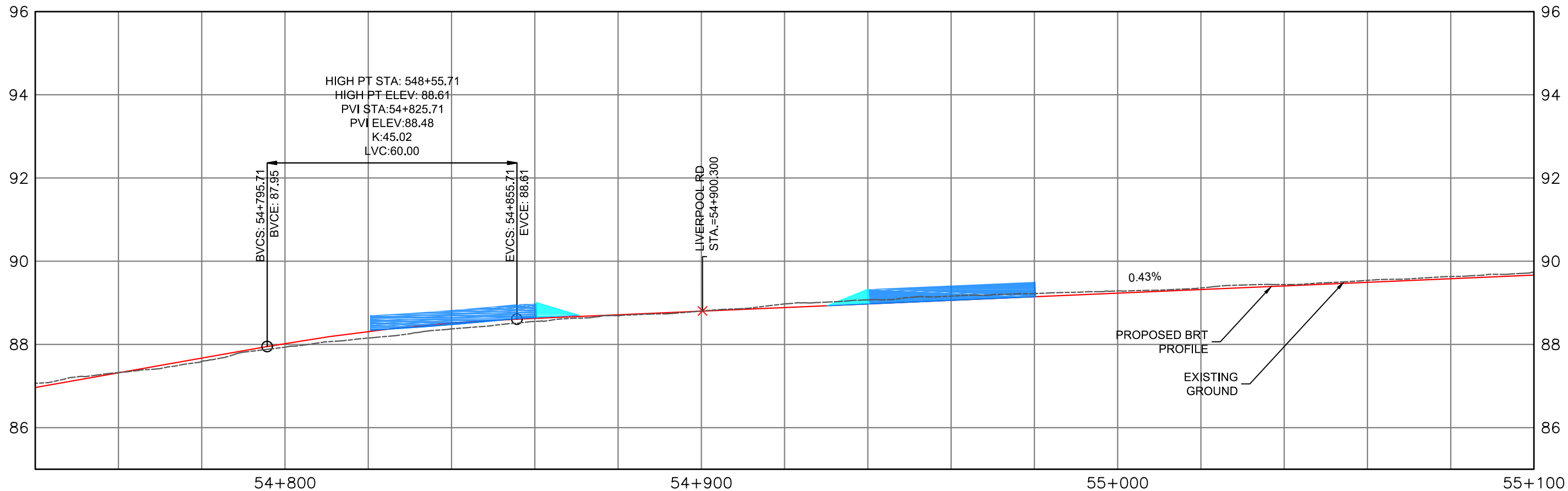
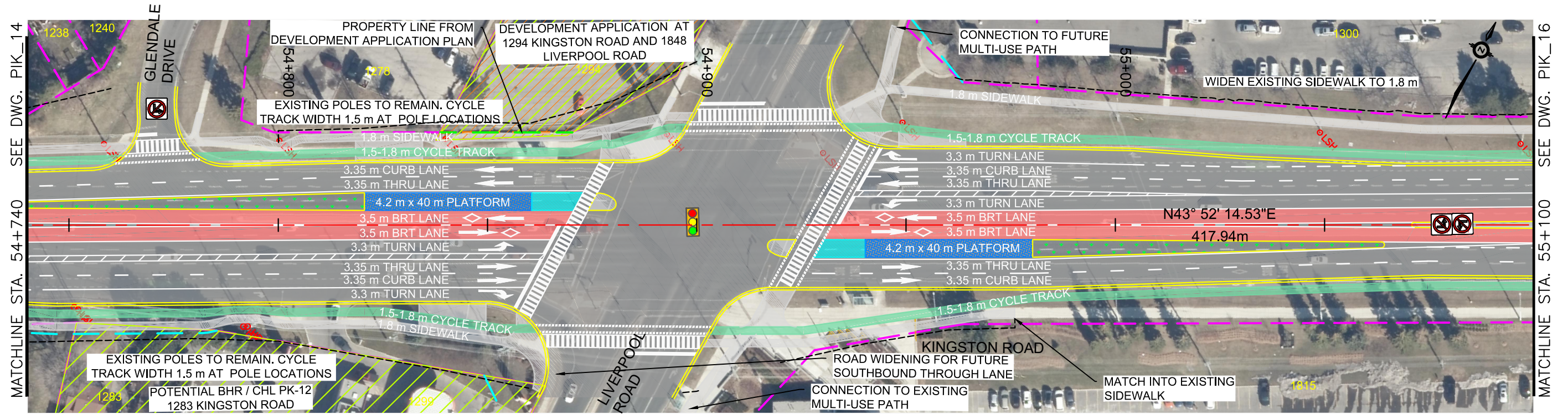
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SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 0 10 20m



DURHAM-SCARBOROUGH BUS RAPID TRANSIT ENVIRONMENTAL ASSESSMENT PLAN AND PROFILE STA. 54+410 TO STA. 54+740			
CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_14

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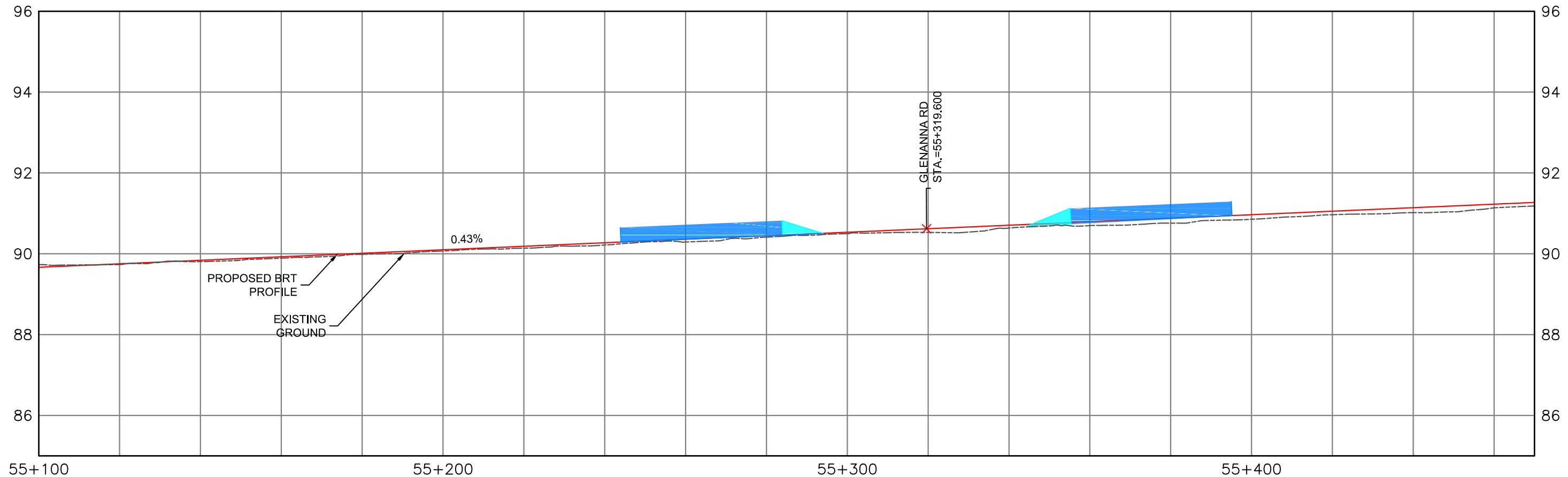
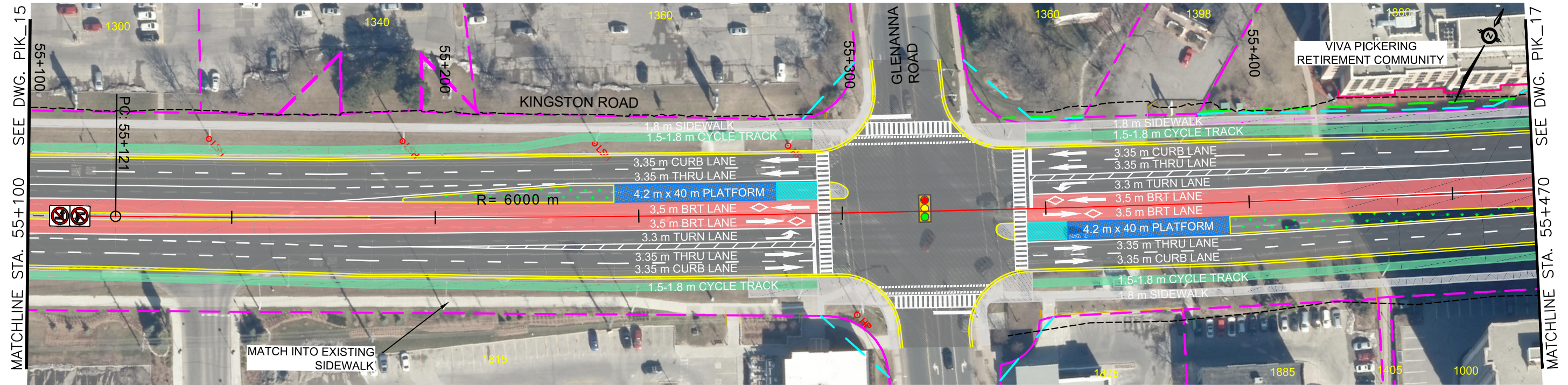
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SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 1p 20m 2m

DURHAM - SCARBOROUGH				
Bus Rapid Transit				

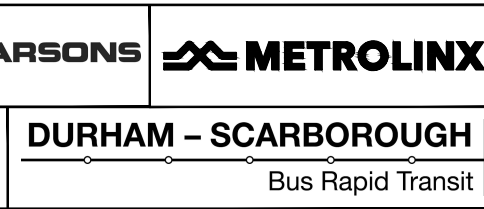
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CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRTO_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_15

January 14, 2022, 4:19 PM Login name: adrian.chiu
 Drawing Name: J:\119887_Mx_DS_BRT\5.9 Drawings\59civil\layouts\CPG_DSBRT_CO-200_PLAN&PROFILE_PIK.dwg



ALL DIMENSIONS SHOWN ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE NOTED.

DRAWN BY: A.C 08/17/21	DESIGNED BY: M.H 08/17/21
CHECKED BY: M.H 08/17/21	APPROVED BY: M.P 08/17/21
SCALE: HOR 1:1000 VER 1:100	FULL SIZE ONLY 20m 2m



DURHAM-SCARBOROUGH BUS RAPID TRANSIT
 ENVIRONMENTAL ASSESSMENT
 PLAN AND PROFILE
 STA. 55+100 TO STA. 55+470

CONTRACT NO. RQQ-2018-PPDD-244	DWG. NO. CPG_DSBRT_CO-200_PLAN&PROFILE_PIK	REV. 01	SHEET PIK_16
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APPENDIX

F

FUTURE

BACKGROUND

TRAFFIC

CONDITIONS

F-1 *2028 FUTURE
BACKGROUND
CONDITIONS*

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2028 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.986			0.992			0.862			0.877	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3405	0	1652	3390	0	1745	1555	0	1725	1601	0
Fit Permitted	0.950			0.950			0.732			0.622		
Satd. Flow (perm)	1677	3405	0	1643	3390	0	1330	1555	0	1127	1601	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			6			155				32
Link Speed (kh)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	820	82	112	487	27	252	13	155	15	7	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	902	0	112	514	0	252	168	0	15	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2028 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	60.6		13.4	70.3		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.06	0.50		0.11	0.59		0.24	0.24		0.24	0.24	
v/c Ratio	0.22	0.52		0.61	0.26		0.81	0.35		0.06	0.10	
Control Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
LOS	E	B		F	A		E	A		C	B	
Approach Delay		17.8			20.1			40.3			18.4	
Approach LOS		B			C			D			B	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 23.2 Intersection LOS: C
 Intersection Capacity Utilization 64.5% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2028 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	902	112	514	252	168	15	39
w/c Ratio	0.22	0.52	0.61	0.26	0.81	0.35	0.06	0.10
Control Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Length 50th (m)	5.4	50.0	27.8	9.1	56.2	2.4	2.7	1.3
Queue Length 95th (m)	m13.0	101.7	46.7	18.0	78.1	17.5	7.6	9.0
Internal Link Dist (m)		105.3	670.6		100.5		155.7	
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	1723	231	1988	452	631	383	565
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 w/c Ratio	0.21	0.52	0.48	0.26	0.56	0.27	0.04	0.07

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

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↗	↓	↖	↗	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.88	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3406		1652	3391		1726	1554		1721	1600	
Fit Permitted	0.95	1.00		0.95	1.00		0.73	1.00		0.62	1.00	
Satd. Flow (perm)	1685	3406		1652	3391		1330	1554		1128	1600	
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)	22	820	82	112	487	27	252	13	155	15	7	32
RTOR Reduction (vph)	0	5	0	0	3	0	0	118	0	0	24	0
Lane Group Flow (vph)	22	897	0	112	511	0	252	50	0	15	15	0
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3	
Effective Green, g (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.04	0.50		0.11	0.58		0.24	0.24		0.24	0.24	
Clearance Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	67	1717		184	1952		313	366		266	377	
v/s Ratio Prot	0.01	c0.26		c0.07	0.15			0.03			0.01	
v/s Ratio Perm							c0.19			0.01		
w/c Ratio	0.33	0.52		0.61	0.26		0.81	0.14		0.06	0.04	
Uniform Delay, d1	56.0	20.0		50.8	12.7		43.2	36.2		35.5	35.4	
Progression Factor	1.28	0.70		1.46	0.38		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	1.1		5.2	0.3		13.9	0.2		0.1	0.0	
Delay (s)	74.2	15.1		79.5	5.1		57.2	36.4		35.6	35.4	
Level of Service	E	B		E	A		E	D		D	D	
Approach Delay (s)		16.5			18.5			48.9			35.5	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 24.3 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.61
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 17.8
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Background>AM
10-02-2023

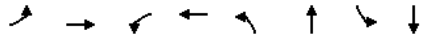
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Frt	0.986		0.981		0.900		0.879					
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1564	3316	0	1645	3304	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950			0.950			0.540			0.726		
Satd. Flow (perm)	1554	3316	0	1639	3304	0	993	1769	0	1393	1759	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		12			16			32			157	
Link Speed (kh)	60		60		40		60					
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	826	88	85	602	87	40	16	32	142	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	914	0	85	689	0	40	48	0	142	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	8		4		8		8		4		4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.65	0.44		0.80	0.35		0.26	0.16		0.66	0.48	
Control Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
LOS	E	B		F	A		D	B		E	B	
Approach Delay	19.0		19.5		31.5		33.8					
Approach LOS	B		B		C		C					
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	112.8 (94%), 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:	21.9						Intersection LOS: C					
Intersection Capacity Utilization:	71.6%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2028 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	914	85	689	40	48	142	195
w/c Ratio	0.65	0.44	0.80	0.35	0.26	0.16	0.66	0.48
Control Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Length 50th (m)	20.0	53.3	18.9	40.9	8.5	3.3	32.2	7.9
Queue Length 95th (m)	#39.1	87.8	#47.9	48.4	16.9	12.4	47.4	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2061	106	1987	328	606	460	686
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 w/c Ratio	0.59	0.44	0.80	0.35	0.12	0.08	0.31	0.28

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3315		1645	3304		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3315		1645	3304		993	1769		1392	1760	
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)	87	826	88	85	602	87	40	16	32	142	38	157
RTOR Reduction (vph)	0	5	0	0	6	0	0	27	0	0	133	0
Lane Group Flow (vph)	87	909	0	85	683	0	40	21	0	142	62	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Effective Green, g (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2055		106	1979		154	275		216	274	
v/s Ratio Prot	0.06	c0.27		c0.05	0.21			0.01			0.04	
v/s Ratio Perm							0.04			c0.10		
w/c Ratio	0.65	0.44		0.80	0.34		0.26	0.08		0.66	0.23	
Uniform Delay, d1	53.1	11.9		55.3	12.2		44.6	43.3		47.6	44.3	
Progression Factor	1.00	1.00		0.92	0.72		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.7		32.7	0.5		0.9	0.1		7.0	0.4	
Delay (s)	63.5	12.6		83.8	9.2		45.5	43.4		54.7	44.8	
Level of Service	E	B		F	A		D	D		D	D	
Approach Delay (s)		17.1			17.4			44.3			48.9	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 23.2 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.51
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 19.1
Intersection Capacity Utilization 71.6% ICU Level of Service C
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2028 Future Background>AM

10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	178	491	196	148	420	42	115	352	125	76	617	91
Future Volume (vph)	178	491	196	148	420	42	115	352	125	76	617	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8	97.9	170.7		117.0	185.5		52.0	49.0		60.5	
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.298			0.525		
Satd. Flow (perm)	1638	3362	1511	1674	3510	1530	559	3700	1513	1103	3618	1522
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)			182			137			136			119
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	193	534	213	161	457	46	125	383	136	83	671	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	534	213	161	457	46	125	383	136	83	671	99
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane	Yes											
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2028 Future Background>AM

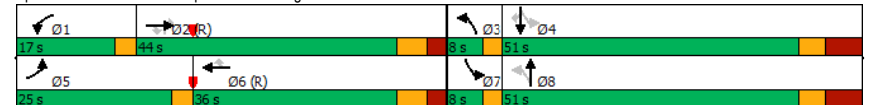
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	18.3	37.4	37.4	13.5	32.6	32.6	53.6	43.5	37.4	53.0	41.9	41.9
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.42	0.29	0.24	0.16	0.53	0.16
Control Delay	47.5	33.8	16.9	87.0	39.5	0.3	23.7	28.4	6.2	18.7	33.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	16.9	87.0	39.5	0.3	23.7	28.4	6.2	18.7	33.1	3.7
LOS	D	C	B	F	D	A	C	C	A	B	C	A
Approach Delay		32.8			48.3			22.8				28.3
Approach LOS		C			D			C				C

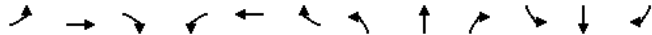
Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 32.8
 Intersection Capacity Utilization 93.1%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2028 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	193	534	213	161	457	46	125	383	136	83	671	99
w/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.42	0.29	0.24	0.16	0.53	0.16
Control Delay	47.5	33.8	16.9	87.0	39.5	0.3	23.7	28.4	6.2	18.7	33.1	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	16.9	87.0	39.5	0.3	23.7	28.4	6.2	18.7	33.1	3.7
Queue Length 50th (m)	44.6	66.2	26.1	37.6	48.0	0.0	16.5	34.2	0.0	10.6	66.0	0.0
Queue Length 95th (m)	51.5	81.8	53.9	#73.1	66.4	0.0	28.1	46.6	13.9	19.7	84.1	8.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1046	595	197	953	515	301	1340	564	525	1263	608
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.64	0.51	0.36	0.82	0.48	0.09	0.42	0.29	0.24	0.16	0.53	0.16

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	178	491	196	148	420	42	115	352	125	76	617	91
Future Volume (vph)	178	491	196	148	420	42	115	352	125	76	617	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1789	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.30	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	561	3700	1513	1111	3618	1522
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)	193	534	213	161	457	46	125	383	136	83	671	99
RTOR Reduction (vph)	0	0	126	0	0	34	0	0	94	0	0	64
Lane Group Flow (vph)	193	534	87	161	457	12	125	383	42	83	671	35
Confl. Peds. (#/hr)	15	19	19		15	15		28	28		15	
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6		8	2		4	4
Actuated Green, G (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Effective Green, g (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.40	0.36	0.31	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	252	1031	463	190	936	408	277	1341	463	460	1281	539
v/s Ratio Prot	c0.12	c0.16		c0.10	0.13		c0.02	0.10		0.01	c0.19	
v/s Ratio Perm			0.06			0.01	0.16		0.03	0.06		0.02
w/c Ratio	0.77	0.52	0.19	0.85	0.49	0.03	0.45	0.29	0.09	0.18	0.52	0.07
Uniform Delay, d1	48.8	34.3	30.6	52.2	37.1	32.5	24.0	27.2	29.7	23.5	30.7	25.6
Progression Factor	0.61	0.94	2.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.7	1.7	0.8	27.8	1.8	0.1	1.2	0.5	0.4	0.2	1.5	0.2
Delay (s)	41.7	33.9	68.8	80.1	38.9	32.7	25.2	27.7	30.0	23.7	32.3	25.8
Level of Service	D	C	E	F	D	C	C	C	C	C	C	C
Approach Delay (s)		43.4			48.5			27.7			30.7	
Approach LOS		D			D			C			C	

Intersection Summary
HCM 2000 Control Delay 37.7 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.58
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 93.1% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	527	272	146	782	24
Future Volume (vph)	10	17	36	194	19	59	53	527	272	146	782	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	0.99		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.320			0.401		
Satd. Flow (perm)	0	3058	0	0	1858	1181	551	5036	1483	703	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Conf. Peds. (#/hr)	7					7	10		11	11		10
Conf. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	573	296	159	850	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	573	296	159	850	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

<2028 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023

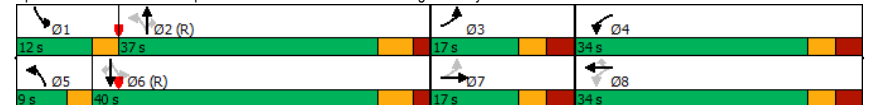


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.14	0.22	0.32	0.29	0.30	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.6	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.6	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.8			12.6	
Approach LOS		C			D			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 14.9
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues <2028 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	573	296	159	850	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.14	0.22	0.32	0.29	0.30	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.6	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.5	22.7	9.5	11.3	33.6	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	5.7	35.2	19.5	21.5	45.9	0.0
Internal Link Dist (m)		58.8	304.5			138.3			233.7		
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	403	2621	913	555	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.14	0.22	0.32	0.29	0.30	0.03

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

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑↑	↑	↑	↑↑↑	↑
Traffic Volume (vph)	10	17	36	194	19	59	53	527	272	146	782	24
Future Volume (vph)	10	17	36	194	19	59	53	527	272	146	782	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1641	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.32	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	554	5036	1483	705	5029	1458
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)	11	18	39	211	21	64	58	573	296	159	850	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	0	146	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	573	150	159	850	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	360	2558	753	516	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.11		c0.03	c0.17	
v/s Ratio Perm							0.01	0.08		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.16	0.22	0.20	0.31	0.31	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.2	13.7	13.5	8.0	12.6	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.77	0.89	1.50	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.2	0.2	0.6	0.3	0.3	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.1	12.4	20.7	8.4	12.9	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.8			12.2	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 18.0 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.34
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	160	188	69	310	163	510	0	0	672	97
Future Volume (vph)	0	0	160	188	69	310	163	510	0	0	672	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0		125.0	50.0		0.0	0.0		0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1583	1700	1767	1551	1738	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.322					
Satd. Flow (perm)	0	0	1583	1700	1767	1551	586	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						105
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	174	204	75	337	177	554	0	0	730	105
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	174	139	140	337	177	554	0	0	730	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4			9.4	
Detector 2 Size(m)						0.6		0.6			0.6	
Detector 2 Type						Cl+Ex		Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings

<2028 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023

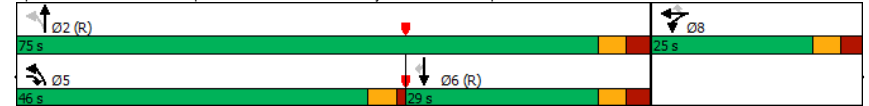


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			16.6	13.7	13.7	13.7	75.8	74.0			53.0	53.0
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.76	0.74			0.53	0.53
v/c Ratio			0.66	0.60	0.58	0.67	0.28	0.15			0.28	0.12
Control Delay			50.8	50.7	49.5	11.3	4.9	4.3			8.8	1.7
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			50.8	50.7	49.5	11.3	4.9	4.3			8.8	1.7
LOS			D	D	D	B	A	A			A	A
Approach Delay			50.8			28.9		4.4			7.9	
Approach LOS			D			C		A			A	


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	15.5
Intersection LOS:	B
Intersection Capacity Utilization:	45.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp




Queues <2028 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	174	139	140	337	177	554	730	105
w/c Ratio	0.66	0.60	0.58	0.67	0.28	0.15	0.28	0.12
Control Delay	50.8	50.7	49.5	11.3	4.9	4.3	8.8	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	50.7	49.5	11.3	4.9	4.3	8.8	1.7
Queue Length 50th (m)	32.0	27.1	27.2	0.0	7.5	9.5	18.6	0.1
Queue Length 95th (m)	49.6	44.3	44.3	23.2	16.3	16.1	23.8	2.3
Internal Link Dist (m)	202.7				348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	656	323	335	567	922	3651	2583	864
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 w/c Ratio	0.27	0.43	0.42	0.59	0.19	0.15	0.28	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	160	188	69	310	163	510	0	0	672	97
Future Volume (vph)	0	0	160	188	69	310	163	510	0	0	672	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1583	1700	1767	1551	1735	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.32	1.00			1.00	1.00
Satd. Flow (perm)			1583	1700	1767	1551	588	4932			4877	1538
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	0	174	204	75	337	177	554	0	0	730	105
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	49
Lane Group Flow (vph)	0	0	174	139	140	46	177	554	0	0	730	56
Confl. Peds. (#/hr)							7	14	14		7	7
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Effective Green, g (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.74	0.74			0.53	0.53
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			262	232	242	212	625	3649			2579	813
v/s Ratio Prot			c0.11	c0.08	0.08		0.05	0.11			0.15	
v/s Ratio Perm						0.03	c0.16					0.04
w/c Ratio			0.66	0.60	0.58	0.22	0.28	0.15			0.28	0.07
Uniform Delay, d1			39.1	40.6	40.4	38.4	4.0	3.8			13.0	11.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.58	0.38
Incremental Delay, d2			6.2	4.1	3.3	0.5	0.3	0.1			0.3	0.2
Delay (s)			45.3	44.7	43.8	38.9	4.3	3.9			7.9	4.5
Level of Service			D	D	D	D	A	A			A	A
Approach Delay (s)			45.3			41.3		4.0			7.5	
Approach LOS			D			D		A			A	

Intersection Summary

HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

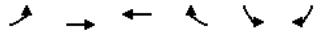
c Critical Lane Group

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2028 Future Background>AM

10-02-2023



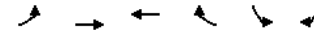
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↔	↕	
Traffic Volume (vph)	96	714	648	99	182	229	
Future Volume (vph)	96	714	648	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Frt			0.980			0.850	
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3379	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3379	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			17			249	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	776	704	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	776	812	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2028 Future Background>AM

10-02-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.33	0.39		0.72	0.52	
Control Delay	71.9	4.0	15.0		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	71.9	4.0	15.0		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		12.0	15.0		34.1		
Approach LOS		B	B		C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.8
 Intersection LOS: B
 Intersection Capacity Utilization 51.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

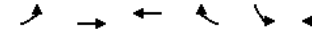
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Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	776	812	198	249
v/c Ratio	0.62	0.33	0.39	0.72	0.52
Control Delay	71.9	4.0	15.0	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	4.0	15.0	65.5	9.1
Queue Length 50th (m)	16.6	69.6	51.5	49.0	0.0
Queue Length 95th (m)	29.5	2.1	86.2	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2059	476	649
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	0.44	0.33	0.39	0.42	0.38
Intersection Summary					

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2028 Future Background>AM
10-02-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↕↕
Traffic Volume (vph)	96	714	648	99	182	229
Future Volume (vph)	96	714	648	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			0%
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3379		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3379		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	776	704	108	198	249
RTOR Reduction (vph)	0	0	7	0	0	209
Lane Group Flow (vph)	104	776	805	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2053		276	271
v/s Ratio Prot	c0.06	0.23	c0.24		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.34	0.39		0.72	0.15
Uniform Delay, d1	55.7	8.1	13.1		51.9	47.0
Progression Factor	1.05	0.41	1.00		1.00	1.00
Incremental Delay, d2	5.9	0.4	0.6		8.6	0.3
Delay (s)	64.4	3.7	13.7		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	13.7		53.1	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay		20.8		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.48				
Actuated Cycle Length (s)		130.0		Sum of lost time (s)		16.6
Intersection Capacity Utilization		51.1%		ICU Level of Service		A
Analysis Period (min)		15				

c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	813	13	309	665	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	826	0	309	665	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2028 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effect Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.52		0.85	0.27	0.78	0.20
Control Delay	14.7		57.6	12.5	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.7		57.6	12.5	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	14.7			26.8	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.8
 Intersection Capacity Utilization 64.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Background>AM
10-02-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	826	309	665	501	71
w/c Ratio	0.52	0.85	0.27	0.78	0.20
Control Delay	14.7	57.6	12.5	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	57.6	12.5	58.6	10.2
Queue Length 50th (m)	72.1	76.0	55.7	63.7	0.0
Queue Length 95th (m)	97.3	104.4	73.3	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.52	0.68	0.27	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Background>AM
10-02-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑↑	↑
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	813	13	309	665	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	825	0	309	665	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.24		c0.19	0.19	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.52		0.84	0.27	0.78	0.04
Uniform Delay, d1	25.6		47.8	6.9	50.2	43.2
Progression Factor	0.49		0.80	1.65	1.00	1.00
Incremental Delay, d2	1.1		15.3	0.2	5.8	0.1
Delay (s)	13.6		53.6	11.7	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	13.6			25.0	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2028 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3380	0	1805	1755	0	1643	1468	0
Flt Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3380	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			9			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1060	40	104	1065	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1100	0	104	1145	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

<2028 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0					
Flash Dont Walk (s)	18.0		18.0		20.0		20.0					
Pedestrian Calls (#/hr)	1		16		0		0				1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.57		0.63	0.56		0.76	0.29		0.24	0.43	
Control Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
LOS	E	B		E	B		E	B		D	B	
Approach Delay	20.1		17.1		48.2		21.2					
Approach LOS	C		B		D		C					

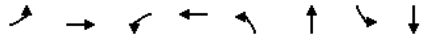
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 78.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



Queues <2028 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1100	104	1145	152	107	46	149
w/c Ratio	0.59	0.57	0.63	0.56	0.76	0.29	0.24	0.43
Control Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Length 50th (m)	19.3	80.7	21.9	78.2	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.7	106.9	38.9	165.1	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7	244.7		106.9		145.9	
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2036	278	469	264	432
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 w/c Ratio	0.50	0.57	0.51	0.56	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3279		1671	3378		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3279		1671	3378		1249	1755		1185	1468	
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)	83	1060	40	104	1065	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	4	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1098	0	104	1141	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2031		200	282		190	236	
v/s Ratio Prot	0.05	0.33		c0.06	c0.34			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.57		0.63	0.56		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	16.6		56.3	15.6		52.2	46.4		47.6	46.9	
Progression Factor	0.86	0.84		1.13	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	1.2		7.3	1.1		15.5	0.1		0.7	0.3	
Delay (s)	55.4	15.2		71.2	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.0			15.7			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2028 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt		0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			167		241			196				172
Link Speed (kh)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

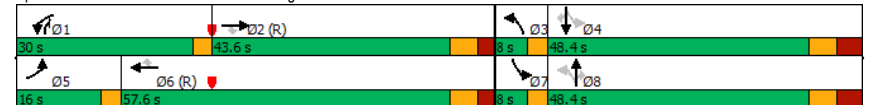
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	40.7	40.7	22.9	52.5	52.5	50.4	40.0	68.3	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.39	0.31	0.53	0.39	0.31	0.31
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	34.6		24.9		27.4		33.2					
Approach LOS	C		C		C		C					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 29.8
 Intersection Capacity Utilization 104.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service G

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2028 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Length 50th (m)	21.2	39.4	31.5	47.9	63.2	20.2	26.2	30.0	30.9	28.1	67.8	3.2
Queue Length 95th (m)	38.4	55.3	63.5	79.7	50.7	9.2	#51.5	39.4	50.6	44.5	81.8	20.2
Internal Link Dist (m)		273.5		198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	1044	604	366	1418	758	208	1556	937	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.53	0.69	0.43	0.40	0.76	0.27	0.45	0.45	0.56	0.32

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑	↑	↑	↑↑	↑	↑	↑↑	↑
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1527	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1527	906	5057	1574
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)	85	374	320	254	612	305	159	424	424	170	865	190
RTOR Reduction (vph)	0	0	115	0	0	144	0	0	101	0	0	119
Lane Group Flow (vph)	85	374	205	254	612	161	159	424	323	170	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Effective Green, g (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	1044	489	311	1417	614	191	1556	738	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.14	c0.17		c0.03	0.08	0.08	0.02	0.17	
v/s Ratio Perm			0.13			0.11	c0.25		0.13	0.15		0.05
v/c Ratio	0.61	0.36	0.42	0.82	0.43	0.26	0.83	0.27	0.44	0.49	0.56	0.15
Uniform Delay, d1	57.4	34.5	35.3	51.5	28.0	25.8	37.0	34.0	22.0	31.5	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.89	0.63	0.55	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.0	2.6	13.2	0.8	0.9	25.5	0.4	0.4	1.1	1.4	0.6
Delay (s)	65.1	35.5	37.9	59.1	18.4	15.1	62.5	34.4	22.4	32.6	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		39.7			26.4			33.8			37.2	
Approach LOS		D			C			C			D	

Intersection Summary
 HCM 2000 Control Delay 33.8 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.69
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
 Intersection Capacity Utilization 104.4% ICU Level of Service G
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

10-02-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↗↗	↗↗	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3387	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3387	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	636	291	0	753	453	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	665	262	0	753	453	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2028 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

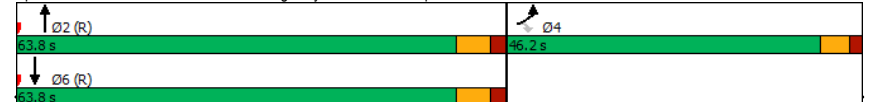
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	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
v/c Ratio	0.78	0.48		0.35	0.20	
Control Delay	44.3	6.7		10.5	9.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.3	6.7		10.5	9.2	
LOS	D	A		B	A	
Approach Delay	33.7			10.5	9.2	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.3
 Intersection Capacity Utilization 48.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Background>AM
10-02-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	665	262	753	453
w/c Ratio	0.78	0.48	0.35	0.20
Control Delay	44.3	6.7	10.5	9.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.3	6.7	10.5	9.2
Queue Length 50th (m)	68.0	0.0	36.7	19.6
Queue Length 95th (m)	80.8	19.4	56.4	32.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1256	683	2150	2218
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.38	0.35	0.20
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Background>AM
10-02-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	←←←	←		↑↑	↑↑	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3390	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3390	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	636	291	0	753	453	0
RTOR Reduction (vph)	4	196	0	0	0	0
Lane Group Flow (vph)	661	66	0	753	453	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	27.7	27.7		70.1	70.1	
Effective Green, g (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	853	352		2150	2218	
v/s Ratio Prot	c0.20			c0.22	0.13	
v/s Ratio Perm		0.05				
v/c Ratio	0.78	0.19		0.35	0.20	
Uniform Delay, d1	38.3	32.3		9.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.5	0.2	
Delay (s)	42.7	32.6		9.8	8.5	
Level of Service	D	C		A	A	
Approach Delay (s)	39.8			9.8	8.5	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay			22.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.47			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.2
Intersection Capacity Utilization			48.8%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2028 Future Background>PM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.98	
Frt		0.976			0.992			0.863			0.906	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3444	0	1685	3509	0	1745	1594	0	1725	1707	0
Flt Permitted	0.950			0.950			0.591			0.577		
Satd. Flow (perm)	1677	3444	0	1682	3509	0	1067	1594	0	1043	1707	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			6			96			27	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	1742	0	123	710	0	275	300	0	25	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2028 Future Background>PM
09-29-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8				4	
Detector Phase	5	2			1	6	3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0	5.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	32.6			8.0	32.6	8.0	37.2		37.2	37.2	
Total Split (s)	8.0	72.0			9.0	73.0	11.8	49.0		37.2	37.2	
Total Split (%)	6.2%	55.4%			6.9%	56.2%	9.1%	37.7%		28.6%	28.6%	
Maximum Green (s)	5.0	65.4			6.0	66.4	8.8	40.8		29.0	29.0	
Yellow Time (s)	3.0	4.4			3.0	4.4	3.0	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2			0.0	2.2	0.0	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6			3.0	6.6	3.0	8.2		8.2	8.2	
Lead/Lag	Lead	Lag			Lead	Lag	Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max			None	C-Max	None	None		None	None	
Walk Time (s)		7.0				7.0		7.0		7.0	7.0	
Flash Dont Walk (s)		19.0				19.0		22.0		22.0	22.0	
Pedestrian Calls (#/hr)		8				4		2		9	9	
Act Effect Green (s)	5.0	81.3			6.0	83.9	30.1	24.9		14.4	14.4	
Actuated g/C Ratio	0.04	0.63			0.05	0.65	0.23	0.19		0.11	0.11	
v/c Ratio	0.61	0.81			1.60	0.31	0.91	0.79		0.22	0.20	
Control Delay	108.3	13.7			365.0	6.1	79.2	46.9		52.8	25.5	
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	108.3	13.7			365.0	6.1	79.2	46.9		52.8	25.5	
LOS	F	B			F	A	E	D		D	C	
Approach Delay		15.8				59.1		62.4			35.6	
Approach LOS		B				E		E			D	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.60
Intersection Signal Delay:	35.5
Intersection LOS:	D
Intersection Capacity Utilization:	92.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2028 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	1742	123	710	275	300	25	43
w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.79	0.22	0.20
Control Delay	108.3	13.7	365.0	6.1	79.2	46.9	52.8	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.3	13.7	365.0	6.1	79.2	46.9	52.8	25.5
Queue Length 50th (m)	10.6	135.3	~46.0	7.1	65.8	51.9	6.1	3.8
Queue Length 95th (m)	m14.7	#280.7	#80.9	91.5	79.2	71.2	13.0	13.1
Internal Link Dist (m)		105.3	670.6		100.5		155.7	
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	2163	77	2267	302	566	232	401
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 w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.53	0.11	0.11

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.

HCM Signalized Intersection Capacity Analysis <2028 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑↑		↑↑	↑↑		↑↑	↑↑	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.98	
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.86		1.00	0.91	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3444		1685	3509		1728	1595		1717	1707	
Fit Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.58	1.00	
Satd. Flow (perm)	1685	3444		1685	3509		1074	1595		1043	1707	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
RTOR Reduction (vph)	0	9	0	0	2	0	0	76	0	0	24	0
Lane Group Flow (vph)	39	1733	0	123	708	0	275	224	0	25	19	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8					
Actuated Green, G (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Effective Green, g (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Actuated g/C Ratio	0.03	0.61		0.05	0.63		0.20	0.20		0.10	0.10	
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	51	2111		77	2205		272	325		102	168	
v/s Ratio Prot	0.02	c0.50		c0.07	0.20		c0.08	0.14			0.01	
v/s Ratio Perm							c0.12			0.02		
w/c Ratio	0.76	0.82		1.60	0.32		1.01	0.69		0.25	0.11	
Uniform Delay, d1	62.5	19.6		62.0	11.2		50.9	47.9		54.1	53.4	
Progression Factor	1.33	0.51		1.47	0.48		1.00	1.00		1.00	1.00	
Incremental Delay, d2	38.4	2.8		316.2	0.3		57.4	5.9		1.3	0.3	
Delay (s)	121.8	12.7		407.6	5.7		108.3	53.9		55.4	53.7	
Level of Service	F	B		F	A		F	D		E	D	
Approach Delay (s)		15.1			65.1			79.9			54.3	
Approach LOS		B			E			E			D	

Intersection Summary

HCM 2000 Control Delay 40.1 HCM 2000 Level of Service D

HCM 2000 Volume to Capacity ratio 0.91

Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8

Intersection Capacity Utilization 92.1% ICU Level of Service F

Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.991		0.977		0.977		0.920		0.885		0.885	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3394	0	1597	3418	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.676			0.678		
Satd. Flow (perm)	1578	3394	0	1594	3418	0	1254	1786	0	1294	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			20			42			97	
Link Speed (k/h)	60		60		60		40		60		60	
Link Distance (m)	896.3		191.2		123.5		236.2		236.2		236.2	
Travel Time (s)	53.8		11.5		11.1		14.2		14.2		14.2	
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	1693	0	42	956	0	117	123	0	149	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8		3.8		3.8	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	4.9		4.9		4.9		4.9		4.9		4.9	
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases							8	8			4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		40.1	40.1		40.1	40.1	
Total Split (s)	26.0	81.6		8.0	63.6		40.4	40.4		40.4	40.4	
Total Split (%)	20.0%	62.8%		6.2%	48.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	23.0	75.0		5.0	57.0		30.9	30.9		30.9	30.9	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.0	86.9		5.0	69.4		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.67		0.04	0.53		0.16	0.16		0.16	0.16	
v/c Ratio	0.85	0.75		0.69	0.52		0.59	0.39		0.73	0.35	
Control Delay	87.0	9.1		117.0	9.8		61.6	33.8		71.1	16.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	87.0	9.1		117.0	9.8		61.6	33.8		71.1	16.1	
LOS	F	A		F	A		E	C		E	B	
Approach Delay	17.9		14.3		47.3		45.9		45.9		45.9	
Approach LOS	B		B		D		D		D		D	

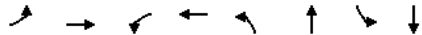
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 21.2
 Intersection LOS: C
 Intersection Capacity Utilization 81.7%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Dixie Road & Kingston Road



Queues <2028 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	215	1693	42	956	117	123	149	126
w/c Ratio	0.85	0.75	0.69	0.52	0.59	0.39	0.73	0.35
Control Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Length 50th (m)	49.6	35.3	11.5	48.8	28.3	18.6	36.9	6.5
Queue Length 95th (m)	m#83.6	154.5	m#24.3	m65.4	44.4	34.0	55.5	22.0
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2272	61	1832	298	456	307	485
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 w/c Ratio	0.77	0.75	0.69	0.52	0.39	0.27	0.49	0.26

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.

HCM Signalized Intersection Capacity Analysis <2028 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3393		1597	3418		1762	1785		1813	1729	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3393		1597	3418		1254	1785		1294	1729	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
RTOR Reduction (vph)	0	3	0	0	9	0	35	0	0	82	0	0
Lane Group Flow (vph)	215	1690	0	42	947	0	117	88	0	149	44	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Effective Green, g (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.66		0.03	0.53		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	2252		49	1822		198	282		205	273	
v/s Ratio Prot	c0.14	c0.50		0.03	0.28			0.05			0.03	
v/s Ratio Perm							0.09			c0.12		
w/c Ratio	0.84	0.75		0.86	0.52		0.59	0.31		0.73	0.16	
Uniform Delay, d1	52.9	14.6		62.7	19.6		50.8	48.4		52.0	47.2	
Progression Factor	1.27	0.47		1.19	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.8	1.6		71.5	1.0		4.7	0.6		12.1	0.3	
Delay (s)	83.0	8.4		146.3	9.3		55.4	49.0		64.1	47.5	
Level of Service	F	A		F	A		E	D		E	D	
Approach Delay (s)		16.8			15.0			52.2			56.5	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay				22.0	HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio	0.78											
Actuated Cycle Length (s)	130.0											
Sum of lost time (s)	19.1											
Intersection Capacity Utilization				81.7%	ICU Level of Service			D				
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2028 Future Background>PM
09-29-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1094	383	239	539	72	131	770	241	102	626	127
Future Volume (vph)	279	1094	383	239	539	72	131	770	241	102	626	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.98		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.291			0.197		
Satd. Flow (perm)	1654	3461	1479	1688	3579	1485	546	3773	1543	414	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			86			127			192			130
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	285	1116	391	244	550	73	134	786	246	104	639	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	1116	391	244	550	73	134	786	246	104	639	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2028 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	26.1	43.3	52.4	21.5	36.7	36.7	51.1	40.0	43.3	51.1	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.40	0.17	0.28	0.28	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.51	0.68	0.38	0.46	0.57	0.24
Control Delay	61.0	48.3	19.6	81.1	43.0	1.0	33.1	42.9	10.1	31.2	40.1	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	19.6	81.1	43.0	1.0	33.1	42.9	10.1	31.2	40.1	6.5
LOS	E	D	B	F	D	A	C	D	B	C	D	A
Approach Delay	44.1			50.2			34.8			34.1		
Approach LOS	D			D			C			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.0 Intersection LOS: D
 Intersection Capacity Utilization 104.2% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2028 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	285	1116	391	244	550	73	134	786	246	104	639	130
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.51	0.68	0.38	0.46	0.57	0.24
Control Delay	61.0	48.3	19.6	81.1	43.0	1.0	33.1	42.9	10.1	31.2	40.1	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	19.6	81.1	43.0	1.0	33.1	42.9	10.1	31.2	40.1	6.5
Queue Length 50th (m)	62.7	159.5	72.9	61.3	63.7	0.0	21.4	92.6	9.6	16.2	72.2	0.0
Queue Length 95th (m)	m80.4	#192.2	m59.6	#104.4	85.6	1.0	35.3	114.5	30.4	27.9	91.4	14.2
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	402	1153	652	289	1009	509	263	1160	642	224	1124	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.97	0.60	0.84	0.55	0.14	0.51	0.68	0.38	0.46	0.57	0.24

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	279	1094	383	239	539	72	131	770	241	102	626	127
Future Volume (vph)	279	1094	383	239	539	72	131	770	241	102	626	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	3.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1803	3773	1543	2021	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.29	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	552	3773	1543	419	3654	1466
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	285	1116	391	244	550	73	134	786	246	104	639	130
RTOR Reduction (vph)	0	0	54	0	0	52	0	0	128	0	0	90
Lane Group Flow (vph)	285	1116	337	244	550	21	134	786	118	104	639	40
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6	6		8	2	4		4
Actuated Green, G (s)	26.1	43.3	48.3	19.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Effective Green, g (s)	26.1	43.3	48.3	21.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.37	0.17	0.28	0.28	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	1152	554	282	1010	419	239	1160	513	206	1124	451
v/s Ratio Prot	c0.17	c0.32	c0.02	c0.14	0.15		0.02	c0.21		0.02	0.17	
v/s Ratio Perm			0.20			0.01	0.17		0.08	0.15		0.03
v/c Ratio	0.84	0.97	0.61	0.87	0.54	0.05	0.56	0.68	0.23	0.50	0.57	0.09
Uniform Delay, d1	50.0	42.7	33.2	52.8	39.6	34.0	33.3	39.4	31.3	30.7	37.8	32.0
Progression Factor	0.93	0.76	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.9	15.2	1.2	23.0	2.1	0.2	3.0	3.2	1.0	1.9	2.1	0.4
Delay (s)	58.2	47.7	26.6	75.9	41.7	34.2	36.3	42.6	32.4	32.6	39.8	32.4
Level of Service	E	D	C	E	D	C	D	D	C	C	D	C
Approach Delay (s)		44.7			50.7			39.7			37.9	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		43.3		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		130.0		Sum of lost time (s)				22.2				
Intersection Capacity Utilization		104.2%		ICU Level of Service				G				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
8: Liverpool Road & Private Access/Pickering Parkway

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	832	401	196	986	46
Future Volume (vph)	87	69	130	412	58	174	116	832	401	196	986	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			0.99		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950		0.950			0.950
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.207		0.268			
Satd. Flow (perm)	0	2959	0	0	1858	1399	355	5085	1502	478	5079	1482
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		134				179		413				144
Link Speed (k/h)		30			50			50				50
Link Distance (m)		82.8			328.5			162.3				257.7
Travel Time (s)		9.9			23.7			11.7				18.6
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	90	71	134	425	60	179	120	858	413	202	1016	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	205	0	425	60	179	120	858	413	202	1016	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8				3.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings <2028 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	3	7	4	8	8	5	2	2	6	1	6	6
Permitted Phases	7		8		8	2		2	6	1	6	6
Detector Phase	3	7	4	8	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0	30.0
Total Split (s)	21.0	21.0	34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0	36.0
Total Split (%)	21.0%	21.0%	34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4	27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7	29.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2	4.2
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max	C-Max
Walk Time (s)			19.0		19.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)			8.0		8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Pedestrian Calls (#/hr)			20		20	28	28	28	28	15	15	15
Act Effect Green (s)	10.8	10.8	20.5	20.5	20.5	49.4	40.1	40.1	49.4	40.1	40.1	40.1
Actuated g/C Ratio	0.11	0.11	0.20	0.20	0.20	0.49	0.40	0.40	0.49	0.40	0.40	0.40
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.48	0.42	0.49	0.65	0.50	0.07	0.07
Control Delay	50.5	18.9	40.5	31.2	7.6	20.7	22.2	8.7	29.2	25.0	0.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	18.9	40.5	31.2	7.6	20.7	22.2	8.7	29.2	25.0	0.2	0.2
LOS	D	B	D	C	A	C	C	A	C	C	C	A
Approach Delay	28.5		30.8		18.1		24.7					
Approach LOS	C		C		B		C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.65

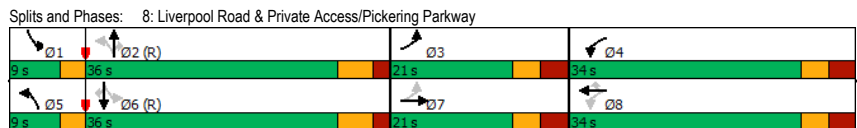
Intersection Signal Delay: 23.6

Intersection Capacity Utilization 68.8%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service C



Queues <2028 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	90	205	425	60	179	120	858	413	202	1016	47	
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.48	0.42	0.49	0.65	0.50	0.07	
Control Delay	50.5	18.9	40.5	31.2	7.6	20.7	22.2	8.7	29.2	25.0	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.5	18.9	40.5	31.2	7.6	20.7	22.2	8.7	29.2	25.0	0.2	
Queue Length 50th (m)	16.7	6.7	40.2	9.9	0.0	13.7	45.8	22.4	19.0	50.7	0.0	
Queue Length 95th (m)	30.9	16.6	50.0	18.5	15.4	m30.0	67.3	50.8	#51.6	77.5	0.0	
Internal Link Dist (m)	58.8		304.5		138.3		233.7					
Turn Bay Length (m)			57.0		62.1		54.4	75.7	132.5	35.5		
Base Capacity (vph)	245	540	877	509	513	252	2041	850	310	2038	680	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38	0.48	0.12	0.35	0.48	0.42	0.49	0.65	0.50	0.07	

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2028 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	832	401	196	986	46
Future Volume (vph)	87	69	130	412	58	174	116	832	401	196	986	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2929		3204	1858	1399	1642	5085	1504	1705	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.21	1.00	1.00	0.27	1.00	1.00
Satd. Flow (perm)	0	2929		0	1858	1399	359	5085	1504	480	5079	1485
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	71	134	425	60	179	120	858	413	202	1016	47
RTOR Reduction (vph)	0	120	0	0	0	142	0	0	247	0	0	28
Lane Group Flow (vph)	90	85	0	425	60	37	120	858	166	202	1016	19
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			8	2		2	6	
Actuated Green, G (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Effective Green, g (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	184	316		656	380	286	242	2044	604	295	2041	596
v/s Ratio Prot	c0.05	0.03		c0.13	0.03		0.03	0.17		c0.04	0.20	
v/s Ratio Perm						0.03	0.20		0.11	c0.27		0.01
v/c Ratio	0.49	0.27		0.65	0.16	0.13	0.50	0.42	0.27	0.68	0.50	0.03
Uniform Delay, d1	42.0	41.0		36.4	32.7	32.5	16.2	21.5	20.1	17.8	22.4	18.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.94	0.93	2.35	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.5		2.2	0.2	0.2	1.5	0.6	1.1	6.4	0.9	0.1
Delay (s)	44.0	41.4		38.7	32.9	32.7	16.8	20.6	48.3	24.2	23.2	18.2
Level of Service	D	D		D	C	C	B	C	D	C	C	B
Approach Delay (s)		42.2			36.5			28.5			23.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		29.2		HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio		0.65										
Actuated Cycle Length (s)		100.0		Sum of lost time (s)				22.5				
Intersection Capacity Utilization		68.8%		ICU Level of Service				C				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	237	278	168	293	121	1058	0	0	929	71
Future Volume (vph)	0	0	237	278	168	293	121	1058	0	0	929	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor							0.99					0.92
Frt			0.865		0.850							0.850
Flt Protected			0.950	0.987		0.950						
Satd. Flow (prot)	0	0	1662	1734	1801	1581	1825	5079	0	0	4972	1633
Flt Permitted			0.950	0.987		0.196						
Satd. Flow (perm)	0	0	1662	1734	1801	1581	374	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes		Yes			Yes
Satd. Flow (RTOR)					85							82
Link Speed (k/h)		50		50		50					50	
Link Distance (m)		379.4		226.7		372.2					162.3	
Travel Time (s)		27.3		16.3		26.8					11.7	
Confl. Peds. (#/hr)						17		15	15			17
Confl. Bikes (#/hr)						6						7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	255	299	181	315	130	1138	0	0	999	76
Shared Lane Traffic (%)				21%								
Lane Group Flow (vph)	0	0	255	236	244	315	130	1138	0	0	999	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7		3.7		3.7					3.7	
Link Offset(m)		0.0		0.0		0.0					0.0	
Crosswalk Width(m)		1.6		1.6		1.6					1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2028 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023

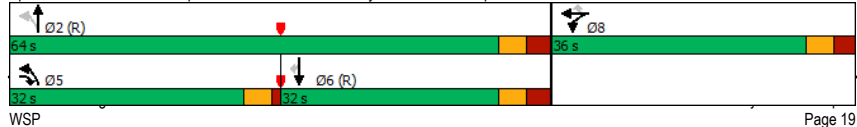


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases		5	8	8				5	2		6	
Permitted Phases						8	2					6
Detector Phase		5	8	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)		5.0	8.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)		9.5	25.0	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)		32.0	36.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)		32.0%	36.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)		27.5	30.0	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)		3.5	3.3	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)		1.0	2.7	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.5	6.0	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag		Lead					Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode		None	None	None	None	None	C-Max	C-Max			C-Max	C-Max
Walk Time (s)			14.0	14.0	14.0	14.0	13.0	13.0			13.0	13.0
Flash Dont Walk (s)			5.0	5.0	5.0	5.0	5.0	5.0			5.0	5.0
Pedestrian Calls (#/hr)			0	0	0	0	14	14			7	7
Act Effct Green (s)		20.5	21.3	21.3	21.3	21.3	68.2	66.4			41.4	41.4
Actuated g/C Ratio		0.20	0.21	0.21	0.21	0.21	0.68	0.66			0.41	0.41
v/c Ratio		0.75	0.64	0.64	0.78	0.24	0.34	0.34			0.49	0.11
Control Delay		50.6	42.8	42.4	39.7	7.8	8.4	8.4			24.0	11.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		50.6	42.8	42.4	39.7	7.8	8.4	8.4			24.0	11.1
LOS		D	D	D	D	A	A	A			C	B
Approach Delay		50.6			41.4			8.4			23.1	
Approach LOS		D			D			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9
 Intersection LOS: C
 Intersection Capacity Utilization 58.7%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2028 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	255	236	244	315	130	1138	999	76
v/c Ratio	0.75	0.64	0.64	0.78	0.24	0.34	0.49	0.11
Control Delay	50.6	42.8	42.4	39.7	7.8	8.4	24.0	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	42.8	42.4	39.7	7.8	8.4	24.0	11.1
Queue Length 50th (m)	46.7	44.0	45.4	42.6	7.7	31.5	36.7	1.1
Queue Length 95th (m)	67.4	62.2	63.5	65.2	18.2	50.3	73.2	10.1
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	540	533	654	3371	2057	672
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	0.56	0.45	0.45	0.59	0.20	0.34	0.49	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2028 Future Background>PM
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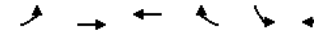


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	237	278	168	293	121	1058	0	0	929	71
Future Volume (vph)	0	0	237	278	168	293	121	1058	0	0	929	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.93
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1802	1581	1823	5079			4972	1515
Flt Permitted			1.00	0.95	0.99	1.00	0.20	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1802	1581	376	5079			4972	1515
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	255	299	181	315	130	1138	0	0	999	76
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	0	0	0	45
Lane Group Flow (vph)	0	0	255	236	244	248	130	1138	0	0	999	31
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Effective Green, g (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Actuated g/C Ratio			0.20	0.21	0.21	0.21	0.66	0.66			0.41	0.41
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			340	369	383	336	546	3372			2058	627
v/s Ratio Prot			c0.15	0.14	0.14		0.05	0.22			c0.20	
v/s Ratio Perm						c0.16	0.11					0.02
v/c Ratio			0.75	0.64	0.64	0.74	0.24	0.34			0.49	0.05
Uniform Delay, d1			37.3	35.9	35.8	36.7	7.2	7.3			21.5	17.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.96	1.85
Incremental Delay, d2			9.0	3.6	3.5	8.2	0.2	0.3			0.7	0.1
Delay (s)			46.3	39.5	39.3	45.0	7.5	7.5			21.4	32.6
Level of Service			D	D	D	D	A	A			C	C
Approach Delay (s)		46.3			41.6			7.5			22.2	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

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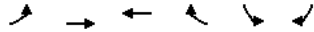
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1590	757	223	271	137	
Future Volume (vph)	205	1590	757	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%		0%		
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		0.99				0.99
Frt			0.966				0.850
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3346	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3346	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			40			143	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	214	1656	789	232	282	143	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	214	1656	1021	0	282	143	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2028 Future Background>PM

10: Kingston Road & Fairport Road

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases				4			
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.2	86.8	68.4		24.8	24.8	
Actuated g/C Ratio	0.16	0.67	0.53		0.19	0.19	
v/c Ratio	0.85	0.72	0.57		0.82	0.32	
Control Delay	87.1	2.9	14.1		69.4	8.3	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	87.1	2.9	14.1		69.4	8.3	
LOS	F	A	B		E	A	
Approach Delay	12.5		14.1		48.9		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 17.7 Intersection LOS: B
 Intersection Capacity Utilization 70.9% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2028 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	214	1656	1021	282	143
v/c Ratio	0.85	0.72	0.57	0.82	0.32
Control Delay	87.1	2.9	14.1	69.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	87.1	2.9	14.1	69.4	8.3
Queue Length 50th (m)	47.8	5.7	108.9	69.5	0.0
Queue Length 95th (m)	m53.4	m6.0	81.5	96.9	16.4
Internal Link Dist (m)	400.0		872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	273	2293	1779	416	514
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	0.78	0.72	0.57	0.68	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2028 Future Background>PM
09-29-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	↕
Traffic Volume (vph)	205	1590	757	223	271	137
Future Volume (vph)	205	1590	757	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3345		1805	1751
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3345		1805	1751
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1656	789	232	282	143
RTOR Reduction (vph)	0	0	19	0	0	116
Lane Group Flow (vph)	214	1656	1002	0	282	27
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.2	85.6	68.4		24.8	24.8
Effective Green, g (s)	20.2	85.6	68.4		24.8	24.8
Actuated g/C Ratio	0.16	0.66	0.53		0.19	0.19
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	251	2260	1759		344	334
v/s Ratio Prot	c0.13	c0.48	0.30		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.85	0.73	0.57		0.82	0.08
Uniform Delay, d1	53.5	14.7	20.8		50.5	43.2
Progression Factor	1.36	0.12	0.61		1.00	1.00
Incremental Delay, d2	12.3	1.0	1.2		14.1	0.1
Delay (s)	84.9	2.8	13.8		64.6	43.3
Level of Service	F	A	B		E	D
Approach Delay (s)		12.2	13.8		57.4	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			70.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					84
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1727	23	188	723	676	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1750	0	188	723	676	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

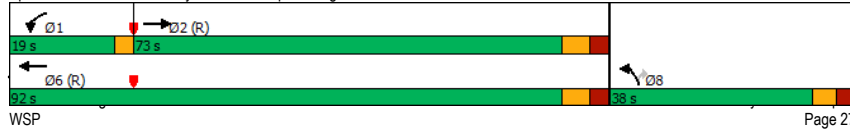
<2028 Future Background>PM
09-29-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
v/c Ratio	0.93		0.97	0.30	0.87	0.25
Control Delay	21.1		92.2	24.2	61.0	13.0
Queue Delay	0.2		0.0	0.0	0.0	0.0
Total Delay	21.3		92.2	24.2	61.0	13.0
LOS	C		F	C	E	B
Approach Delay	21.3			38.2	54.7	
Approach LOS	C			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 33.4
 Intersection LOS: C
 Intersection Capacity Utilization 92.2%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Background>PM
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Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1750	188	723	676	102
v/c Ratio	0.93	0.97	0.30	0.87	0.25
Control Delay	21.1	92.2	24.2	61.0	13.0
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	21.3	92.2	24.2	61.0	13.0
Queue Length 50th (m)	137.8	47.7	91.4	85.6	3.6
Queue Length 95th (m)	#274.7	#96.5	109.7	106.0	17.8
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1883	194	2433	853	446
Starvation Cap Reductn	7	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.93	0.97	0.30	0.79	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Background>PM
09-29-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1727	23	188	723	676	102
RTOR Reduction (vph)	0	0	0	0	0	65
Lane Group Flow (vph)	1750	0	188	723	676	37
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	68.4		16.0	87.4	28.7	28.7
Effective Green, g (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1882		194	2432	782	351
v/s Ratio Prot	c0.49		c0.12	0.20	c0.19	
v/s Ratio Perm						0.02
v/c Ratio	0.93		0.97	0.30	0.86	0.10
Uniform Delay, d1	28.6		56.8	8.7	48.8	40.4
Progression Factor	0.45		0.66	2.65	1.00	1.00
Incremental Delay, d2	6.9		50.5	0.3	9.8	0.1
Delay (s)	19.8		87.8	23.3	58.6	40.5
Level of Service	B		F	C	E	D
Approach Delay (s)	19.8			36.6	56.2	
Approach LOS	B			D	E	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2028 Future Background>PM
09-29-2023

	↖	→	↗	↖	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↑↑		↖	↑↑		↖	↗	↖	↗	↖	↗	
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143	
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7	
Grade (%)		6%			0%			0%				0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	35.3			2.5			2.5			2.5			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		1.00			0.99		1.00					0.99	
Frt		0.996			0.986			0.864				0.862	
Fit Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1656	3343	0	1705	3399	0	1770	1824	0	1725	1474	0	
Fit Permitted	0.133			0.083			0.650			0.658			
Satd. Flow (perm)	232	3343	0	149	3399	0	1209	1824	0	1195	1474	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		3			14			96				146	
Link Speed (k/h)		60			60			30				40	
Link Distance (m)		222.7			268.7			130.9				169.9	
Travel Time (s)		13.4			16.1			15.7				15.3	
Confl. Peds. (#/hr)	16		1	1		16	1					1	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	133	1634	0	91	1315	0	202	156	0	84	159	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.6				3.6	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		1.6			1.6			1.6				1.6	
Two way Left Turn Lane					Yes								
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Number of Detectors	1	2		1	2		1	2		1	2		
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru		
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6		
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		

Lanes, Volumes, Timings

<2028 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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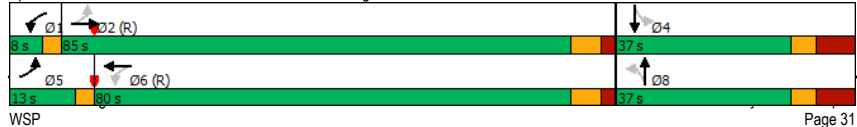


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	92.2	80.6		85.9	77.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.71	0.62		0.66	0.59		0.19	0.19		0.19	0.19	
v/c Ratio	0.51	0.79		0.58	0.65		0.89	0.37		0.37	0.40	
Control Delay	14.0	14.4		31.1	15.4		87.5	20.6		50.3	11.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	14.6		31.1	15.4		87.5	20.6		50.3	11.7	
LOS	B	B		C	B		F	C		D	B	
Approach Delay		14.6			16.4			58.4			25.0	
Approach LOS		B			B			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 20.1 Intersection LOS: C
 Intersection Capacity Utilization 96.1% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

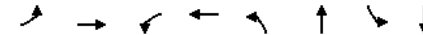


Queues

<2028 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	1634	91	1315	202	156	84	159
v/c Ratio	0.51	0.79	0.58	0.65	0.89	0.37	0.37	0.40
Control Delay	14.0	14.4	31.1	15.4	87.5	20.6	50.3	11.7
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	14.6	31.1	15.4	87.5	20.6	50.3	11.7
Queue Length 50th (m)	8.2	101.2	4.0	184.6	49.7	12.7	18.5	2.7
Queue Length 95th (m)	m12.9	111.0	m13.2	187.7	#89.1	32.1	34.3	21.1
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	274	2073	158	2018	251	454	248	421
Starvation Cap Reductn	0	53	0	0	0	0	0	0
Spillback Cap Reductn	0	78	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.82	0.58	0.65	0.80	0.35	0.34	0.38

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2028 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3344	1705	3399	1768	1825	1725	1474	1725	1474	1725	1474
Fit Permitted	0.13	1.00	0.08	1.00	0.65	1.00	0.66	1.00	0.66	1.00	0.66	1.00
Satd. Flow (perm)	231	3344	149	3399	1210	1825	1194	1474	1194	1474	1194	1474
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146
RTOR Reduction (vph)	0	1	0	0	6	0	78	0	0	118	0	0
Lane Group Flow (vph)	133	1633	0	91	1309	0	202	78	0	84	41	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4		4	
Actuated Green, G (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Effective Green, g (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.68	0.62	0.63	0.59	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	2073	153	2013	228	343	225	277	225	277	225	277
v/s Ratio Prot	c0.03	c0.49	c0.02	0.39	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03
v/s Ratio Perm	0.32		0.35		c0.17		0.07		0.07		0.07	
v/c Ratio	0.53	0.79	0.59	0.65	0.89	0.23	0.37	0.15	0.37	0.15	0.37	0.15
Uniform Delay, d1	12.3	18.3	16.3	17.6	51.4	44.7	46.0	44.0	46.0	44.0	46.0	44.0
Progression Factor	1.61	0.66	1.89	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	1.6	5.2	1.4	30.9	0.3	1.0	0.2	1.0	0.2	1.0	0.2
Delay (s)	20.9	13.7	36.1	14.8	82.3	45.1	47.1	44.3	47.1	44.3	47.1	44.3
Level of Service	C	B	D	B	F	D	D	D	D	D	D	D
Approach Delay (s)	14.2		16.2		66.1		45.2		45.2		45.2	
Approach LOS	B		B		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt		0.850			0.850			0.850			0.850	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950			0.950			0.350			0.310		
Satd. Flow (perm)	1635	3400	1549	1718	3579	1502	642	5255	1470	559	5105	1550
Right Turn on Red		Yes		Yes		Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		187			153			59				192
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	297.5			222.7			158.6			385.2		
Travel Time (s)	17.9			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Shared Lane Traffic (%)												
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2028 Future Background>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0				7.0	7.0
Flash Dont Walk (s)	29.0	29.0		29.0	29.0		33.0				33.0	33.0
Pedestrian Calls (#/hr)	13	13		38	38		20				20	20
Act Effect Green (s)	14.5	41.4	41.4	22.2	49.1	49.1	50.4	40.0	67.6	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.39	0.31	0.52	0.39	0.31	0.31
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
LOS	F	D	C	F	B	B	D	C	D	C	D	A
Approach Delay	50.9			26.2			37.4			33.1		
Approach LOS	D			C			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 37.2 Intersection LOS: D
 Intersection Capacity Utilization 108.3% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



Queues
13: Whites Road & Kingston Road

<2028 Future Background>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Length 50th (m)	40.7	127.0	39.5	56.2	33.0	12.5	40.4	52.9	115.9	32.8	47.2	0.0
Queue Length 95th (m)	#77.2	#174.8	74.7	m79.0	65.6	m75.2	#72.8	65.1	159.2	#57.0	58.7	16.8
Internal Link Dist (m)	273.5			198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	193	1083	620	346	1351	662	292	1616	857	262	1570	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.90	0.60	0.69	0.58	0.76	0.80	0.44	0.79	0.74	0.41	0.32

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2028 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1759	5255	1512	1739	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	648	5255	1512	568	5105	1550
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
RTOR Reduction (vph)	0	0	127	0	0	95	0	0	31	0	0	133
Lane Group Flow (vph)	160	970	242	238	787	410	235	705	644	195	636	59
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Effective Green, g (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	187	1082	493	295	1351	567	267	1616	723	241	1570	476
v/s Ratio Prot	0.10	c0.29		0.14	0.22		c0.03	0.13	c0.15	0.03	0.12	
v/s Ratio Perm			0.16			0.27	0.27		0.27	0.25		0.04
v/c Ratio	0.86	0.90	0.49	0.81	0.58	0.72	0.88	0.44	0.89	0.81	0.41	0.12
Uniform Delay, d1	56.7	42.3	35.8	51.8	32.3	34.6	38.5	36.0	30.8	37.0	35.6	32.4
Progression Factor	1.00	1.00	1.00	1.31	0.46	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.7	11.5	3.5	11.6	1.4	6.0	26.7	0.9	13.2	17.8	0.8	0.5
Delay (s)	86.5	53.8	39.2	79.5	16.1	17.5	65.2	36.8	44.0	54.8	36.4	32.9
Level of Service	F	D	D	E	B	B	E	D	D	D	D	C
Approach Delay (s)	53.7			26.4			44.0			39.2		
Approach LOS	D			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	41.0			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.89											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			21.4					
Intersection Capacity Utilization	108.3%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Background>PM
09-29-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.955					
Satd. Flow (prot)	3453	1427	0	3539	3618	0
Fit Permitted	0.955					
Satd. Flow (perm)	3453	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	138				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1245	620	0	885	576	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1307	558	0	885	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2028 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

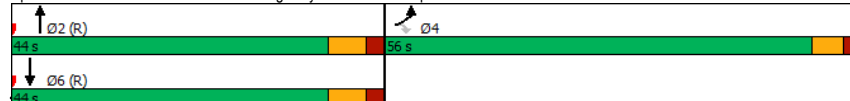


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
v/c Ratio	0.82	0.78		0.60	0.38	
Control Delay	27.9	24.5		25.6	21.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	27.9	24.5		25.6	21.9	
LOS	C	C		C	C	
Approach Delay	26.9			25.6	21.9	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 73.4%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2028 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1307	558	885	576
v/c Ratio	0.82	0.78	0.60	0.38
Control Delay	27.9	24.5	25.6	21.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.5	25.6	21.9
Queue Length 50th (m)	106.7	72.7	69.8	40.6
Queue Length 95th (m)	124.5	113.7	95.5	57.8
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1747	777	1478	1511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.72	0.60	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Background>PM
 09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑↑	↑		↑↑	↑↑	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Fpfb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3451	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3451	1404		3539	3618	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1245	620	0	885	576	0
RTOR Reduction (vph)	4	75	0	0	0	0
Lane Group Flow (vph)	1303	483	0	885	576	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	46.0	46.0		41.8	41.8	
Effective Green, g (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1587	645		1479	1512	
v/s Ratio Prot	c0.38			c0.25	0.16	
v/s Ratio Perm		0.34				
v/c Ratio	0.82	0.75		0.60	0.38	
Uniform Delay, d1	23.4	22.3		22.6	20.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	4.8		1.8	0.7	
Delay (s)	27.0	27.0		24.4	20.9	
Level of Service	C	C		C	C	
Approach Delay (s)	27.0			24.4	20.9	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		25.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

F-2 *2033 FUTURE
BACKGROUND
CONDITIONS*

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2033 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.986			0.992			0.862			0.877	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3405	0	1652	3390	0	1745	1555	0	1725	1601	0
Fit Permitted	0.950			0.950			0.732			0.622		
Satd. Flow (perm)	1677	3405	0	1643	3390	0	1330	1555	0	1127	1601	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			6			155				32
Link Speed (k/h)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	820	82	112	487	27	252	13	155	15	7	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	902	0	112	514	0	252	168	0	15	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2033 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	60.6		13.4	70.3		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.06	0.50		0.11	0.59		0.24	0.24		0.24	0.24	
v/c Ratio	0.22	0.52		0.61	0.26		0.81	0.35		0.06	0.10	
Control Delay	72.7	16.5		86.4	5.7		61.8	8.2		32.1	13.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.7	16.5		86.4	5.7		61.8	8.2		32.1	13.2	
LOS	E	B		F	A		E	A		C	B	
Approach Delay		17.8			20.1			40.3			18.4	
Approach LOS		B			C			D			B	
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green											
Natural Cycle:	85											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.81											
Intersection Signal Delay:	23.2						Intersection LOS: C					
Intersection Capacity Utilization:	64.5%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	1: Walnut Lane & Kingston Road											

Queues <2033 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	902	112	514	252	168	15	39
w/c Ratio	0.22	0.52	0.61	0.26	0.81	0.35	0.06	0.10
Control Delay	72.7	16.5	86.4	5.7	61.8	8.2	32.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	16.5	86.4	5.7	61.8	8.2	32.1	13.2
Queue Length 50th (m)	5.4	50.0	27.8	9.1	56.2	2.4	2.7	1.3
Queue Length 95th (m)	m13.0	101.7	46.7	18.0	78.1	17.5	7.6	9.0
Internal Link Dist (m)		105.3	670.6		100.5		155.7	
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	1723	231	1988	452	631	383	565
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 w/c Ratio	0.21	0.52	0.48	0.26	0.56	0.27	0.04	0.07

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

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↗	↓	↖	↗	↘	↙	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	↖	↖↗	↖↗
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29		
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7		
Total Lost time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2			
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00			
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98			
Frbp, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00			
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.88			
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00			
Satd. Flow (prot)	1685	3406		1652	3391		1726	1554		1721	1600			
Fit Permitted	0.95	1.00		0.95	1.00		0.73	1.00		0.62	1.00			
Satd. Flow (perm)	1685	3406		1652	3391		1330	1554		1128	1600			
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	0.92	0.92
Adj. Flow (vph)	22	820	82	112	487	27	252	13	155	15	7	32		
RTOR Reduction (vph)	0	5	0	0	3	0	0	118	0	0	24	0		
Lane Group Flow (vph)	22	897	0	112	511	0	252	50	0	15	15	0		
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9		
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%		
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0		
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA			
Protected Phases	5	2		1	6		8				4			
Permitted Phases							8				4			
Actuated Green, G (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3			
Effective Green, g (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3			
Actuated g/C Ratio	0.04	0.50		0.11	0.58		0.24	0.24		0.24	0.24			
Clearance Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2			
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	67	1717		184	1952		313	366		266	377			
v/s Ratio Prot	0.01	c0.26		c0.07	0.15			0.03			0.01			
v/s Ratio Perm							c0.19			0.01				
w/c Ratio	0.33	0.52		0.61	0.26		0.81	0.14		0.06	0.04			
Uniform Delay, d1	56.0	20.0		50.8	12.7		43.2	36.2		35.5	35.4			
Progression Factor	1.28	0.70		1.47	0.38		1.00	1.00		1.00	1.00			
Incremental Delay, d2	2.7	1.1		5.2	0.3		13.9	0.2		0.1	0.0			
Delay (s)	74.2	15.1		79.6	5.1		57.2	36.4		35.6	35.4			
Level of Service	E	B		E	A		E	D		D	D			
Approach Delay (s)		16.5			18.5			48.9			35.5			
Approach LOS		B			B			D			D			

Intersection Summary
HCM 2000 Control Delay 24.3 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.61
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 17.8
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Background>AM
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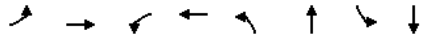
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Frt	0.986		0.981		0.900		0.879					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1564	3316	0	1645	3304	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950			0.950			0.540			0.726		
Satd. Flow (perm)	1554	3316	0	1639	3304	0	993	1769	0	1393	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			16			32				157
Link Speed (k/h)	60		60		40		60					
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	826	88	85	602	87	40	16	32	142	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	914	0	85	689	0	40	48	0	142	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		4.9					
Link Offset(m)	0.0		0.0		0.0		4.9					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8		4			
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.65	0.44		0.80	0.35		0.26	0.16		0.66	0.48	
Control Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
LOS	E	B		F	A		D	B		E	B	
Approach Delay	19.0		19.5		31.5		33.8					
Approach LOS	B		B		C		C					
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	112.8 (94%), 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:	21.9						Intersection LOS: C					
Intersection Capacity Utilization:	71.6%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2033 Future Background>AM
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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	914	85	689	40	48	142	195
w/c Ratio	0.65	0.44	0.80	0.35	0.26	0.16	0.66	0.48
Control Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Length 50th (m)	20.0	53.3	18.9	40.9	8.5	3.3	32.2	7.9
Queue Length 95th (m)	#39.1	87.8	#47.9	48.4	16.9	12.4	47.4	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2061	106	1987	328	606	460	686
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 w/c Ratio	0.59	0.44	0.80	0.35	0.12	0.08	0.31	0.28

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3315		1645	3304		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3315		1645	3304		993	1769		1392	1760	
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)	87	826	88	85	602	87	40	16	32	142	38	157
RTOR Reduction (vph)	0	5	0	0	6	0	0	27	0	0	133	0
Lane Group Flow (vph)	87	909	0	85	683	0	40	21	0	142	62	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Effective Green, g (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2055		106	1979		154	275		216	274	
v/s Ratio Prot	0.06	c0.27		c0.05	0.21			0.01			0.04	
v/s Ratio Perm							0.04			c0.10		
w/c Ratio	0.65	0.44		0.80	0.34		0.26	0.08		0.66	0.23	
Uniform Delay, d1	53.1	11.9		55.3	12.2		44.6	43.3		47.6	44.3	
Progression Factor	1.00	1.00		0.92	0.72		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.7		32.7	0.5		0.9	0.1		7.0	0.4	
Delay (s)	63.5	12.6		83.8	9.2		45.5	43.4		54.7	44.8	
Level of Service	E	B		F	A		D	D		D	D	
Approach Delay (s)		17.1			17.4			44.3			48.9	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 23.2 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.51
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 19.1
Intersection Capacity Utilization 71.6% ICU Level of Service C
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2033 Future Background>AM

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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Traffic Volume (vph)	178	491	196	148	420	42	115	361	125	76	630	91
Future Volume (vph)	178	491	196	148	420	42	115	361	125	76	630	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.289			0.520		
Satd. Flow (perm)	1638	3362	1511	1674	3510	1530	542	3700	1513	1093	3618	1522
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			179			137			136			119
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	193	534	213	161	457	46	125	392	136	83	685	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	534	213	161	457	46	125	392	136	83	685	99
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	18.3	37.4	37.4	13.5	32.6	32.6	53.6	43.5	37.4	53.0	41.9	41.9
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.43	0.29	0.24	0.16	0.54	0.16
Control Delay	47.5	33.8	17.1	87.0	39.5	0.3	24.0	28.5	6.2	18.7	33.3	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	17.1	87.0	39.5	0.3	24.0	28.5	6.2	18.7	33.3	3.7
LOS	D	C	B	F	D	A	C	A	B	C	A	A
Approach Delay		32.8			48.3			23.0			28.5	
Approach LOS		C			D			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 105

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 32.9

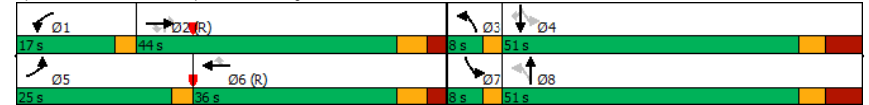
Intersection LOS: C

Intersection Capacity Utilization 93.1%

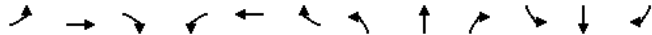
ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2033 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	193	534	213	161	457	46	125	392	136	83	685	99
w/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.43	0.29	0.24	0.16	0.54	0.16
Control Delay	47.5	33.8	17.1	87.0	39.5	0.3	24.0	28.5	6.2	18.7	33.3	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	17.1	87.0	39.5	0.3	24.0	28.5	6.2	18.7	33.3	3.7
Queue Length 50th (m)	44.6	66.2	26.4	37.6	48.0	0.0	16.5	35.1	0.0	10.6	67.6	0.0
Queue Length 95th (m)	51.5	81.8	54.1	#73.1	66.4	0.0	28.1	47.6	13.9	19.7	86.1	8.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1046	593	197	953	515	294	1340	564	521	1263	608
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.64	0.51	0.36	0.82	0.48	0.09	0.43	0.29	0.24	0.16	0.54	0.16

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔↔	↔↔	↔	↔	↔↔	↔
Traffic Volume (vph)	178	491	196	148	420	42	115	361	125	76	630	91
Future Volume (vph)	178	491	196	148	420	42	115	361	125	76	630	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1789	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.29	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	545	3700	1513	1102	3618	1522
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)	193	534	213	161	457	46	125	392	136	83	685	99
RTOR Reduction (vph)	0	0	124	0	0	34	0	0	94	0	0	64
Lane Group Flow (vph)	193	534	89	161	457	12	125	392	42	83	685	35
Confl. Peds. (#/hr)	15	19	19		15	15		28	28		15	
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6		8	2		4	4
Actuated Green, G (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Effective Green, g (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.40	0.36	0.31	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	252	1031	463	190	936	408	272	1341	463	457	1281	539
v/s Ratio Prot	c0.12	c0.16		c0.10	0.13		c0.02	0.11		0.01	c0.19	
v/s Ratio Perm			0.06			0.01	0.17		0.03	0.06		0.02
w/c Ratio	0.77	0.52	0.19	0.85	0.49	0.03	0.46	0.29	0.09	0.18	0.53	0.07
Uniform Delay, d1	48.8	34.3	30.6	52.2	37.1	32.5	24.1	27.3	29.7	23.5	30.9	25.6
Progression Factor	0.61	0.94	2.16	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.7	1.7	0.8	27.8	1.8	0.1	1.2	0.6	0.4	0.2	1.6	0.2
Delay (s)	41.7	33.9	67.0	80.1	38.9	32.7	25.3	27.8	30.0	23.7	32.5	25.8
Level of Service	D	C	E	F	D	C	C	C	C	C	C	C
Approach Delay (s)		43.0			48.5			27.8			30.9	
Approach LOS		D			D			C			C	

Intersection Summary
HCM 2000 Control Delay 37.6 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.59
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 93.1% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	540	272	146	798	24
Future Volume (vph)	10	17	36	194	19	59	53	540	272	146	798	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	0.99		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.314			0.393		
Satd. Flow (perm)	0	3058	0	0	1858	1181	540	5036	1483	689	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	587	296	159	867	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	587	296	159	867	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2033 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023

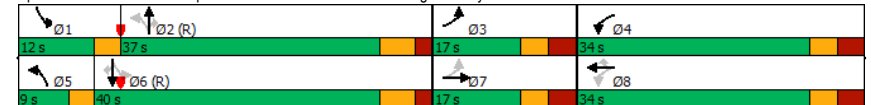


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)					19.0	19.0		17.0	17.0		17.0	17.0
Flash Dont Walk (s)					8.0	8.0		6.0	6.0		6.0	6.0
Pedestrian Calls (#/hr)					0	0		21	21		21	21
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.15	0.22	0.32	0.30	0.31	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.7	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.7	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.8			12.6	
Approach LOS		C			D			A			B	


Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 14.9
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway




Queues <2033 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	587	296	159	867	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.15	0.22	0.32	0.30	0.31	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	6.8	13.1	4.0	9.0	13.7	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.5	23.3	9.6	11.3	34.5	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.5	36.1	19.6	21.5	47.0	0.0
Internal Link Dist (m)		58.8	304.5				138.3			233.7	
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	397	2621	913	547	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.15	0.22	0.32	0.29	0.31	0.03

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

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	540	272	146	798	24
Future Volume (vph)	10	17	36	194	19	59	53	540	272	146	798	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1642	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.31	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	543	5036	1483	692	5029	1458
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)	11	18	39	211	21	64	58	587	296	159	867	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	0	146	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	587	150	159	867	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	354	2558	753	509	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.17	
v/s Ratio Perm							0.01	0.08		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.16	0.23	0.20	0.31	0.32	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.2	13.7	13.5	8.1	12.7	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.77	0.89	1.50	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.2	0.2	0.6	0.4	0.3	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.0	12.4	20.7	8.4	13.0	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.8			12.2	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.35
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	160	188	69	310	163	522	0	0	686	97
Future Volume (vph)	0	0	160	188	69	310	163	522	0	0	686	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	0	1	1	0	1	0	0	0	0	0	1
Taper Length (m)	2.5	0	0	2.5	0	30.0	0	0	0	2.5	0	0
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1583	1700	1767	1551	1738	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.316					
Satd. Flow (perm)	0	0	1583	1700	1767	1551	576	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						105
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)									4			
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
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	174	204	75	337	177	567	0	0	746	105
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	174	139	140	337	177	567	0	0	746	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4				9.4
Detector 2 Size(m)						0.6		0.6				0.6
Detector 2 Type						Cl+Ex		Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2033 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023

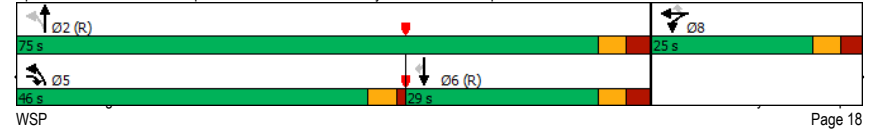


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			16.6	13.7	13.7	13.7	75.8	74.0			53.0	53.0
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.76	0.74			0.53	0.53
v/c Ratio			0.66	0.60	0.58	0.67	0.28	0.16			0.29	0.12
Control Delay			50.8	50.7	49.5	11.3	5.0	4.3			8.8	1.6
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			50.8	50.7	49.5	11.3	5.0	4.3			8.8	1.6
LOS			D	D	D	B	A	A			A	A
Approach Delay		50.8			28.9			4.4				7.9
Approach LOS		D			C			A				A


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	15.4
Intersection LOS:	B
Intersection Capacity Utilization:	45.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp




Queues <2033 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	174	139	140	337	177	567	746	105
v/c Ratio	0.66	0.60	0.58	0.67	0.28	0.16	0.29	0.12
Control Delay	50.8	50.7	49.5	11.3	5.0	4.3	8.8	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	50.7	49.5	11.3	5.0	4.3	8.8	1.6
Queue Length 50th (m)	32.0	27.1	27.2	0.0	7.5	9.7	18.8	0.2
Queue Length 95th (m)	49.6	44.3	44.3	23.2	16.3	16.5	24.1	2.2
Internal Link Dist (m)	202.7				348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	656	323	335	567	919	3651	2583	864
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	0.27	0.43	0.42	0.59	0.19	0.16	0.29	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	160	188	69	310	163	522	0	0	686	97
Future Volume (vph)	0	0	160	188	69	310	163	522	0	0	686	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Fipb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1583	1700	1767	1551	1735	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.32	1.00			1.00	1.00
Satd. Flow (perm)			1583	1700	1767	1551	576	4932			4877	1538
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	0	174	204	75	337	177	567	0	0	746	105
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	49
Lane Group Flow (vph)	0	0	174	139	140	46	177	567	0	0	746	56
Confl. Peds. (#/hr)							7	14	14		7	7
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Effective Green, g (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.74	0.74			0.53	0.53
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			262	232	242	212	618	3649			2579	813
v/s Ratio Prot			c0.11	c0.08	0.08		0.05	0.11			0.15	
v/s Ratio Perm						0.03	c0.16					0.04
v/c Ratio			0.66	0.60	0.58	0.22	0.29	0.16			0.29	0.07
Uniform Delay, d1			39.1	40.6	40.4	38.4	4.1	3.8			13.1	11.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.58	0.37
Incremental Delay, d2			6.2	4.1	3.3	0.5	0.3	0.1			0.3	0.2
Delay (s)			45.3	44.7	43.8	38.9	4.3	3.9			7.9	4.4
Level of Service			D	D	D	D	A	A			A	A
Approach Delay (s)			45.3			41.3		4.0			7.5	
Approach LOS			D			D		A			A	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

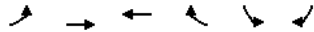
c Critical Lane Group

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2033 Future Background>AM

10-02-2023



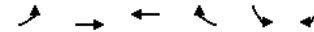
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↕	↕	
Traffic Volume (vph)	96	714	648	99	182	229	
Future Volume (vph)	96	714	648	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Frt			0.980				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3379	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3379	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			17			249	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	776	704	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	776	812	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2033 Future Background>AM

10-02-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.33	0.39		0.72	0.52	
Control Delay	71.9	4.0	15.0		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	71.9	4.0	15.0		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		12.0	15.0		34.1		
Approach LOS		B	B		C		

Intersection Summary

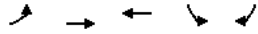
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.8
 Intersection LOS: B
 Intersection Capacity Utilization 51.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

<2033 Future Background>AM
10-02-2023

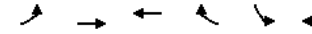


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	776	812	198	249
w/c Ratio	0.62	0.33	0.39	0.72	0.52
Control Delay	71.9	4.0	15.0	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	4.0	15.0	65.5	9.1
Queue Length 50th (m)	16.6	69.6	51.5	49.0	0.0
Queue Length 95th (m)	29.5	2.1	86.2	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2059	476	649
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 w/c Ratio	0.44	0.33	0.39	0.42	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2033 Future Background>AM
10-02-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↕↕
Traffic Volume (vph)	96	714	648	99	182	229
Future Volume (vph)	96	714	648	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Fr	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3379		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3379		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	776	704	108	198	249
RTOR Reduction (vph)	0	0	7	0	0	209
Lane Group Flow (vph)	104	776	805	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2053		276	271
v/s Ratio Prot	c0.06	0.23	c0.24		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.34	0.39		0.72	0.15
Uniform Delay, d1	55.7	8.1	13.1		51.9	47.0
Progression Factor	1.05	0.41	1.00		1.00	1.00
Incremental Delay, d2	5.9	0.4	0.6		8.6	0.3
Delay (s)	64.4	3.7	13.7		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	13.7		53.1	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	813	13	309	665	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	826	0	309	665	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2033 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effect Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.52		0.85	0.27	0.78	0.20
Control Delay	14.7		57.6	12.5	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.7		57.6	12.5	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	14.7			26.8	52.6	
Approach LOS	B			C	D	

Intersection Summary

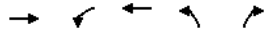
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.8
 Intersection Capacity Utilization 64.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>AM
10-02-2023



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	826	309	665	501	71
w/c Ratio	0.52	0.85	0.27	0.78	0.20
Control Delay	14.7	57.6	12.5	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	57.6	12.5	58.6	10.2
Queue Length 50th (m)	72.1	76.0	55.7	63.7	0.0
Queue Length 95th (m)	97.3	104.4	73.3	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.52	0.68	0.27	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>AM
10-02-2023



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑↑	↑
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	813	13	309	665	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	825	0	309	665	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.24		c0.19	0.19	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.52		0.84	0.27	0.78	0.04
Uniform Delay, d1	25.6		47.8	6.9	50.2	43.2
Progression Factor	0.49		0.80	1.65	1.00	1.00
Incremental Delay, d2	1.1		15.3	0.2	5.8	0.1
Delay (s)	13.6		53.6	11.7	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	13.6			25.0	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2033 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3380	0	1805	1755	0	1643	1468	0
Fit Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3380	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			9			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1060	40	104	1065	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1100	0	104	1145	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2033 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	18.0		18.0		20.0		20.0		20.0		20.0	
Pedestrian Calls (#/hr)	1		16		0		0		1		1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.57		0.63	0.56		0.76	0.29		0.24	0.43	
Control Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
LOS	E	B		E	B		E	B		D	B	
Approach Delay	20.1		17.1		48.2		21.2					
Approach LOS	C		B		D		C					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 78.6%
 ICU Level of Service D
 Analysis Period (min) 15

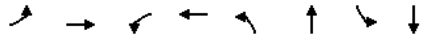
Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



WSP

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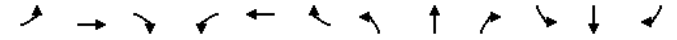
Queues <2033 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1100	104	1145	152	107	46	149
w/c Ratio	0.59	0.57	0.63	0.56	0.76	0.29	0.24	0.43
Control Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Length 50th (m)	19.3	80.7	21.9	78.2	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.7	106.9	38.9	165.1	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2036	278	469	264	432
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 w/c Ratio	0.50	0.57	0.51	0.56	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3279		1671	3378		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3279		1671	3378		1249	1755		1185	1468	
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)	83	1060	40	104	1065	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	4	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1098	0	104	1141	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2031		200	282		190	236	
v/s Ratio Prot	0.05	0.33		c0.06	c0.34			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.57		0.63	0.56		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	16.6		56.3	15.6		52.2	46.4		47.6	46.9	
Progression Factor	0.86	0.84		1.13	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	1.2		7.3	1.1		15.5	0.1		0.7	0.3	
Delay (s)	55.4	15.2		71.2	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.0			15.7			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2033 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0		87.1		35.0		72.0		47.0	
Storage Lanes	1		1		1		1		1		1	
Taper Length (m)	64.0		39.6		66.8		32.6					
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97		0.99		0.95		0.99		0.97	
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950		0.950		0.230		0.494					
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	167		241		196		172					
Link Speed (kh)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13		13		38		20		20	
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	0	0	0	2
Adj. Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Shared Lane Traffic (%)	85		374		320		254		612		305	
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24	14	14	24	14	24	14	24	14	24	14	24
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

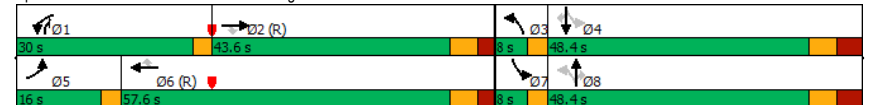
<2033 Future Background>AM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases	2		6		8		8		4		4	
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	40.7	40.7	22.9	52.5	52.5	50.4	40.0	68.3	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.39	0.31	0.53	0.39	0.31	0.31
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	34.6		24.9		27.4		33.2					
Approach LOS	C		C		C		C					

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	29.8
Intersection Capacity Utilization:	104.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	G

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2033 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Length 50th (m)	21.2	39.4	31.5	47.9	63.2	20.2	26.2	30.0	30.9	28.1	67.8	3.2
Queue Length 95th (m)	38.4	55.3	63.5	79.7	50.7	9.2	#51.5	39.4	50.6	44.5	81.8	20.2
Internal Link Dist (m)		273.5		198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	1044	604	366	1418	758	208	1556	937	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.53	0.69	0.43	0.40	0.76	0.27	0.45	0.45	0.56	0.32

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2033 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑↑	↑		↑↑↑	↑
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1527	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1527	906	5057	1574
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)	85	374	320	254	612	305	159	424	424	170	865	190
RTOR Reduction (vph)	0	0	115	0	0	144	0	0	101	0	0	119
Lane Group Flow (vph)	85	374	205	254	612	161	159	424	323	170	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Effective Green, g (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	1044	489	311	1417	614	191	1556	738	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.14	c0.17		c0.03	0.08	0.08	0.02	0.17	
v/s Ratio Perm			0.13			0.11	c0.25		0.13	0.15		0.05
v/c Ratio	0.61	0.36	0.42	0.82	0.43	0.26	0.83	0.27	0.44	0.49	0.56	0.15
Uniform Delay, d1	57.4	34.5	35.3	51.5	28.0	25.8	37.0	34.0	22.0	31.5	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.89	0.63	0.55	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.0	2.6	13.2	0.8	0.9	25.5	0.4	0.4	1.1	1.4	0.6
Delay (s)	65.1	35.5	37.9	59.1	18.4	15.1	62.5	34.4	22.4	32.6	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		39.7			26.4			33.8			37.2	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	21.4
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2033 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

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	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↖↖	↖↖	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3387	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3387	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	636	291	0	753	453	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	665	262	0	753	453	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2033 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

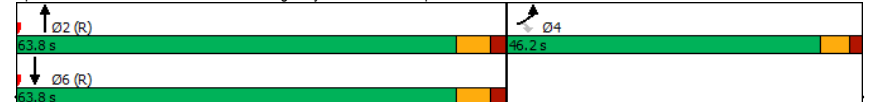
10-02-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
v/c Ratio	0.78	0.48		0.35	0.20	
Control Delay	44.3	6.7		10.5	9.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.3	6.7		10.5	9.2	
LOS	D	A		B	A	
Approach Delay	33.7			10.5	9.2	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.3
 Intersection Capacity Utilization 48.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

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Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	665	262	753	453
w/c Ratio	0.78	0.48	0.35	0.20
Control Delay	44.3	6.7	10.5	9.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.3	6.7	10.5	9.2
Queue Length 50th (m)	68.0	0.0	36.7	19.6
Queue Length 95th (m)	80.8	19.4	56.4	32.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1256	683	2150	2218
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.38	0.35	0.20
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Background>AM
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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	←←←	→		←←	←←	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3390	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3390	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	636	291	0	753	453	0
RTOR Reduction (vph)	4	196	0	0	0	0
Lane Group Flow (vph)	661	66	0	753	453	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	27.7	27.7		70.1	70.1	
Effective Green, g (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	853	352		2150	2218	
v/s Ratio Prot	c0.20			c0.22	0.13	
v/s Ratio Perm		0.05				
v/c Ratio	0.78	0.19		0.35	0.20	
Uniform Delay, d1	38.3	32.3		9.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.5	0.2	
Delay (s)	42.7	32.6		9.8	8.5	
Level of Service	D	C		A	A	
Approach Delay (s)	39.8			9.8	8.5	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay		22.6		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.47				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		48.8%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2033 Future Background>PM
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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.98	
Frt		0.976			0.992			0.863			0.906	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3444	0	1685	3509	0	1745	1594	0	1725	1707	0
Flt Permitted	0.950			0.950			0.591			0.577		
Satd. Flow (perm)	1677	3444	0	1682	3509	0	1067	1594	0	1043	1707	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			6			96			27	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	1742	0	123	710	0	275	300	0	25	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8				4	
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	32.6		8.0	32.6		8.0	37.2		37.2	37.2	
Total Split (s)	8.0	72.0		9.0	73.0		11.8	49.0		37.2	37.2	
Total Split (%)	6.2%	55.4%		6.9%	56.2%		9.1%	37.7%		28.6%	28.6%	
Maximum Green (s)	5.0	65.4		6.0	66.4		8.8	40.8		29.0	29.0	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.0	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		0.0	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0			22.0		22.0	22.0	
Pedestrian Calls (#/hr)		8			4			2		9	9	
Act Effect Green (s)	5.0	81.3		6.0	83.9		30.1	24.9		14.4	14.4	
Actuated g/C Ratio	0.04	0.63		0.05	0.65		0.23	0.19		0.11	0.11	
v/c Ratio	0.61	0.81		1.60	0.31		0.91	0.79		0.22	0.20	
Control Delay	108.3	13.7		365.0	6.1		79.2	46.9		52.8	25.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	108.3	13.7		365.0	6.1		79.2	46.9		52.8	25.5	
LOS	F	B		F	A		E	D		D	C	
Approach Delay		15.8			59.1			62.4			35.6	
Approach LOS		B			E			E			D	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.60
Intersection Signal Delay:	35.5
Intersection LOS:	D
Intersection Capacity Utilization:	92.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2033 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	1742	123	710	275	300	25	43
w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.79	0.22	0.20
Control Delay	108.3	13.7	365.0	6.1	79.2	46.9	52.8	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.3	13.7	365.0	6.1	79.2	46.9	52.8	25.5
Queue Length 50th (m)	10.6	135.3	~46.1	7.1	65.8	51.9	6.1	3.8
Queue Length 95th (m)	m14.7	#280.7	#80.9	91.5	79.2	71.2	13.0	13.1
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	2163	77	2267	302	566	232	401
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 w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.53	0.11	0.11

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.

HCM Signalized Intersection Capacity Analysis <2033 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑↑			↑↑	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.98	
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.86		1.00	0.91	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3444		1685	3509		1728	1595		1717	1707	
Fit Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.58	1.00	
Satd. Flow (perm)	1685	3444		1685	3509		1074	1595		1043	1707	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
RTOR Reduction (vph)	0	9	0	0	2	0	0	76	0	0	24	0
Lane Group Flow (vph)	39	1733	0	123	708	0	275	224	0	25	19	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8					
Actuated Green, G (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Effective Green, g (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Actuated g/C Ratio	0.03	0.61		0.05	0.63		0.20	0.20		0.10	0.10	
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	51	2111		77	2205		272	325		102	168	
v/s Ratio Prot	0.02	c0.50		c0.07	0.20		c0.08	0.14			0.01	
v/s Ratio Perm							c0.12			0.02		
w/c Ratio	0.76	0.82		1.60	0.32		1.01	0.69		0.25	0.11	
Uniform Delay, d1	62.5	19.6		62.0	11.2		50.9	47.9		54.1	53.4	
Progression Factor	1.33	0.51		1.47	0.48		1.00	1.00		1.00	1.00	
Incremental Delay, d2	38.4	2.8		316.2	0.3		57.4	5.9		1.3	0.3	
Delay (s)	121.8	12.7		407.5	5.7		108.3	53.9		55.4	53.7	
Level of Service	F	B		F	A		F	D		E	D	
Approach Delay (s)		15.1			65.1			79.9			54.3	
Approach LOS		B			E			E			D	

Intersection Summary

HCM 2000 Control Delay 40.1 HCM 2000 Level of Service D

HCM 2000 Volume to Capacity ratio 0.91

Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8

Intersection Capacity Utilization 92.1% ICU Level of Service F

Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.991		0.977		0.977		0.920		0.885		0.885	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3394	0	1597	3418	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.676			0.678		
Satd. Flow (perm)	1578	3394	0	1594	3418	0	1254	1786	0	1294	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9				20		42		97			
Link Speed (k/h)	60		60		60		40		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	1693	0	42	956	0	117	123	0	149	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases								8			4	
Detector Phase	5	2		1	6			8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0			8.0	8.0		8.0	8.0
Minimum Split (s)	8.0	27.6		8.0	27.6			40.1	40.1		40.1	40.1
Total Split (s)	26.0	81.6		8.0	63.6			40.4	40.4		40.4	40.4
Total Split (%)	20.0%	62.8%		6.2%	48.9%			31.1%	31.1%		31.1%	31.1%
Maximum Green (s)	23.0	75.0		5.0	57.0			30.9	30.9		30.9	30.9
Yellow Time (s)	3.0	4.2		3.0	4.2			4.4	4.4		4.4	4.4
All-Red Time (s)	0.0	2.4		0.0	2.4			5.1	5.1		5.1	5.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	3.0	6.6		3.0	6.6			9.5	9.5		9.5	9.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Recall Mode	None	C-Max		None	C-Max			None	None		None	None
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.0	86.9		5.0	69.4			20.6	20.6		20.6	20.6
Actuated g/C Ratio	0.16	0.67		0.04	0.53			0.16	0.16		0.16	0.16
v/c Ratio	0.85	0.75		0.69	0.52			0.59	0.39		0.73	0.35
Control Delay	87.0	9.1		117.0	9.8			61.6	33.8		71.1	16.1
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	87.0	9.1		117.0	9.8			61.6	33.8		71.1	16.1
LOS	F	A		F	A			E	C		E	B
Approach Delay	17.9		14.3		47.3		45.9					
Approach LOS	B		B		D		D					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 21.2
 Intersection Capacity Utilization 81.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 3: Dixie Road & Kingston Road



Queues <2033 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	215	1693	42	956	117	123	149	126
w/c Ratio	0.85	0.75	0.69	0.52	0.59	0.39	0.73	0.35
Control Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Length 50th (m)	49.6	35.3	11.5	48.7	28.3	18.6	36.9	6.5
Queue Length 95th (m)	m#83.6	154.5	m#24.3	m65.4	44.4	34.0	55.5	22.0
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2272	61	1832	298	456	307	485
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 w/c Ratio	0.77	0.75	0.69	0.52	0.39	0.27	0.49	0.26

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.

HCM Signalized Intersection Capacity Analysis <2033 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3393		1597	3418		1762	1785		1813	1729	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3393		1597	3418		1254	1785		1294	1729	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
RTOR Reduction (vph)	0	3	0	0	9	0	35	0	0	82	0	0
Lane Group Flow (vph)	215	1690	0	42	947	0	117	88	0	149	44	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Effective Green, g (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.66		0.03	0.53		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	2252		49	1822		198	282		205	273	
v/s Ratio Prot	c0.14	c0.50		0.03	0.28			0.05			0.03	
v/s Ratio Perm							0.09			c0.12		
w/c Ratio	0.84	0.75		0.86	0.52		0.59	0.31		0.73	0.16	
Uniform Delay, d1	52.9	14.6		62.7	19.6		50.8	48.4		52.0	47.2	
Progression Factor	1.27	0.47		1.19	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.8	1.6		71.5	1.0		4.7	0.6		12.1	0.3	
Delay (s)	83.0	8.4		146.3	9.3		55.4	49.0		64.1	47.5	
Level of Service	F	A		F	A		E	D		E	D	
Approach Delay (s)		16.8			15.0			52.2			56.5	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay		22.0			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.78										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			19.1				
Intersection Capacity Utilization		81.7%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1094	383	239	539	72	131	789	241	102	639	127
Future Volume (vph)	279	1094	383	239	539	72	131	789	241	102	639	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.282			0.186		
Satd. Flow (perm)	1654	3461	1479	1688	3579	1485	530	3773	1543	391	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			84			127			188			130
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	285	1116	391	244	550	73	134	805	246	104	652	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	1116	391	244	550	73	134	805	246	104	652	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2033 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	26.1	43.3	52.4	21.5	36.7	36.7	51.1	40.0	43.3	51.1	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.40	0.17	0.28	0.28	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.52	0.69	0.38	0.48	0.58	0.24
Control Delay	61.0	48.3	19.8	81.1	43.0	1.0	33.7	43.4	10.6	32.0	40.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	19.8	81.1	43.0	1.0	33.7	43.4	10.6	32.0	40.4	6.5
LOS	E	D	B	F	D	A	C	D	B	C	D	A
Approach Delay	44.1			50.2			35.5			34.5		
Approach LOS	D			D			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.2 Intersection LOS: D
 Intersection Capacity Utilization 104.2% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2033 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	285	1116	391	244	550	73	134	805	246	104	652	130
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.52	0.69	0.38	0.48	0.58	0.24
Control Delay	61.0	48.3	19.8	81.1	43.0	1.0	33.7	43.4	10.6	32.0	40.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	19.8	81.1	43.0	1.0	33.7	43.4	10.6	32.0	40.4	6.5
Queue Length 50th (m)	62.7	159.5	73.6	61.3	63.7	0.0	21.4	95.5	10.3	16.2	74.1	0.0
Queue Length 95th (m)	m80.4	#192.2	m60.2	#104.4	85.6	1.0	35.3	117.8	31.4	27.9	93.4	14.2
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	402	1153	651	289	1009	509	257	1160	640	216	1124	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.97	0.60	0.84	0.55	0.14	0.52	0.69	0.38	0.48	0.58	0.24

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<2033 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	279	1094	383	239	539	72	131	789	241	102	639	127
Future Volume (vph)	279	1094	383	239	539	72	131	789	241	102	639	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	1.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1803	3773	1543	2021	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.28	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	535	3773	1543	396	3654	1466
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	285	1116	391	244	550	73	134	805	246	104	652	130
RTOR Reduction (vph)	0	0	53	0	0	52	0	0	125	0	0	90
Lane Group Flow (vph)	285	1116	338	244	550	21	134	805	121	104	652	40
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6		8		2	4		4
Actuated Green, G (s)	26.1	43.3	48.3	19.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Effective Green, g (s)	26.1	43.3	48.3	21.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.37	0.17	0.28	0.28	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	1152	554	282	1010	419	233	1160	513	199	1124	451
v/s Ratio Prot	c0.17	c0.32	c0.02	c0.14	0.15		0.02	c0.21		0.02	0.18	
v/s Ratio Perm			0.20			0.01	0.18		0.08	0.16		0.03
v/c Ratio	0.84	0.97	0.61	0.87	0.54	0.05	0.58	0.69	0.24	0.52	0.58	0.09
Uniform Delay, d1	50.0	42.7	33.2	52.8	39.6	34.0	33.5	39.6	31.4	30.8	37.9	32.0
Progression Factor	0.93	0.76	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.9	15.2	1.3	23.0	2.1	0.2	3.4	3.4	1.1	2.5	2.2	0.4
Delay (s)	58.2	47.7	26.7	75.9	41.7	34.2	36.9	43.0	32.4	33.3	40.1	32.4
Level of Service	E	D	C	E	D	C	D	D	C	C	D	C
Approach Delay (s)		44.8			50.7			40.2			38.2	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		43.5										D
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		130.0						22.2				
Intersection Capacity Utilization		104.2%										G
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
8: Liverpool Road & Private Access/Pickering Parkway

<2033 Future Background>PM
09-29-2023

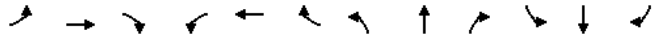
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	852	401	196	1006	46
Future Volume (vph)	87	69	130	412	58	174	116	852	401	196	1006	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			0.99		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.200		0.259			
Satd. Flow (perm)	0	2959	0	0	1858	1399	343	5085	1502	463	5079	1482
Right Turn on Red			Yes			Yes		Yes			Yes	
Satd. Flow (RTOR)		134				179		413				144
Link Speed (k/h)		30			50		50				50	
Link Distance (m)		82.8			328.5		162.3				257.7	
Travel Time (s)		9.9			23.7		11.7				18.6	
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	90	71	134	425	60	179	120	878	413	202	1037	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	205	0	425	60	179	120	878	413	202	1037	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0		3.8				3.8	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

<2033 Future Background>PM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023

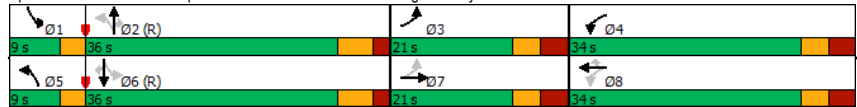


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	3	7	4	8	8	5	2	2	6	1	6	6
Permitted Phases	7		8		8	2		2	6	1	6	6
Detector Phase	3	7	4	8	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0	30.0
Total Split (s)	21.0	21.0	34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0	36.0
Total Split (%)	21.0%	21.0%	34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4	27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7	29.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2	4.2
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag					Lead		Lag	Lag	Lead	Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max	C-Max
Walk Time (s)			19.0		19.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)			8.0		8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Pedestrian Calls (#/hr)			20		20	28	28	28	28	15	15	15
Act Effect Green (s)	10.8	10.8	20.5	20.5	20.5	49.4	40.1	40.1	49.4	40.1	40.1	40.1
Actuated g/C Ratio	0.11	0.11	0.20	0.20	0.20	0.49	0.40	0.40	0.49	0.40	0.40	0.40
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.49	0.43	0.49	0.67	0.51	0.07	0.07
Control Delay	50.5	18.9	40.5	31.2	7.6	20.9	22.2	8.7	30.2	25.1	0.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	18.9	40.5	31.2	7.6	20.9	22.2	8.7	30.2	25.1	0.2	0.2
LOS	D	B	D	C	A	C	C	A	C	C	C	A
Approach Delay	28.5		30.8		18.1		25.0					
Approach LOS	C		C		B		C					

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.67
 Intersection Signal Delay: 23.7
 Intersection LOS: C
 Intersection Capacity Utilization 68.8%
 ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<2033 Future Background>PM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	90	205	425	60	179	120	878	413	202	1037	47	
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.49	0.43	0.49	0.67	0.51	0.07	
Control Delay	50.5	18.9	40.5	31.2	7.6	20.9	22.2	8.7	30.2	25.1	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.5	18.9	40.5	31.2	7.6	20.9	22.2	8.7	30.2	25.1	0.2	
Queue Length 50th (m)	16.7	6.7	40.2	9.9	0.0	13.7	46.9	22.6	19.0	52.0	0.0	
Queue Length 95th (m)	30.9	16.6	50.0	18.5	15.4	m29.8	68.9	51.2	#52.7	79.3	0.0	
Internal Link Dist (m)	58.8		304.5		138.3		233.7					
Turn Bay Length (m)			57.0		62.1		54.4	75.7	132.5	35.5		
Base Capacity (vph)	245	540	877	509	513	247	2041	850	303	2038	680	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38	0.48	0.12	0.35	0.49	0.43	0.49	0.67	0.51	0.07	

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2033 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	852	401	196	1006	46
Future Volume (vph)	87	69	130	412	58	174	116	852	401	196	1006	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2929		3204	1858	1399	1642	5085	1504	1705	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.20	1.00	1.00	0.26	1.00	1.00
Satd. Flow (perm)	0	2929		0	1858	1399	346	5085	1504	466	5079	1485
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	71	134	425	60	179	120	878	413	202	1037	47
RTOR Reduction (vph)	0	120	0	0	0	142	0	0	247	0	0	28
Lane Group Flow (vph)	90	85	0	425	60	37	120	878	166	202	1037	19
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			8	2		2	6	
Actuated Green, G (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Effective Green, g (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	184	316		656	380	286	237	2044	604	289	2041	596
v/s Ratio Prot	c0.05	0.03		c0.13	0.03		0.03	0.17		c0.04	0.20	
v/s Ratio Perm						0.03	0.20		0.11	c0.28		0.01
v/c Ratio	0.49	0.27		0.65	0.16	0.13	0.51	0.43	0.27	0.70	0.51	0.03
Uniform Delay, d1	42.0	41.0		36.4	32.7	32.5	16.3	21.6	20.1	17.9	22.5	18.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.93	0.92	2.35	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.5		2.2	0.2	0.2	1.6	0.6	1.1	7.2	0.9	0.1
Delay (s)	44.0	41.4		38.7	32.9	32.7	16.8	20.5	48.3	25.1	23.4	18.2
Level of Service	D	D		D	C	C	B	C	D	C	C	B
Approach Delay (s)		42.2			36.5			28.3			23.5	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay	29.2		HCM 2000 Level of Service				C					
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	100.0			Sum of lost time (s)				22.5				
Intersection Capacity Utilization	68.8%											
ICU Level of Service	C											
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2033 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	237	278	168	293	121	1084	0	0	950	71
Future Volume (vph)	0	0	237	278	168	293	121	1084	0	0	950	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1		1	1	0	0		0	0	1
Taper Length (m)	2.5		2.5		30.0		2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor							0.99					0.92
Frt			0.865		0.850							0.850
Flt Protected			0.950	0.987	0.950							
Satd. Flow (prot)	0	0	1662	1734	1801	1581	1825	5079	0	0	4972	1633
Flt Permitted			0.950	0.987	0.189							
Satd. Flow (perm)	0	0	1662	1734	1801	1581	361	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes				Yes	
Satd. Flow (RTOR)					85							82
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4			226.7		372.2				162.3	
Travel Time (s)		27.3			16.3		26.8				11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	255	299	181	315	130	1166	0	0	1022	76
Shared Lane Traffic (%)				21%								
Lane Group Flow (vph)	0	0	255	236	244	315	130	1166	0	0	1022	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7		3.7				3.7	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<2033 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023

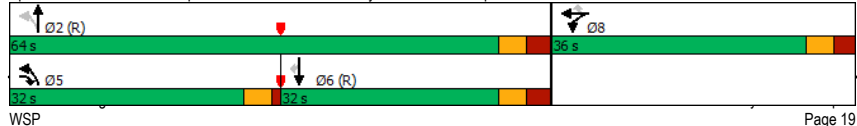


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases		5	8	8				5	2		6	
Permitted Phases						8	2					6
Detector Phase		5	8	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)		5.0	8.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)		9.5	25.0	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)		32.0	36.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)		32.0%	36.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)		27.5	30.0	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)		3.5	3.3	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)		1.0	2.7	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.5	6.0	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag		Lead					Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode		None	None	None	None	None	C-Max	C-Max			C-Max	C-Max
Walk Time (s)			14.0	14.0	14.0	14.0	13.0	13.0			13.0	13.0
Flash Dont Walk (s)			5.0	5.0	5.0	5.0	5.0	5.0			5.0	5.0
Pedestrian Calls (#/hr)			0	0	0	0	14	14			7	7
Act Effct Green (s)		20.5	21.3	21.3	21.3	21.3	68.2	66.4			41.4	41.4
Actuated g/C Ratio		0.20	0.21	0.21	0.21	0.21	0.68	0.66			0.41	0.41
v/c Ratio		0.75	0.64	0.64	0.78	0.24	0.35	0.35			0.50	0.11
Control Delay		50.6	42.8	42.4	39.7	7.9	8.5	8.5			24.3	11.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		50.6	42.8	42.4	39.7	7.9	8.5	8.5			24.3	11.4
LOS		D	D	D	D	A	A	A			C	B
Approach Delay		50.6			41.4			8.4			23.4	
Approach LOS		D			D			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9
 Intersection LOS: C
 Intersection Capacity Utilization 59.1%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2033 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	255	236	244	315	130	1166	1022	76
v/c Ratio	0.75	0.64	0.64	0.78	0.24	0.35	0.50	0.11
Control Delay	50.6	42.8	42.4	39.7	7.9	8.5	24.3	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	42.8	42.4	39.7	7.9	8.5	24.3	11.4
Queue Length 50th (m)	46.7	44.0	45.4	42.6	7.7	32.5	37.3	1.1
Queue Length 95th (m)	67.4	62.2	63.5	65.2	18.2	51.7	74.9	10.4
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	540	533	648	3371	2057	672
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	0.56	0.45	0.45	0.59	0.20	0.35	0.50	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2033 Future Background>PM
 09-29-2023

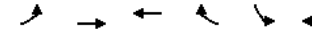


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	237	278	168	293	121	1084	0	0	950	71
Future Volume (vph)	0	0	237	278	168	293	121	1084	0	0	950	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.93
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1802	1581	1823	5079			4972	1515
Flt Permitted			1.00	0.95	0.99	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1802	1581	362	5079			4972	1515
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	255	299	181	315	130	1166	0	0	1022	76
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	0	0	0	45
Lane Group Flow (vph)	0	0	255	236	244	248	130	1166	0	0	1022	31
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Effective Green, g (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Actuated g/C Ratio			0.20	0.21	0.21	0.21	0.66	0.66			0.41	0.41
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			340	369	383	336	539	3372			2058	627
v/s Ratio Prot			c0.15	0.14	0.14		0.05	0.23			c0.21	
v/s Ratio Perm						c0.16	0.11					0.02
v/c Ratio			0.75	0.64	0.64	0.74	0.24	0.35			0.50	0.05
Uniform Delay, d1			37.3	35.9	35.8	36.7	7.3	7.3			21.6	17.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.97	1.89
Incremental Delay, d2			9.0	3.6	3.5	8.2	0.2	0.3			0.8	0.1
Delay (s)			46.3	39.5	39.3	45.0	7.5	7.6			21.7	33.3
Level of Service			D	D	D	D	A	A			C	C
Approach Delay (s)		46.3			41.6			7.6			22.5	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2033 Future Background>PM
 09-29-2023



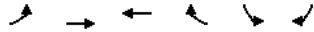
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1590	757	223	271	137	
Future Volume (vph)	205	1590	757	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		0.99			0.99	
Frt			0.966			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3346	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3346	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			40			143	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	214	1656	789	232	282	143	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	214	1656	1021	0	282	143	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2033 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023

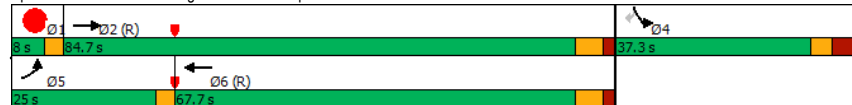


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases				4			
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.2	86.8	68.4		24.8	24.8	
Actuated g/C Ratio	0.16	0.67	0.53		0.19	0.19	
v/c Ratio	0.85	0.72	0.57		0.82	0.32	
Control Delay	87.1	2.9	14.1		69.4	8.3	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	87.1	2.9	14.1		69.4	8.3	
LOS	F	A	B		E	A	
Approach Delay	12.5		14.1		48.9		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 17.7 Intersection LOS: B
 Intersection Capacity Utilization 70.9% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2033 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	214	1656	1021	282	143
v/c Ratio	0.85	0.72	0.57	0.82	0.32
Control Delay	87.1	2.9	14.1	69.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	87.1	2.9	14.1	69.4	8.3
Queue Length 50th (m)	47.8	5.7	108.9	69.5	0.0
Queue Length 95th (m)	m53.4	m6.0	81.5	96.9	16.4
Internal Link Dist (m)	400.0		872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	273	2293	1779	416	514
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	0.78	0.72	0.57	0.68	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2033 Future Background>PM
09-29-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↕
Traffic Volume (vph)	205	1590	757	223	271	137
Future Volume (vph)	205	1590	757	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	
Frb, ped/bikes	1.00	1.00	0.99	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.97	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1618	3433	3345		1805	1751
Fit Permitted	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1618	3433	3345		1805	1751
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1656	789	232	282	143
RTOR Reduction (vph)	0	0	19	0	0	116
Lane Group Flow (vph)	214	1656	1002	0	282	27
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA	Prot	Perm	
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.2	85.6	68.4		24.8	24.8
Effective Green, g (s)	20.2	85.6	68.4		24.8	24.8
Actuated g/C Ratio	0.16	0.66	0.53		0.19	0.19
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	251	2260	1759		344	334
v/s Ratio Prot	c0.13	c0.48	0.30		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.85	0.73	0.57		0.82	0.08
Uniform Delay, d1	53.5	14.7	20.8		50.5	43.2
Progression Factor	1.36	0.12	0.61		1.00	1.00
Incremental Delay, d2	12.3	1.0	1.2		14.1	0.1
Delay (s)	84.9	2.8	13.8		64.6	43.3
Level of Service	F	A	B		E	D
Approach Delay (s)		12.2	13.8		57.4	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			70.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>PM
09-29-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					84
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1727	23	188	723	676	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1750	0	188	723	676	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>PM
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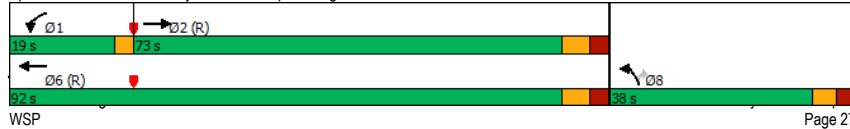


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
v/c Ratio	0.93		0.97	0.30	0.87	0.25
Control Delay	21.1		92.2	24.2	61.0	13.0
Queue Delay	0.2		0.0	0.0	0.0	0.0
Total Delay	21.3		92.2	24.2	61.0	13.0
LOS	C		F	C	E	B
Approach Delay	21.3			38.2	54.7	
Approach LOS	C			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 33.4 Intersection LOS: C
 Intersection Capacity Utilization 92.2% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road

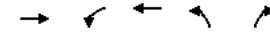


WSP

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Queues
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>PM
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Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1750	188	723	676	102
v/c Ratio	0.93	0.97	0.30	0.87	0.25
Control Delay	21.1	92.2	24.2	61.0	13.0
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	21.3	92.2	24.2	61.0	13.0
Queue Length 50th (m)	137.8	47.7	91.4	85.6	3.6
Queue Length 95th (m)	#274.7	#96.5	109.7	106.0	17.8
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1883	194	2433	853	446
Starvation Cap Reductn	7	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.93	0.97	0.30	0.79	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

1105-1163 Kingston Road
WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Background>PM
09-29-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1727	23	188	723	676	102
RTOR Reduction (vph)	0	0	0	0	0	65
Lane Group Flow (vph)	1750	0	188	723	676	37
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	68.4		16.0	87.4	28.7	28.7
Effective Green, g (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1882		194	2432	782	351
v/s Ratio Prot	c0.49		c0.12	0.20	c0.19	
v/s Ratio Perm						0.02
v/c Ratio	0.93		0.97	0.30	0.86	0.10
Uniform Delay, d1	28.6		56.8	8.7	48.8	40.4
Progression Factor	0.45		0.66	2.65	1.00	1.00
Incremental Delay, d2	6.9		50.5	0.3	9.8	0.1
Delay (s)	19.8		87.8	23.3	58.6	40.5
Level of Service	B		F	C	E	D
Approach Delay (s)	19.8			36.6	56.2	
Approach LOS	B			D	E	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2033 Future Background>PM
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	↖	→	↗	←	↖	↗	↑	↖	↗	↓	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑		↖	↑↑		↖	↗		↖	↗	
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99		1.00					0.99
Frt		0.996			0.986			0.864				0.862
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3343	0	1705	3399	0	1770	1824	0	1725	1474	0
Fit Permitted	0.133			0.083			0.650			0.658		
Satd. Flow (perm)	232	3343	0	149	3399	0	1209	1824	0	1195	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			14			96				146
Link Speed (k/h)		60			60			30				40
Link Distance (m)		222.7			268.7			130.9				169.9
Travel Time (s)		13.4			16.1			15.7				15.3
Confl. Peds. (#/hr)	16		1	1		16	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146
Shared Lane Traffic (%)												
Lane Group Flow (vph)	133	1634	0	91	1315	0	202	156	0	84	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane					Yes							
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2			2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	

Lanes, Volumes, Timings

<2033 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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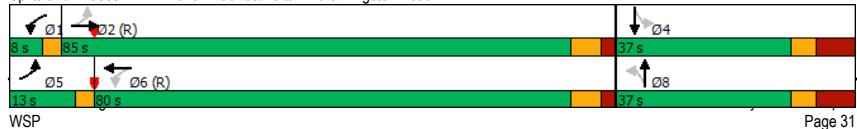


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	92.2	80.6		85.9	77.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.71	0.62		0.66	0.59		0.19	0.19		0.19	0.19	
v/c Ratio	0.51	0.79		0.58	0.65		0.89	0.37		0.37	0.40	
Control Delay	14.0	14.4		31.1	15.4		87.5	20.6		50.3	11.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	14.6		31.1	15.4		87.5	20.6		50.3	11.7	
LOS	B	B		C	B		F	C		D	B	
Approach Delay		14.6			16.4			58.4			25.0	
Approach LOS		B			B			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 20.1
 Intersection LOS: C
 Intersection Capacity Utilization 96.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

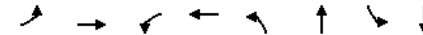


Queues

<2033 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	1634	91	1315	202	156	84	159
v/c Ratio	0.51	0.79	0.58	0.65	0.89	0.37	0.37	0.40
Control Delay	14.0	14.4	31.1	15.4	87.5	20.6	50.3	11.7
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	14.6	31.1	15.4	87.5	20.6	50.3	11.7
Queue Length 50th (m)	8.2	101.2	4.0	184.6	49.7	12.7	18.5	2.7
Queue Length 95th (m)	m12.9	111.0	m13.2	187.7	#89.1	32.1	34.3	21.1
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	274	2073	158	2018	251	454	248	421
Starvation Cap Reductn	0	53	0	0	0	0	0	0
Spillback Cap Reductn	0	78	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.82	0.58	0.65	0.80	0.35	0.34	0.38

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

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09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3344	1705	3399	1768	1825	1725	1474	1725	1474	1725	1474
Fit Permitted	0.13	1.00	0.08	1.00	0.65	1.00	0.66	1.00	0.66	1.00	0.66	1.00
Satd. Flow (perm)	231	3344	149	3399	1210	1825	1194	1474	1194	1474	1194	1474
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146
RTOR Reduction (vph)	0	1	0	0	6	0	78	0	0	118	0	0
Lane Group Flow (vph)	133	1633	0	91	1309	0	202	78	0	84	41	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Effective Green, g (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.68	0.62	0.63	0.59	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	2073	153	2013	228	343	225	277	225	277	225	277
v/s Ratio Prot	c0.03	c0.49	c0.02	0.39	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
v/s Ratio Perm	0.32		0.35		c0.17		0.07		0.07		0.07	
v/c Ratio	0.53	0.79	0.59	0.65	0.89	0.23	0.37	0.15	0.37	0.15	0.37	0.15
Uniform Delay, d1	12.3	18.3	16.3	17.6	51.4	44.7	46.0	44.0	46.0	44.0	46.0	44.0
Progression Factor	1.61	0.66	1.89	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	1.6	5.2	1.4	30.9	0.3	1.0	0.2	1.0	0.2	1.0	0.2
Delay (s)	20.9	13.7	36.1	14.8	82.3	45.1	47.1	44.3	47.1	44.3	47.1	44.3
Level of Service	C	B	D	B	F	D	D	D	D	D	D	D
Approach Delay (s)	14.2		16.2		66.1		45.2		45.2		45.2	
Approach LOS	B		B		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2033 Future Background>PM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt		0.850			0.850			0.850			0.850	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950			0.950			0.350			0.310		
Satd. Flow (perm)	1635	3400	1549	1718	3579	1502	642	5255	1470	559	5105	1550
Right Turn on Red		Yes		Yes		Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		187			153			59				192
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	297.5			222.7			158.6			385.2		
Travel Time (s)	17.9			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Shared Lane Traffic (%)												
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2033 Future Background>PM

13: Whites Road & Kingston Road

09-29-2023

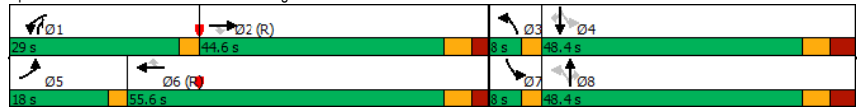


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		33.0		33.0		33.0	
Pedestrian Calls (#/hr)	13		13		38		38		20		20	
Act Effect Green (s)	14.5	41.4	41.4	22.2	49.1	49.1	50.4	40.0	67.6	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.39	0.31	0.52	0.39	0.31	0.31
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
LOS	F	D	C	F	B	B	D	D	C	D	D	A
Approach Delay	50.9			26.2			37.4			33.1		
Approach LOS	D			C			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 37.2 Intersection LOS: D
 Intersection Capacity Utilization 108.3% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2033 Future Background>PM

13: Whites Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Length 50th (m)	40.7	127.0	39.5	56.2	33.0	12.5	40.4	52.9	115.9	32.8	47.2	0.0
Queue Length 95th (m)	#77.2	#174.8	74.7	m79.0	65.6	m75.2	#72.8	65.1	159.2	#57.0	58.7	16.8
Internal Link Dist (m)	273.5			198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0		87.1		35.0		72.0		47.0	
Base Capacity (vph)	193	1083	620	346	1351	662	292	1616	857	262	1570	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.90	0.60	0.69	0.58	0.76	0.80	0.44	0.79	0.74	0.41	0.32

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2033 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1759	5255	1512	1739	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	648	5255	1512	568	5105	1550
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
RTOR Reduction (vph)	0	0	127	0	0	95	0	0	31	0	0	133
Lane Group Flow (vph)	160	970	242	238	787	410	235	705	644	195	636	59
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Effective Green, g (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	187	1082	493	295	1351	567	267	1616	723	241	1570	476
v/s Ratio Prot	0.10	c0.29		0.14	0.22		c0.03	0.13	c0.15	0.03	0.12	
v/s Ratio Perm			0.16			0.27	0.27		0.27	0.25		0.04
v/c Ratio	0.86	0.90	0.49	0.81	0.58	0.72	0.88	0.44	0.89	0.81	0.41	0.12
Uniform Delay, d1	56.7	42.3	35.8	51.8	32.3	34.6	38.5	36.0	30.8	37.0	35.6	32.4
Progression Factor	1.00	1.00	1.00	1.31	0.46	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.7	11.5	3.5	11.6	1.4	6.0	26.7	0.9	13.2	17.8	0.8	0.5
Delay (s)	86.5	53.8	39.2	79.5	16.1	17.5	65.2	36.8	44.0	54.8	36.4	32.9
Level of Service	F	D	D	E	B	B	E	D	D	D	D	C
Approach Delay (s)	53.7			26.4			44.0			39.2		
Approach LOS	D			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	41.0			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.89											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			21.4					
Intersection Capacity Utilization	108.3%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Background>PM
09-29-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔		↔	↔	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.955					
Satd. Flow (prot)	3453	1427	0	3539	3618	0
Fit Permitted	0.955					
Satd. Flow (perm)	3453	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	138				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1245	620	0	885	576	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1307	558	0	885	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2033 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

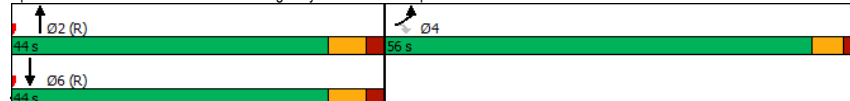


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
v/c Ratio	0.82	0.78		0.60	0.38	
Control Delay	27.9	24.5		25.6	21.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	27.9	24.5		25.6	21.9	
LOS	C	C		C	C	
Approach Delay	26.9			25.6	21.9	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.7 Intersection LOS: C
 Intersection Capacity Utilization 73.4% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2033 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1307	558	885	576
v/c Ratio	0.82	0.78	0.60	0.38
Control Delay	27.9	24.5	25.6	21.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.5	25.6	21.9
Queue Length 50th (m)	106.7	72.7	69.8	40.6
Queue Length 95th (m)	124.5	113.7	95.5	57.8
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1747	777	1478	1511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.72	0.60	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Background>PM
 09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑↑	↑		↑↑	↑↑	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3451	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3451	1404		3539	3618	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1245	620	0	885	576	0
RTOR Reduction (vph)	4	75	0	0	0	0
Lane Group Flow (vph)	1303	483	0	885	576	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	46.0	46.0		41.8	41.8	
Effective Green, g (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1587	645		1479	1512	
v/s Ratio Prot	c0.38			c0.25	0.16	
v/s Ratio Perm		0.34				
v/c Ratio	0.82	0.75		0.60	0.38	
Uniform Delay, d1	23.4	22.3		22.6	20.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	4.8		1.8	0.7	
Delay (s)	27.0	27.0		24.4	20.9	
Level of Service	C	C		C	C	
Approach Delay (s)	27.0			24.4	20.9	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		25.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

F-3 *2038 FUTURE
BACKGROUND
CONDITIONS*

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.986			0.992			0.862			0.877	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3405	0	1652	3390	0	1745	1555	0	1725	1601	0
Fit Permitted	0.950			0.950			0.732			0.622		
Satd. Flow (perm)	1677	3405	0	1643	3390	0	1330	1555	0	1127	1601	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			6			155				32
Link Speed (kh)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	820	82	112	487	27	252	13	155	15	7	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	902	0	112	514	0	252	168	0	15	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	60.6		13.4	70.3		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.06	0.50		0.11	0.59		0.24	0.24		0.24	0.24	
v/c Ratio	0.22	0.52		0.61	0.26		0.81	0.35		0.06	0.10	
Control Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
LOS	E	B		F	A		E	A		C	B	
Approach Delay		17.8			20.1			40.3			18.4	
Approach LOS		B			C			D			B	
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green											
Natural Cycle:	85											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.81											
Intersection Signal Delay:	23.2						Intersection LOS: C					
Intersection Capacity Utilization:	64.5%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	1: Walnut Lane & Kingston Road											
<p>The diagram shows a 120-second cycle with the following phases and durations:</p> <ul style="list-style-type: none"> Phase 01: 19.4s (Green) Phase 02 (R): 51.6s (Green) Phase 03: 49.4s (Green) Phase 04: 49.4s (Green) Phase 05: 8.6s (Green) Phase 06 (L): 51.4s (Green) Phase 07: 49.4s (Green) Phase 08: 49.4s (Green) 												

Queues <2038 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	902	112	514	252	168	15	39
w/c Ratio	0.22	0.52	0.61	0.26	0.81	0.35	0.06	0.10
Control Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Length 50th (m)	5.4	50.0	27.8	9.1	56.2	2.4	2.7	1.3
Queue Length 95th (m)	m13.0	101.7	46.7	18.0	78.1	17.5	7.6	9.0
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	1723	231	1988	452	631	383	565
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 w/c Ratio	0.21	0.52	0.48	0.26	0.56	0.27	0.04	0.07
Intersection Summary								
m	Volume for 95th percentile queue is metered by upstream signal.							

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓	↙				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	↖	
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29	
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7	
Total Lost time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00		
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98		
Frbp, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00		
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.88		
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1685	3406		1652	3391		1726	1554		1721	1600		
Fit Permitted	0.95	1.00		0.95	1.00		0.73	1.00		0.62	1.00		
Satd. Flow (perm)	1685	3406		1652	3391		1330	1554		1128	1600		
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)	22	820	82	112	487	27	252	13	155	15	7	32	
RTOR Reduction (vph)	0	5	0	0	3	0	0	118	0	0	24	0	
Lane Group Flow (vph)	22	897	0	112	511	0	252	50	0	15	15	0	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9	
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%	
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA		
Protected Phases	5	2		1	6		8				4		
Permitted Phases							8			4			
Actuated Green, G (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3		
Effective Green, g (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3		
Actuated g/C Ratio	0.04	0.50		0.11	0.58		0.24	0.24		0.24	0.24		
Clearance Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	67	1717		184	1952		313	366		266	377		
v/s Ratio Prot	0.01	c0.26		c0.07	0.15			0.03			0.01		
v/s Ratio Perm							c0.19			0.01			
w/c Ratio	0.33	0.52		0.61	0.26		0.81	0.14		0.06	0.04		
Uniform Delay, d1	56.0	20.0		50.8	12.7		43.2	36.2		35.5	35.4		
Progression Factor	1.28	0.70		1.46	0.38		1.00	1.00		1.00	1.00		
Incremental Delay, d2	2.7	1.1		5.2	0.3		13.9	0.2		0.1	0.0		
Delay (s)	74.2	15.1		79.5	5.1		57.2	36.4		35.6	35.4		
Level of Service	E	B		E	A		E	D		D	D		
Approach Delay (s)		16.5			18.4			48.9			35.5		
Approach LOS		B			B			D			D		
Intersection Summary													
HCM 2000 Control Delay	24.3		HCM 2000 Level of Service					C					
HCM 2000 Volume to Capacity ratio	0.61												
Actuated Cycle Length (s)	120.0				Sum of lost time (s)				17.8				
Intersection Capacity Utilization	64.5%		ICU Level of Service					C					
Analysis Period (min)	15												

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Frt	0.986		0.981		0.900		0.879					
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1564	3316	0	1645	3304	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950			0.950			0.540			0.726		
Satd. Flow (perm)	1554	3316	0	1639	3304	0	993	1769	0	1393	1759	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		12			16			32			157	
Link Speed (k/h)	60		60		40		60		60		60	
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	826	88	85	602	87	40	16	32	142	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	914	0	85	689	0	40	48	0	142	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8		4			
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.65	0.44		0.80	0.35		0.26	0.16		0.66	0.48	
Control Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
LOS	E	B		F	A		D	B		E	B	
Approach Delay	19.0		19.5		31.5		33.8					
Approach LOS	B		B		C		C					
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	112.8 (94%), 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:	21.9						Intersection LOS: C					
Intersection Capacity Utilization:	71.6%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2038 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	914	85	689	40	48	142	195
w/c Ratio	0.65	0.44	0.80	0.35	0.26	0.16	0.66	0.48
Control Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Length 50th (m)	20.0	53.3	18.9	40.9	8.5	3.3	32.2	7.9
Queue Length 95th (m)	#39.1	87.8	#47.9	48.4	16.9	12.4	47.4	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2061	106	1987	328	606	460	686
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 w/c Ratio	0.59	0.44	0.80	0.35	0.12	0.08	0.31	0.28

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓	↙	↘		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	↖
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3315		1645	3304		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3315		1645	3304		993	1769		1392	1760	
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)	87	826	88	85	602	87	40	16	32	142	38	157
RTOR Reduction (vph)	0	5	0	0	6	0	0	27	0	0	133	0
Lane Group Flow (vph)	87	909	0	85	683	0	40	21	0	142	62	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8					4
Actuated Green, G (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Effective Green, g (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2055		106	1979		154	275		216	274	
v/s Ratio Prot	0.06	c0.27		c0.05	0.21			0.01			0.04	
v/s Ratio Perm							0.04			c0.10		
w/c Ratio	0.65	0.44		0.80	0.34		0.26	0.08		0.66	0.23	
Uniform Delay, d1	53.1	11.9		55.3	12.2		44.6	43.3		47.6	44.3	
Progression Factor	1.00	1.00		0.92	0.72		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.7		32.7	0.5		0.9	0.1		7.0	0.4	
Delay (s)	63.5	12.6		83.8	9.2		45.5	43.4		54.7	44.8	
Level of Service	E	B		F	A		D	D		D	D	
Approach Delay (s)		17.1			17.4			44.3			48.9	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 23.2 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.51
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 19.1
Intersection Capacity Utilization 71.6% ICU Level of Service C
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2038 Future Background>AM

10-02-2023

	↖		→		↘		↙		←		↖		↗		↑		↘		↙		↓		↖	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖		↖		↖		↖		↖		↖		↖		↖		↖		↖		↖		↖	
Traffic Volume (vph)	178	491	196	148	420	42	115	370	125	76	643	91	178	491	196	148	420	42	115	370	125	76	643	91
Future Volume (vph)	178	491	196	148	420	42	115	370	125	76	643	91	178	491	196	148	420	42	115	370	125	76	643	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0			31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950			0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.281			0.514			0.950			0.950			0.281			0.514		
Satd. Flow (perm)	1638	3362	1511	1674	3510	1530	1791	3700	1513	2026	3618	1522	1638	3362	1511	1674	3510	1530	1791	3700	1513	2026	3618	1522
Right Turn on Red			Yes			Yes			Yes		Yes				Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)			177			137			136		119				177			137			136		119	
Link Speed (k/h)		60			60			50			50			60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6			694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1			41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1												1									
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	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0
Adj. Flow (vph)	193	534	213	161	457	46	125	402	136	83	699	99	193	534	213	161	457	46	125	402	136	83	699	99
Shared Lane Traffic (%)																								
Lane Group Flow (vph)	193	534	213	161	457	46	125	402	136	83	699	99	193	534	213	161	457	46	125	402	136	83	699	99
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7			4.7			3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0			0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6			1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes			Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		24	24		14	24		14	24		14	24		24
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel																								
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4			9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6			0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

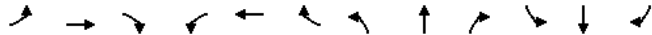
6: Liverpool Road & Kingston Road

<2038 Future Background>AM

10-02-2023

	↖		→		↘		↙		←		↖		↗		↑		↘		↙		↓		↖	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 2 Channel																								
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4		5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase																								
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0						

Queues <2038 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	193	534	213	161	457	46	125	402	136	83	699	99
w/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.43	0.30	0.24	0.16	0.55	0.16
Control Delay	47.5	33.8	17.2	87.0	39.5	0.3	24.3	28.6	6.2	18.7	33.5	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	17.2	87.0	39.5	0.3	24.3	28.6	6.2	18.7	33.5	3.7
Queue Length 50th (m)	44.6	66.2	26.6	37.6	48.0	0.0	16.5	36.1	0.0	10.6	69.4	0.0
Queue Length 95th (m)	51.5	81.8	54.3	#73.1	66.4	0.0	28.1	49.0	13.9	19.7	88.1	8.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1046	592	197	953	515	288	1340	564	516	1263	608
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.64	0.51	0.36	0.82	0.48	0.09	0.43	0.30	0.24	0.16	0.55	0.16

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔↔	↔↔	↔	↔	↔↔	↔
Traffic Volume (vph)	178	491	196	148	420	42	115	370	125	76	643	91
Future Volume (vph)	178	491	196	148	420	42	115	370	125	76	643	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1789	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.28	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	529	3700	1513	1089	3618	1522
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)	193	534	213	161	457	46	125	402	136	83	699	99
RTOR Reduction (vph)	0	0	123	0	0	34	0	0	94	0	0	64
Lane Group Flow (vph)	193	534	90	161	457	12	125	402	42	83	699	35
Confl. Peds. (#/hr)	15	19	19		15	15		28	28		15	
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6		8	2		4	4
Actuated Green, G (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Effective Green, g (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.40	0.36	0.31	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	252	1031	463	190	936	408	266	1341	463	452	1281	539
v/s Ratio Prot	c0.12	c0.16		c0.10	0.13		c0.02	0.11		0.01	c0.19	
v/s Ratio Perm			0.06			0.01	0.17		0.03	0.06		0.02
w/c Ratio	0.77	0.52	0.19	0.85	0.49	0.03	0.47	0.30	0.09	0.18	0.55	0.07
Uniform Delay, d1	48.8	34.3	30.7	52.2	37.1	32.5	24.2	27.4	29.7	23.5	31.0	25.6
Progression Factor	0.61	0.94	2.12	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.7	1.7	0.8	27.8	1.8	0.1	1.3	0.6	0.4	0.2	1.7	0.2
Delay (s)	41.7	33.9	66.0	80.1	38.9	32.7	25.5	27.9	30.0	23.7	32.7	25.8
Level of Service	D	C	E	F	D	C	C	C	C	C	C	C
Approach Delay (s)		42.8			48.5			27.9			31.1	
Approach LOS		D			D			C			C	

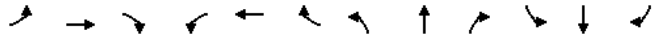
Intersection Summary
HCM 2000 Control Delay 37.6 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.59
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 93.1% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	553	272	146	815	24
Future Volume (vph)	10	17	36	194	19	59	53	553	272	146	815	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	0.99		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.306			0.387		
Satd. Flow (perm)	0	3058	0	0	1858	1181	527	5036	1483	678	5029	1458
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	601	296	159	886	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	601	296	159	886	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2038 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023

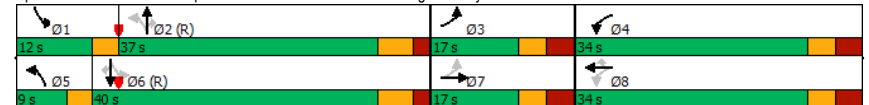


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)					19.0	19.0		17.0	17.0		17.0	17.0
Flash Dont Walk (s)					8.0	8.0		6.0	6.0		6.0	6.0
Pedestrian Calls (#/hr)					0	0		21	21		21	21
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.15	0.23	0.32	0.30	0.31	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	6.7	13.1	4.0	9.0	13.7	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	6.7	13.1	4.0	9.0	13.7	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.9			12.7	
Approach LOS		C			D			A			B	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.56
Intersection Signal Delay:	14.9
Intersection Capacity Utilization:	55.7%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues <2038 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	601	296	159	886	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.15	0.23	0.32	0.30	0.31	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	6.7	13.1	4.0	9.0	13.7	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	6.7	13.1	4.0	9.0	13.7	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.4	24.0	9.7	11.3	35.3	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.5	37.0	19.8	21.5	48.0	0.0
Internal Link Dist (m)		58.8	304.5				138.3			233.7	
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	390	2621	913	541	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.15	0.23	0.32	0.29	0.31	0.03

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

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑↑	↑	↑↑↑	↑↑↑	↑
Traffic Volume (vph)	10	17	36	194	19	59	53	553	272	146	815	24
Future Volume (vph)	10	17	36	194	19	59	53	553	272	146	815	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1642	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.31	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	530	5036	1483	680	5029	1458
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)	11	18	39	211	21	64	58	601	296	159	886	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	0	146	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	601	150	159	886	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	348	2558	753	502	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.18	
v/s Ratio Perm							0.01	0.08	0.10	0.17		0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.17	0.23	0.20	0.32	0.33	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.2	13.7	13.5	8.1	12.7	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.75	0.89	1.49	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.2	0.2	0.6	0.4	0.3	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	7.9	12.4	20.6	8.4	13.0	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.7			12.3	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.35
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	160	188	69	310	163	535	0	0	700	97
Future Volume (vph)	0	0	160	188	69	310	163	535	0	0	700	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1583	1700	1767	1551	1738	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.309					
Satd. Flow (perm)	0	0	1583	1700	1767	1551	563	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						105
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	174	204	75	337	177	582	0	0	761	105
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	174	139	140	337	177	582	0	0	761	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2038 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023

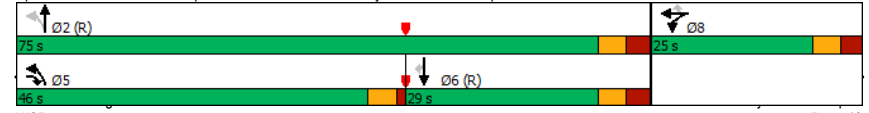


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			16.6	13.7	13.7	13.7	75.8	74.0			53.0	53.0
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.76	0.74			0.53	0.53
v/c Ratio			0.66	0.60	0.58	0.67	0.29	0.16			0.29	0.12
Control Delay			50.8	50.7	49.5	11.3	5.0	4.3			8.7	1.6
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			50.8	50.7	49.5	11.3	5.0	4.3			8.7	1.6
LOS			D	D	D	B	A	A			A	A
Approach Delay			50.8		28.9		4.5				7.9	
Approach LOS			D		C		A				A	


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	15.2
Intersection LOS:	B
Intersection Capacity Utilization:	45.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp




Queues <2038 Future Background>AM
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	174	139	140	337	177	582	761	105
v/c Ratio	0.66	0.60	0.58	0.67	0.29	0.16	0.29	0.12
Control Delay	50.8	50.7	49.5	11.3	5.0	4.3	8.7	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	50.7	49.5	11.3	5.0	4.3	8.7	1.6
Queue Length 50th (m)	32.0	27.1	27.2	0.0	7.5	10.0	19.1	0.2
Queue Length 95th (m)	49.6	44.3	44.3	23.2	16.3	16.9	24.3	2.1
Internal Link Dist (m)	202.7				348.2	138.3		
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	656	323	335	567	914	3651	2583	864
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	0.27	0.43	0.42	0.59	0.19	0.16	0.29	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	160	188	69	310	163	535	0	0	700	97
Future Volume (vph)	0	0	160	188	69	310	163	535	0	0	700	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1583	1700	1767	1551	1736	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.31	1.00			1.00	1.00
Satd. Flow (perm)			1583	1700	1767	1551	565	4932			4877	1538
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	0	174	204	75	337	177	582	0	0	761	105
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	49
Lane Group Flow (vph)	0	0	174	139	140	46	177	582	0	0	761	56
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)									4			
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Effective Green, g (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.74	0.74			0.53	0.53
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			262	232	242	212	612	3649			2579	813
v/s Ratio Prot			c0.11	c0.08	0.08		0.05	0.12			0.16	
v/s Ratio Perm						0.03	c0.17					0.04
v/c Ratio			0.66	0.60	0.58	0.22	0.29	0.16			0.30	0.07
Uniform Delay, d1			39.1	40.6	40.4	38.4	4.1	3.8			13.1	11.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.58	0.36
Incremental Delay, d2			6.2	4.1	3.3	0.5	0.3	0.1			0.3	0.2
Delay (s)			45.3	44.7	43.8	38.9	4.3	3.9			7.9	4.3
Level of Service			D	D	D	D	A	A			A	A
Approach Delay (s)			45.3			41.3		4.0			7.4	
Approach LOS			D			D		A			A	

Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

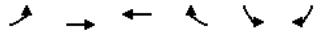
c Critical Lane Group

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2038 Future Background>AM

10-02-2023



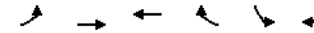
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↕	↕	
Traffic Volume (vph)	96	714	648	99	182	229	
Future Volume (vph)	96	714	648	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Frt			0.980				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3379	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3379	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			17				249
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	776	704	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	776	812	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

10: Kingston Road & Fairport Road

<2038 Future Background>AM

10-02-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.33	0.39		0.72	0.52	
Control Delay	71.9	4.0	15.0		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	71.9	4.0	15.0		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		12.0	15.0		34.1		
Approach LOS		B	B		C		

Intersection Summary

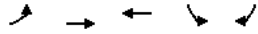
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.8
 Intersection LOS: B
 Intersection Capacity Utilization 51.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

<2038 Future Background>AM
10-02-2023

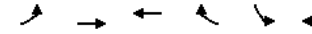


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	776	812	198	249
w/c Ratio	0.62	0.33	0.39	0.72	0.52
Control Delay	71.9	4.0	15.0	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	4.0	15.0	65.5	9.1
Queue Length 50th (m)	16.6	69.6	51.5	49.0	0.0
Queue Length 95th (m)	29.5	2.1	86.2	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2059	476	649
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	0.44	0.33	0.39	0.42	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2038 Future Background>AM
10-02-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↕↕
Traffic Volume (vph)	96	714	648	99	182	229
Future Volume (vph)	96	714	648	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			0%
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Fr	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3379		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3379		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	776	704	108	198	249
RTOR Reduction (vph)	0	0	7	0	0	209
Lane Group Flow (vph)	104	776	805	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2053		276	271
v/s Ratio Prot	c0.06	0.23	c0.24		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.34	0.39		0.72	0.15
Uniform Delay, d1	55.7	8.1	13.1		51.9	47.0
Progression Factor	1.05	0.41	1.00		1.00	1.00
Incremental Delay, d2	5.9	0.4	0.6		8.6	0.3
Delay (s)	64.4	3.7	13.7		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	13.7		53.1	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	813	13	309	665	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	826	0	309	665	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2038 Future Background>AM

11: Hwy 401 WB Ramps & Kingston Road

10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effect Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.52		0.85	0.27	0.78	0.20
Control Delay	14.7		57.6	12.5	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.7		57.6	12.5	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	14.7			26.8	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.8
 Intersection Capacity Utilization 64.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Background>AM
10-02-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	826	309	665	501	71
w/c Ratio	0.52	0.85	0.27	0.78	0.20
Control Delay	14.7	57.6	12.5	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	57.6	12.5	58.6	10.2
Queue Length 50th (m)	72.1	76.0	55.7	63.7	0.0
Queue Length 95th (m)	97.3	104.4	73.3	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.52	0.68	0.27	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Background>AM
10-02-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕	↕↔	↕↔	↕
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	813	13	309	665	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	825	0	309	665	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.24		c0.19	0.19	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.52		0.84	0.27	0.78	0.04
Uniform Delay, d1	25.6		47.8	6.9	50.2	43.2
Progression Factor	0.49		0.80	1.65	1.00	1.00
Incremental Delay, d2	1.1		15.3	0.2	5.8	0.1
Delay (s)	13.6		53.6	11.7	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	13.6			25.0	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2038 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3380	0	1805	1755	0	1643	1468	0
Flt Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3380	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			9			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1060	40	104	1065	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1100	0	104	1145	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

<2038 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	18.0		18.0		20.0		20.0		20.0		20.0	
Pedestrian Calls (#/hr)	1		16		0		0		1		1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.57		0.63	0.56		0.76	0.29		0.24	0.43	
Control Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
LOS	E	B		E	B		E	B		D	B	
Approach Delay	20.1		17.1		48.2		21.2					
Approach LOS	C		B		D		C					

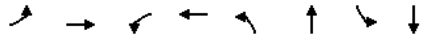
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 78.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



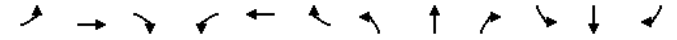
Queues <2038 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1100	104	1145	152	107	46	149
w/c Ratio	0.59	0.57	0.63	0.56	0.76	0.29	0.24	0.43
Control Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Length 50th (m)	19.3	80.7	21.9	78.2	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.7	106.9	38.9	165.1	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2036	278	469	264	432
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 w/c Ratio	0.50	0.57	0.51	0.56	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3279		1671	3378		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3279		1671	3378		1249	1755		1185	1468	
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)	83	1060	40	104	1065	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	4	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1098	0	104	1141	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2031		200	282		190	236	
v/s Ratio Prot	0.05	0.33		c0.06	c0.34			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.57		0.63	0.56		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	16.6		56.3	15.6		52.2	46.4		47.6	46.9	
Progression Factor	0.86	0.84		1.13	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	1.2		7.3	1.1		15.5	0.1		0.7	0.3	
Delay (s)	55.4	15.2		71.2	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.0			15.7			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2038 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0		87.1		35.0		72.0		47.0	
Storage Lanes	1		1		1		1		1		1	
Taper Length (m)	64.0		39.6		66.8		32.6					
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97		0.99		0.95		0.99		0.97	
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950		0.950		0.230		0.494					
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	167		241		196		172					
Link Speed (kh)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13		13		38		20		20	
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24	14	14	24	14	24	14	24	14	24	14	24
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

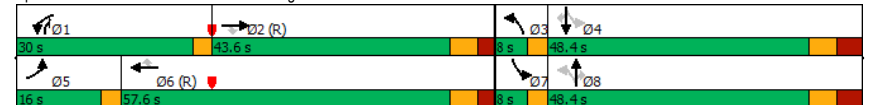
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10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	4
Permitted Phases	2		2		6		8		8		4	
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	40.7	40.7	22.9	52.5	52.5	50.4	40.0	68.3	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.39	0.31	0.53	0.39	0.31	0.31
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	34.6		24.9		27.4		33.2					
Approach LOS	C		C		C		C					

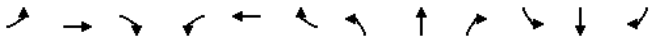
Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	110
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	29.8
Intersection Capacity Utilization:	104.4%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	G

Splits and Phases: 13: Whites Road & Kingston Road



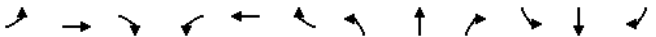
Queues <2038 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Length 50th (m)	21.2	39.4	31.5	47.9	63.2	20.2	26.2	30.0	30.9	28.1	67.8	3.2
Queue Length 95th (m)	38.4	55.3	63.5	79.7	50.7	9.2	#51.5	39.4	50.6	44.5	81.8	20.2
Internal Link Dist (m)		273.5		198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	1044	604	366	1418	758	208	1556	937	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.53	0.69	0.43	0.40	0.76	0.27	0.45	0.45	0.56	0.32

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2038 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1527	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1527	906	5057	1574
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)	85	374	320	254	612	305	159	424	424	170	865	190
RTOR Reduction (vph)	0	0	115	0	0	144	0	0	101	0	0	119
Lane Group Flow (vph)	85	374	205	254	612	161	159	424	323	170	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Effective Green, g (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	1044	489	311	1417	614	191	1556	738	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.14	c0.17		c0.03	0.08	0.08	0.02	0.17	
v/s Ratio Perm			0.13			0.11	c0.25		0.13	0.15		0.05
v/c Ratio	0.61	0.36	0.42	0.82	0.43	0.26	0.83	0.27	0.44	0.49	0.56	0.15
Uniform Delay, d1	57.4	34.5	35.3	51.5	28.0	25.8	37.0	34.0	22.0	31.5	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.89	0.63	0.55	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.0	2.6	13.2	0.8	0.9	25.5	0.4	0.4	1.1	1.4	0.6
Delay (s)	65.1	35.5	37.9	59.1	18.4	15.1	62.5	34.4	22.4	32.6	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		39.7			26.4			33.8			37.2	
Approach LOS		D			C			C			D	

Intersection Summary
HCM 2000 Control Delay 33.8 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.69
Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
Intersection Capacity Utilization 104.4% ICU Level of Service G
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

10-02-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↗↗	↗↗	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3387	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3387	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	636	291	0	753	453	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	665	262	0	753	453	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2038 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

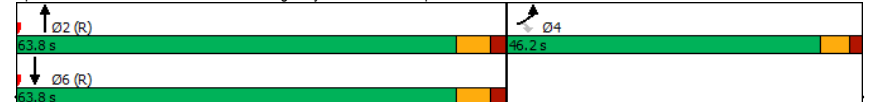
10-02-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
v/c Ratio	0.78	0.48		0.35	0.20	
Control Delay	44.3	6.7		10.5	9.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.3	6.7		10.5	9.2	
LOS	D	A		B	A	
Approach Delay	33.7			10.5	9.2	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.3
 Intersection Capacity Utilization 48.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Background>AM
10-02-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	665	262	753	453
w/c Ratio	0.78	0.48	0.35	0.20
Control Delay	44.3	6.7	10.5	9.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.3	6.7	10.5	9.2
Queue Length 50th (m)	68.0	0.0	36.7	19.6
Queue Length 95th (m)	80.8	19.4	56.4	32.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1256	683	2150	2218
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.38	0.35	0.20
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Background>AM
10-02-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	←←	←		↑↑	↑↑	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frlb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3390	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3390	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	636	291	0	753	453	0
RTOR Reduction (vph)	4	196	0	0	0	0
Lane Group Flow (vph)	661	66	0	753	453	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	27.7	27.7		70.1	70.1	
Effective Green, g (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	853	352		2150	2218	
v/s Ratio Prot	c0.20			c0.22	0.13	
v/s Ratio Perm		0.05				
v/c Ratio	0.78	0.19		0.35	0.20	
Uniform Delay, d1	38.3	32.3		9.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.5	0.2	
Delay (s)	42.7	32.6		9.8	8.5	
Level of Service	D	C		A	A	
Approach Delay (s)	39.8			9.8	8.5	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay		22.6		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.47				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		48.8%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.98	
Frt		0.976			0.992			0.863			0.906	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3444	0	1685	3509	0	1745	1594	0	1725	1707	0
Flt Permitted	0.950			0.950			0.591			0.577		
Satd. Flow (perm)	1677	3444	0	1682	3509	0	1067	1594	0	1043	1707	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			6			96			27	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	1742	0	123	710	0	275	300	0	25	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases										8		4
Detector Phase	5	2			1	6				3	8	4 4
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0				5.0	8.0	8.0 8.0
Minimum Split (s)	8.0	32.6			8.0	32.6				8.0	37.2	37.2 37.2
Total Split (s)	8.0	72.0			9.0	73.0				11.8	49.0	37.2 37.2
Total Split (%)	6.2%	55.4%			6.9%	56.2%				9.1%	37.7%	28.6% 28.6%
Maximum Green (s)	5.0	65.4			6.0	66.4				8.8	40.8	29.0 29.0
Yellow Time (s)	3.0	4.4			3.0	4.4				3.0	3.3	3.3 3.3
All-Red Time (s)	0.0	2.2			0.0	2.2				0.0	4.9	4.9 4.9
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0 0.0
Total Lost Time (s)	3.0	6.6			3.0	6.6				3.0	8.2	8.2 8.2
Lead/Lag	Lead	Lag			Lead	Lag				Lead		Lag Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0 3.0
Recall Mode	None	C-Max			None	C-Max				None	None	None None
Walk Time (s)		7.0				7.0					7.0	7.0 7.0
Flash Dont Walk (s)		19.0				19.0					22.0	22.0 22.0
Pedestrian Calls (#/hr)		8				4					2	9 9
Act Effect Green (s)	5.0	81.3			6.0	83.9				30.1	24.9	14.4 14.4
Actuated g/C Ratio	0.04	0.63			0.05	0.65				0.23	0.19	0.11 0.11
v/c Ratio	0.61	0.81			1.60	0.31				0.91	0.79	0.22 0.20
Control Delay	108.3	13.7			364.9	6.1				79.2	46.9	52.8 25.5
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0 0.0
Total Delay	108.3	13.7			364.9	6.1				79.2	46.9	52.8 25.5
LOS	F	B			F	A				E	D	D C
Approach Delay		15.8				59.0					62.4	35.6
Approach LOS		B				E					E	D

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.60
 Intersection Signal Delay: 35.5
 Intersection LOS: D
 Intersection Capacity Utilization 92.1%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2038 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	1742	123	710	275	300	25	43
w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.79	0.22	0.20
Control Delay	108.3	13.7	364.9	6.1	79.2	46.9	52.8	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.3	13.7	364.9	6.1	79.2	46.9	52.8	25.5
Queue Length 50th (m)	10.6	135.3	~46.1	7.1	65.8	51.9	6.1	3.8
Queue Length 95th (m)	m14.7	#280.7	#80.9	91.5	79.2	71.2	13.0	13.1
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	2163	77	2267	302	566	232	401
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 w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.53	0.11	0.11

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.

HCM Signalized Intersection Capacity Analysis <2038 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑↑		↑↑	↑↑		↑↑	↑↑	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.98	
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.86		1.00	0.91	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3444		1685	3509		1728	1595		1717	1707	
Fit Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.58	1.00	
Satd. Flow (perm)	1685	3444		1685	3509		1074	1595		1043	1707	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
RTOR Reduction (vph)	0	9	0	0	2	0	0	76	0	0	24	0
Lane Group Flow (vph)	39	1733	0	123	708	0	275	224	0	25	19	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Effective Green, g (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Actuated g/C Ratio	0.03	0.61		0.05	0.63		0.20	0.20		0.10	0.10	
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	51	2111		77	2205		272	325		102	168	
v/s Ratio Prot	0.02	c0.50		c0.07	0.20		c0.08	0.14			0.01	
v/s Ratio Perm							c0.12			0.02		
w/c Ratio	0.76	0.82		1.60	0.32		1.01	0.69		0.25	0.11	
Uniform Delay, d1	62.5	19.6		62.0	11.2		50.9	47.9		54.1	53.4	
Progression Factor	1.33	0.51		1.47	0.48		1.00	1.00		1.00	1.00	
Incremental Delay, d2	38.4	2.8		316.1	0.3		57.4	5.9		1.3	0.3	
Delay (s)	121.8	12.7		407.4	5.7		108.3	53.9		55.4	53.7	
Level of Service	F	B		F	A		F	D		E	D	
Approach Delay (s)		15.1			65.1			79.9			54.3	
Approach LOS		B			E			E			D	

Intersection Summary

HCM 2000 Control Delay 40.1 HCM 2000 Level of Service D

HCM 2000 Volume to Capacity ratio 0.91

Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8

Intersection Capacity Utilization 92.1% ICU Level of Service F

Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.991		0.977		0.977		0.920		0.885		0.885	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3394	0	1597	3418	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.676			0.678		
Satd. Flow (perm)	1578	3394	0	1594	3418	0	1254	1786	0	1294	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			20			42			97	
Link Speed (k/h)	60		60		60		40		60		60	
Link Distance (m)	896.3		191.2		123.5		236.2		236.2		236.2	
Travel Time (s)	53.8		11.5		11.1		14.2		14.2		14.2	
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	1693	0	42	956	0	117	123	0	149	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8		3.8		3.8	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	4.9		4.9		4.9		4.9		4.9		4.9	
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases								8				4
Detector Phase	5	2		1	6			8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0			8.0	8.0		8.0	8.0
Minimum Split (s)	8.0	27.6		8.0	27.6			40.1	40.1		40.1	40.1
Total Split (s)	26.0	81.6		8.0	63.6			40.4	40.4		40.4	40.4
Total Split (%)	20.0%	62.8%		6.2%	48.9%			31.1%	31.1%		31.1%	31.1%
Maximum Green (s)	23.0	75.0		5.0	57.0			30.9	30.9		30.9	30.9
Yellow Time (s)	3.0	4.2		3.0	4.2			4.4	4.4		4.4	4.4
All-Red Time (s)	0.0	2.4		0.0	2.4			5.1	5.1		5.1	5.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	3.0	6.6		3.0	6.6			9.5	9.5		9.5	9.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Recall Mode	None	C-Max		None	C-Max			None	None		None	None
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.0	86.9		5.0	69.4			20.6	20.6		20.6	20.6
Actuated g/C Ratio	0.16	0.67		0.04	0.53			0.16	0.16		0.16	0.16
v/c Ratio	0.85	0.75		0.69	0.52			0.59	0.39		0.73	0.35
Control Delay	87.0	9.1		117.0	9.8			61.6	33.8		71.1	16.1
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	87.0	9.1		117.0	9.8			61.6	33.8		71.1	16.1
LOS	F	A		F	A			E	C		E	B
Approach Delay	17.9		14.3		47.3		45.9		45.9		45.9	
Approach LOS	B		B		D		D		D		D	

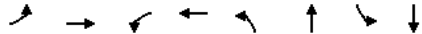
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 21.2
 Intersection Capacity Utilization 81.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 3: Dixie Road & Kingston Road



Queues <2038 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	215	1693	42	956	117	123	149	126
w/c Ratio	0.85	0.75	0.69	0.52	0.59	0.39	0.73	0.35
Control Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Length 50th (m)	49.6	35.3	11.5	48.8	28.3	18.6	36.9	6.5
Queue Length 95th (m)	m#83.6	154.5	m#24.3	m65.4	44.4	34.0	55.5	22.0
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2272	61	1832	298	456	307	485
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 w/c Ratio	0.77	0.75	0.69	0.52	0.39	0.27	0.49	0.26

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.

HCM Signalized Intersection Capacity Analysis <2038 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3393		1597	3418		1762	1785		1813	1729	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3393		1597	3418		1254	1785		1294	1729	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
RTOR Reduction (vph)	0	3	0	0	9	0	35	0	0	82	0	0
Lane Group Flow (vph)	215	1690	0	42	947	0	117	88	0	149	44	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Effective Green, g (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.66		0.03	0.53		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	2252		49	1822		198	282		205	273	
v/s Ratio Prot	c0.14	c0.50		0.03	0.28			0.05			0.03	
v/s Ratio Perm							0.09			c0.12		
w/c Ratio	0.84	0.75		0.86	0.52		0.59	0.31		0.73	0.16	
Uniform Delay, d1	52.9	14.6		62.7	19.6		50.8	48.4		52.0	47.2	
Progression Factor	1.27	0.47		1.19	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.8	1.6		71.5	1.0		4.7	0.6		12.1	0.3	
Delay (s)	83.0	8.4		146.3	9.3		55.4	49.0		64.1	47.5	
Level of Service	F	A		F	A		E	D		E	D	
Approach Delay (s)		16.8			15.0			52.2			56.5	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay		22.0			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.78										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			19.1				
Intersection Capacity Utilization		81.7%			ICU Level of Service			D				
Analysis Period (min)		15										

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1094	383	239	539	72	131	808	241	102	653	127
Future Volume (vph)	279	1094	383	239	539	72	131	808	241	102	653	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.272			0.175		
Satd. Flow (perm)	1654	3461	1479	1688	3579	1485	511	3773	1543	368	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			82			127			184			130
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	285	1116	391	244	550	73	134	824	246	104	666	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	1116	391	244	550	73	134	824	246	104	666	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2038 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023

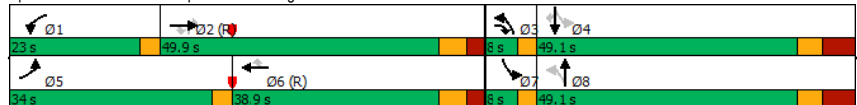


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	26.1	43.3	52.4	21.5	36.7	36.7	51.1	40.0	43.3	51.1	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.40	0.17	0.28	0.28	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.54	0.71	0.39	0.50	0.59	0.24
Control Delay	61.0	48.3	20.0	81.1	43.0	1.0	34.4	43.9	11.0	32.9	40.7	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	20.0	81.1	43.0	1.0	34.4	43.9	11.0	32.9	40.7	6.5
LOS	E	D	C	F	D	A	C	D	B	C	D	A
Approach Delay	44.1			50.2			36.1			34.9		
Approach LOS	D			D			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.5 Intersection LOS: D
 Intersection Capacity Utilization 104.2% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2038 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	285	1116	391	244	550	73	134	824	246	104	666	130
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.54	0.71	0.39	0.50	0.59	0.24
Control Delay	61.0	48.3	20.0	81.1	43.0	1.0	34.4	43.9	11.0	32.9	40.7	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	20.0	81.1	43.0	1.0	34.4	43.9	11.0	32.9	40.7	6.5
Queue Length 50th (m)	62.7	159.5	74.1	61.3	63.7	0.0	21.4	98.3	11.1	16.2	76.0	0.0
Queue Length 95th (m)	m80.4	#192.2	m60.9	#104.4	85.6	1.0	35.3	121.1	32.3	27.9	95.5	14.2
Internal Link Dist (m)	670.6		372.4		233.7		324.6					
Turn Bay Length (m)	188.8	97.9	170.7	117.0	185.5	52.0	49.0	60.5				
Base Capacity (vph)	402	1153	650	289	1009	509	250	1160	637	208	1124	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.97	0.60	0.84	0.55	0.14	0.54	0.71	0.39	0.50	0.59	0.24

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<2038 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	279	1094	383	239	539	72	131	808	241	102	653	127
Future Volume (vph)	279	1094	383	239	539	72	131	808	241	102	653	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	3.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1803	3773	1543	2022	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.27	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	517	3773	1543	373	3654	1466
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	285	1116	391	244	550	73	134	824	246	104	666	130
RTOR Reduction (vph)	0	0	52	0	0	52	0	0	123	0	0	90
Lane Group Flow (vph)	285	1116	339	244	550	21	134	824	123	104	666	40
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6		8		2	4		4
Actuated Green, G (s)	26.1	43.3	48.3	19.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Effective Green, g (s)	26.1	43.3	48.3	21.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.37	0.17	0.28	0.28	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	1152	554	282	1010	419	228	1160	513	192	1124	451
v/s Ratio Prot	c0.17	c0.32	c0.02	c0.14	0.15		0.02	c0.22		0.02	0.18	
v/s Ratio Perm			0.20			0.01	0.18		0.08	0.17		0.03
v/c Ratio	0.84	0.97	0.61	0.87	0.54	0.05	0.59	0.71	0.24	0.54	0.59	0.09
Uniform Delay, d1	50.0	42.7	33.2	52.8	39.6	34.0	33.7	39.9	31.4	31.0	38.1	32.0
Progression Factor	0.93	0.76	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.9	15.2	1.3	23.0	2.1	0.2	3.8	3.7	1.1	3.1	2.3	0.4
Delay (s)	58.2	47.7	26.9	75.9	41.7	34.2	37.6	43.6	32.5	34.1	40.4	32.4
Level of Service	E	D	C	E	D	C	D	D	C	C	D	C
Approach Delay (s)		44.8			50.7			40.6			38.5	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		43.6										D
HCM 2000 Volume to Capacity ratio		0.85										
Actuated Cycle Length (s)		130.0						22.2				
Intersection Capacity Utilization		104.2%										G
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings

8: Liverpool Road & Private Access/Pickering Parkway

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	873	401	196	1027	46
Future Volume (vph)	87	69	130	412	58	174	116	873	401	196	1027	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			0.99		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.193		0.251			
Satd. Flow (perm)	0	2959	0	0	1858	1399	332	5085	1502	448	5079	1482
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		134				179		413				144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	90	71	134	425	60	179	120	900	413	202	1059	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	205	0	425	60	179	120	900	413	202	1059	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings <2038 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	pm+pt	NA	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm
Protected Phases	3	7	4	8	8	5	2	2	6	1	6	6
Permitted Phases	7	8	8	8	8	2	2	2	6	6	6	6
Detector Phase	3	7	4	8	8	5	2	2	1	6	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0	8.0
Minimum Split (s)	15.0	15.0	34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0	30.0
Total Split (s)	21.0	21.0	34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0	36.0
Total Split (%)	21.0%	21.0%	34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4	27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7	29.7
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2	4.2
All-Red Time (s)	3.3	3.3	3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1	2.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6	6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3	6.3
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	None	C-Max	C-Max	C-Max
Walk Time (s)			19.0	19.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)			8.0	8.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Pedestrian Calls (#/hr)			20	20	28	28	15	15	15	15	15	15
Act Effect Green (s)	10.8	10.8	20.5	20.5	20.5	49.4	40.1	40.1	49.4	40.1	40.1	40.1
Actuated g/C Ratio	0.11	0.11	0.20	0.20	0.20	0.49	0.40	0.40	0.49	0.40	0.40	0.40
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.50	0.44	0.49	0.68	0.52	0.07	0.07
Control Delay	50.5	18.9	40.5	31.2	7.6	21.2	22.1	8.7	31.3	25.3	0.2	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	18.9	40.5	31.2	7.6	21.2	22.1	8.7	31.3	25.3	0.2	0.2
LOS	D	B	D	C	A	C	C	A	C	C	C	A
Approach Delay	28.5		30.8		18.2		25.3					
Approach LOS	C		C		B		C					

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

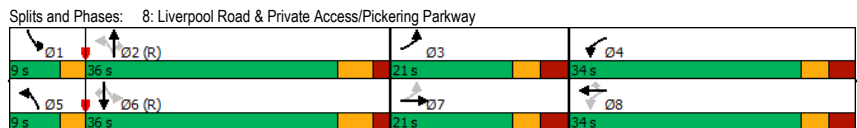
Intersection Signal Delay: 23.8

Intersection Capacity Utilization 68.8%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service C



Queues <2038 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	90	205	425	60	179	120	900	413	202	1059	47	
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.50	0.44	0.49	0.68	0.52	0.07	
Control Delay	50.5	18.9	40.5	31.2	7.6	21.2	22.1	8.7	31.3	25.3	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.5	18.9	40.5	31.2	7.6	21.2	22.1	8.7	31.3	25.3	0.2	
Queue Length 50th (m)	16.7	6.7	40.2	9.9	0.0	13.7	48.3	22.7	19.0	53.4	0.0	
Queue Length 95th (m)	30.9	16.6	50.0	18.5	15.4	m29.7	70.6	51.7	#53.9	81.3	0.0	
Internal Link Dist (m)	58.8		304.5		138.3		233.7					
Turn Bay Length (m)	57.0		62.1		54.4		75.7		132.5		35.5	
Base Capacity (vph)	245	540	877	509	513	242	2041	850	297	2038	680	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38	0.48	0.12	0.35	0.50	0.44	0.49	0.68	0.52	0.07	

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.

HCM Signalized Intersection Capacity Analysis

<2038 Future Background>PM

8: Liverpool Road & Private Access/Pickering Parkway

09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	873	401	196	1027	46
Future Volume (vph)	87	69	130	412	58	174	116	873	401	196	1027	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2929		3204	1858	1399	1643	5085	1504	1705	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.19	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	0	2929		0	1858	1399	334	5085	1504	450	5079	1485
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	71	134	425	60	179	120	900	413	202	1059	47
RTOR Reduction (vph)	0	120	0	0	0	142	0	0	247	0	0	28
Lane Group Flow (vph)	90	85	0	425	60	37	120	900	166	202	1059	19
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			8	2		2	6	
Actuated Green, G (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Effective Green, g (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	184	316		656	380	286	232	2044	604	283	2041	596
v/s Ratio Prot	c0.05	0.03		c0.13	0.03		0.03	0.18		c0.04	0.21	
v/s Ratio Perm						0.03	0.21		0.11	c0.29		0.01
v/c Ratio	0.49	0.27		0.65	0.16	0.13	0.52	0.44	0.27	0.71	0.52	0.03
Uniform Delay, d1	42.0	41.0		36.4	32.7	32.5	16.3	21.7	20.1	18.0	22.6	18.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.93	0.92	2.34	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.5		2.2	0.2	0.2	1.8	0.6	1.0	8.3	0.9	0.1
Delay (s)	44.0	41.4		38.7	32.9	32.7	16.9	20.5	48.2	26.3	23.5	18.2
Level of Service	D	D		D	C	C	B	C	D	C	C	B
Approach Delay (s)		42.2			36.5			28.2			23.8	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay	29.2		HCM 2000 Level of Service				C					
HCM 2000 Volume to Capacity ratio	0.66											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)				22.5					
Intersection Capacity Utilization	68.8%		ICU Level of Service				C					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

<2038 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	237	278	168	293	121	1110	0	0	972	71
Future Volume (vph)	0	0	237	278	168	293	121	1110	0	0	972	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1		1	1	0	0		0		1
Taper Length (m)	2.5		2.5		30.0		2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865		0.850							0.850
Flt Protected				0.950	0.987		0.950					
Satd. Flow (prot)	0	0	1662	1734	1801	1581	1825	5079	0	0	4972	1633
Flt Permitted				0.950	0.987		0.182					
Satd. Flow (perm)	0	0	1662	1734	1801	1581	1825	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes			Yes		Yes
Satd. Flow (RTOR)					85							82
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4		226.7		372.2					162.3	
Travel Time (s)		27.3		16.3		26.8					11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	255	299	181	315	130	1194	0	0	1045	76
Shared Lane Traffic (%)				21%								
Lane Group Flow (vph)	0	0	255	236	244	315	130	1194	0	0	1045	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0		0.0		0.0		0.0			0.0	
Crosswalk Width(m)		1.6		1.6		1.6		1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2038 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023

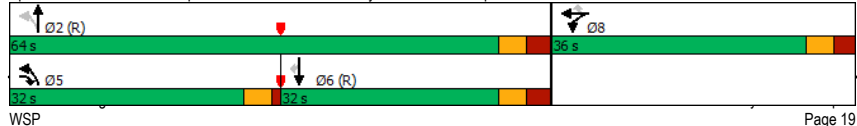


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases		5	8	8				5	2		6	
Permitted Phases						8	2					6
Detector Phase		5	8	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)		5.0	8.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)		9.5	25.0	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)		32.0	36.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)		32.0%	36.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)		27.5	30.0	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)		3.5	3.3	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)		1.0	2.7	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.5	6.0	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag		Lead					Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode		None	None	None	None	None	C-Max	C-Max			C-Max	C-Max
Walk Time (s)			14.0	14.0	14.0	14.0	13.0	13.0			13.0	13.0
Flash Dont Walk (s)			5.0	5.0	5.0	5.0	5.0	5.0			5.0	5.0
Pedestrian Calls (#/hr)			0	0	0	0	14	14			7	7
Act Effct Green (s)		20.5	21.3	21.3	21.3	21.3	68.2	66.4			41.4	41.4
Actuated g/C Ratio		0.20	0.21	0.21	0.21	0.21	0.68	0.66			0.41	0.41
v/c Ratio		0.75	0.64	0.64	0.78	0.24	0.35	0.51			0.51	0.11
Control Delay		50.6	42.8	42.4	39.7	7.9	8.5	24.6			11.6	11.6
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		50.6	42.8	42.4	39.7	7.9	8.5	24.6			11.6	11.6
LOS		D	D	D	D	A	A	C			B	B
Approach Delay		50.6			41.4			8.5			23.7	
Approach LOS		D			D			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9 Intersection LOS: C
 Intersection Capacity Utilization 59.6% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



WSP

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Queues

<2038 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	255	236	244	315	130	1194	1045	76
v/c Ratio	0.75	0.64	0.64	0.78	0.24	0.35	0.51	0.11
Control Delay	50.6	42.8	42.4	39.7	7.9	8.5	24.6	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	42.8	42.4	39.7	7.9	8.5	24.6	11.6
Queue Length 50th (m)	46.7	44.0	45.4	42.6	7.7	33.5	37.9	1.1
Queue Length 95th (m)	67.4	62.2	63.5	65.2	18.2	53.3	76.7	10.6
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	540	533	644	3371	2057	672
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	0.56	0.45	0.45	0.59	0.20	0.35	0.51	0.11

Intersection Summary

1105-1163 Kingston Road
 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2038 Future Background>PM
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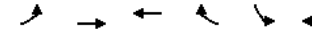


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	237	278	168	293	121	1110	0	0	972	71
Future Volume (vph)	0	0	237	278	168	293	121	1110	0	0	972	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.93
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1802	1581	1823	5079			4972	1515
Flt Permitted			1.00	0.95	0.99	1.00	0.18	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1802	1581	349	5079			4972	1515
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	255	299	181	315	130	1194	0	0	1045	76
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	0	0	0	45
Lane Group Flow (vph)	0	0	255	236	244	248	130	1194	0	0	1045	31
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)								6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Effective Green, g (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Actuated g/C Ratio			0.20	0.21	0.21	0.21	0.66	0.66			0.41	0.41
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			340	369	383	336	533	3372			2058	627
v/s Ratio Prot			c0.15	0.14	0.14		0.05	0.24			c0.21	
v/s Ratio Perm						c0.16	0.11					0.02
v/c Ratio			0.75	0.64	0.64	0.74	0.24	0.35			0.51	0.05
Uniform Delay, d1			37.3	35.9	35.8	36.7	7.4	7.4			21.7	17.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.97	1.92
Incremental Delay, d2			9.0	3.6	3.5	8.2	0.2	0.3			0.8	0.1
Delay (s)			46.3	39.5	39.3	45.0	7.6	7.7			21.9	33.8
Level of Service			D	D	D	D	A	A			C	C
Approach Delay (s)		46.3			41.6			7.7			22.8	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

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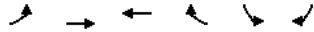
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1590	757	223	271	137	
Future Volume (vph)	205	1590	757	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		0.99			0.99	
Frt			0.966			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3346	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3346	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			40			143	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	214	1656	789	232	282	143	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	214	1656	1021	0	282	143	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2038 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023

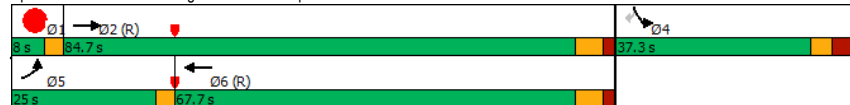


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	0		0	0	20
Act Effect Green (s)	20.2	86.8	68.4		24.8	24.8	
Actuated g/C Ratio	0.16	0.67	0.53		0.19	0.19	
v/c Ratio	0.85	0.72	0.57		0.82	0.32	
Control Delay	87.1	2.9	14.1		69.4	8.3	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	87.1	2.9	14.1		69.4	8.3	
LOS	F	A	B		E	A	
Approach Delay		12.5	14.1		48.9		
Approach LOS		B	B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 17.7 Intersection LOS: B
 Intersection Capacity Utilization 70.9% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2038 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	214	1656	1021	282	143
v/c Ratio	0.85	0.72	0.57	0.82	0.32
Control Delay	87.1	2.9	14.1	69.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	87.1	2.9	14.1	69.4	8.3
Queue Length 50th (m)	47.8	5.7	108.9	69.5	0.0
Queue Length 95th (m)	m53.4	m6.0	81.5	96.9	16.4
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0			15.5	
Base Capacity (vph)	273	2293	1779	416	514
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	0.78	0.72	0.57	0.68	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2038 Future Background>PM
09-29-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕		↕	↕
Traffic Volume (vph)	205	1590	757	223	271	137
Future Volume (vph)	205	1590	757	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3345		1805	1751
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3345		1805	1751
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1656	789	232	282	143
RTOR Reduction (vph)	0	0	19	0	0	116
Lane Group Flow (vph)	214	1656	1002	0	282	27
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.2	85.6	68.4		24.8	24.8
Effective Green, g (s)	20.2	85.6	68.4		24.8	24.8
Actuated g/C Ratio	0.16	0.66	0.53		0.19	0.19
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	251	2260	1759		344	334
v/s Ratio Prot	c0.13	c0.48	0.30		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.85	0.73	0.57		0.82	0.08
Uniform Delay, d1	53.5	14.7	20.8		50.5	43.2
Progression Factor	1.36	0.12	0.61		1.00	1.00
Incremental Delay, d2	12.3	1.0	1.2		14.1	0.1
Delay (s)	84.9	2.8	13.8		64.6	43.3
Level of Service	F	A	B		E	D
Approach Delay (s)		12.2	13.8		57.4	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			70.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					84
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1727	23	188	723	676	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1750	0	188	723	676	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

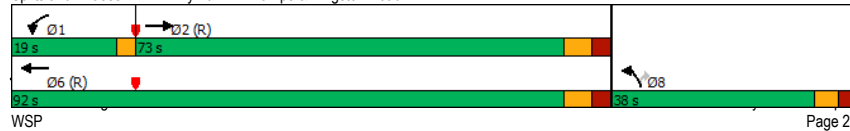
<2038 Future Background>PM
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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
v/c Ratio	0.93		0.97	0.30	0.87	0.25
Control Delay	21.1		92.2	24.2	61.0	13.0
Queue Delay	0.2		0.0	0.0	0.0	0.0
Total Delay	21.3		92.2	24.2	61.0	13.0
LOS	C		F	C	E	B
Approach Delay	21.3			38.2	54.7	
Approach LOS	C			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 33.4
 Intersection LOS: C
 Intersection Capacity Utilization 92.2%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

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Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1750	188	723	676	102
v/c Ratio	0.93	0.97	0.30	0.87	0.25
Control Delay	21.1	92.2	24.2	61.0	13.0
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	21.3	92.2	24.2	61.0	13.0
Queue Length 50th (m)	137.8	47.7	91.4	85.6	3.6
Queue Length 95th (m)	#274.7	#96.5	109.7	106.0	17.8
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1883	194	2433	853	446
Starvation Cap Reductn	7	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.93	0.97	0.30	0.79	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Background>PM
09-29-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1727	23	188	723	676	102
RTOR Reduction (vph)	0	0	0	0	0	65
Lane Group Flow (vph)	1750	0	188	723	676	37
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	68.4		16.0	87.4	28.7	28.7
Effective Green, g (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1882		194	2432	782	351
v/s Ratio Prot	c0.49		c0.12	0.20	c0.19	
v/s Ratio Perm						0.02
v/c Ratio	0.93		0.97	0.30	0.86	0.10
Uniform Delay, d1	28.6		56.8	8.7	48.8	40.4
Progression Factor	0.45		0.66	2.65	1.00	1.00
Incremental Delay, d2	6.9		50.5	0.3	9.8	0.1
Delay (s)	19.8		87.8	23.3	58.6	40.5
Level of Service	B		F	C	E	D
Approach Delay (s)	19.8			36.6	56.2	
Approach LOS	B			D	E	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2038 Future Background>PM
09-29-2023

	↖	→	↗	↖	←	↖	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↑↑		↖	↑↑		↖	↗	↖	↗	↖	↗	
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143	
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7	
Grade (%)		6%			0%			0%				0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	35.3			2.5			2.5			2.5			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		1.00			0.99		1.00					0.99	
Frt		0.996			0.986			0.864				0.862	
Fit Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1656	3343	0	1705	3399	0	1770	1824	0	1725	1474	0	
Fit Permitted	0.133			0.083			0.650			0.658			
Satd. Flow (perm)	232	3343	0	149	3399	0	1209	1824	0	1195	1474	0	
Right Turn on Red			Yes			Yes			Yes				Yes
Satd. Flow (RTOR)		3			14			96				146	
Link Speed (k/h)		60			60			30				40	
Link Distance (m)		222.7			268.7			130.9				169.9	
Travel Time (s)		13.4			16.1			15.7				15.3	
Confl. Peds. (#/hr)	16		1	1		16	1					1	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	133	1634	0	91	1315	0	202	156	0	84	159	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.6				3.6	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		1.6			1.6			1.6				1.6	
Two way Left Turn Lane					Yes								
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Number of Detectors	1	2			2		1	2		1	2		
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru		
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6		
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		

Lanes, Volumes, Timings

<2038 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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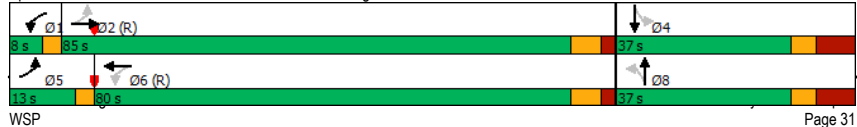


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	92.2	80.6		85.9	77.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.71	0.62		0.66	0.59		0.19	0.19		0.19	0.19	
v/c Ratio	0.51	0.79		0.58	0.65		0.89	0.37		0.37	0.40	
Control Delay	14.0	14.4		31.1	15.4		87.5	20.6		50.3	11.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	14.6		31.1	15.4		87.5	20.6		50.3	11.7	
LOS	B	B		C	B		F	C		D	B	
Approach Delay		14.6			16.4			58.4			25.0	
Approach LOS		B			B			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 20.1 Intersection LOS: C
 Intersection Capacity Utilization 96.1% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

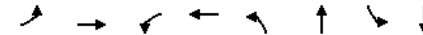


Queues

<2038 Future Background>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	1634	91	1315	202	156	84	159
v/c Ratio	0.51	0.79	0.58	0.65	0.89	0.37	0.37	0.40
Control Delay	14.0	14.4	31.1	15.4	87.5	20.6	50.3	11.7
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	14.6	31.1	15.4	87.5	20.6	50.3	11.7
Queue Length 50th (m)	8.2	101.2	4.0	184.6	49.7	12.7	18.5	2.7
Queue Length 95th (m)	m12.9	111.0	m13.2	187.7	#89.1	32.1	34.3	21.1
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	274	2073	158	2018	251	454	248	421
Starvation Cap Reductn	0	53	0	0	0	0	0	0
Spillback Cap Reductn	0	78	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.82	0.58	0.65	0.80	0.35	0.34	0.38

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2038 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3344	1705	3399	1768	1825	1725	1474	1725	1474	1725	1474
Fit Permitted	0.13	1.00	0.08	1.00	0.65	1.00	0.66	1.00	0.66	1.00	0.66	1.00
Satd. Flow (perm)	231	3344	149	3399	1210	1825	1194	1474	1194	1474	1194	1474
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146
RTOR Reduction (vph)	0	1	0	0	6	0	78	0	0	118	0	0
Lane Group Flow (vph)	133	1633	0	91	1309	0	202	78	0	84	41	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Effective Green, g (s)	88.6	80.6	82.0	77.0	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Actuated g/C Ratio	0.68	0.62	0.63	0.59	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	251	2073	153	2013	228	343	225	277	225	277	225	277
v/s Ratio Prot	c0.03	c0.49	c0.02	0.39	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03
v/s Ratio Perm	0.32		0.35		c0.17		0.07		0.07			
v/c Ratio	0.53	0.79	0.59	0.65	0.89	0.23	0.37	0.15	0.37	0.15	0.37	0.15
Uniform Delay, d1	12.3	18.3	16.3	17.6	51.4	44.7	46.0	44.0	46.0	44.0	46.0	44.0
Progression Factor	1.61	0.66	1.89	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	1.6	5.2	1.4	30.9	0.3	1.0	0.2	1.0	0.2	1.0	0.2
Delay (s)	20.9	13.7	36.1	14.8	82.3	45.1	47.1	44.3	47.1	44.3	47.1	44.3
Level of Service	C	B	D	B	F	D	D	D	D	D	D	D
Approach Delay (s)	14.2		16.2		66.1		45.2		45.2		45.2	
Approach LOS	B		B		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt		0.850			0.850			0.850			0.850	0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950			0.950			0.350			0.310		
Satd. Flow (perm)	1635	3400	1549	1718	3579	1502	642	5255	1470	559	5105	1550
Right Turn on Red		Yes			Yes		Yes		Yes		Yes	Yes
Satd. Flow (RTOR)		187			153		59		59		192	192
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	297.5			222.7			158.6			385.2		
Travel Time (s)	17.9			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Shared Lane Traffic (%)												
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Channel												
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2038 Future Background>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0		7.0				7.0	7.0
Flash Dont Walk (s)	29.0	29.0		29.0	29.0		33.0				33.0	33.0
Pedestrian Calls (#/hr)	13	13		38	38		20				20	20
Act Effect Green (s)	14.5	41.4	41.4	22.2	49.1	49.1	50.4	40.0	67.6	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.39	0.31	0.52	0.39	0.31	0.31
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
LOS	F	D	C	F	B	B	D	D	C	D	D	A
Approach Delay	50.9			26.2			37.4			33.1		
Approach LOS	D			C			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 37.2 Intersection LOS: D
 Intersection Capacity Utilization 108.3% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



Queues
13: Whites Road & Kingston Road

<2038 Future Background>PM
09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Length 50th (m)	40.7	127.0	39.5	56.2	33.0	12.5	40.4	52.9	115.9	32.8	47.2	0.0
Queue Length 95th (m)	#77.2	#174.8	74.7	m79.0	65.6	m75.2	#72.8	65.1	159.2	#57.0	58.7	16.8
Internal Link Dist (m)	273.5			198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	193	1083	620	346	1351	662	292	1616	857	262	1570	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.90	0.60	0.69	0.58	0.76	0.80	0.44	0.79	0.74	0.41	0.32

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2038 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔	↔↔	↔	↔	↔↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1759	5255	1512	1739	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	648	5255	1512	568	5105	1550
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
RTOR Reduction (vph)	0	0	127	0	0	95	0	0	31	0	0	133
Lane Group Flow (vph)	160	970	242	238	787	410	235	705	644	195	636	59
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Effective Green, g (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	187	1082	493	295	1351	567	267	1616	723	241	1570	476
v/s Ratio Prot	0.10	c0.29		0.14	0.22		c0.03	0.13	c0.15	0.03	0.12	
v/s Ratio Perm			0.16			0.27	0.27		0.27	0.25		0.04
v/c Ratio	0.86	0.90	0.49	0.81	0.58	0.72	0.88	0.44	0.89	0.81	0.41	0.12
Uniform Delay, d1	56.7	42.3	35.8	51.8	32.3	34.6	38.5	36.0	30.8	37.0	35.6	32.4
Progression Factor	1.00	1.00	1.00	1.31	0.46	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.7	11.5	3.5	11.6	1.4	6.0	26.7	0.9	13.2	17.8	0.8	0.5
Delay (s)	86.5	53.8	39.2	79.5	16.1	17.5	65.2	36.8	44.0	54.8	36.4	32.9
Level of Service	F	D	D	E	B	B	E	D	D	D	D	C
Approach Delay (s)	53.7			26.4			44.0			39.2		
Approach LOS	D			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	41.0		HCM 2000 Level of Service				D					
HCM 2000 Volume to Capacity ratio	0.89											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)				21.4				
Intersection Capacity Utilization	108.3%		ICU Level of Service				G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Background>PM
09-29-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↔↔	↔↔	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.955					
Satd. Flow (prot)	3453	1427	0	3539	3618	0
Fit Permitted	0.955					
Satd. Flow (perm)	3453	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	138				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1245	620	0	885	576	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1307	558	0	885	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2038 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

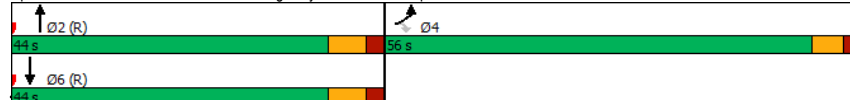


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
v/c Ratio	0.82	0.78		0.60	0.38	
Control Delay	27.9	24.5		25.6	21.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	27.9	24.5		25.6	21.9	
LOS	C	C		C	C	
Approach Delay	26.9			25.6	21.9	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.7
 Intersection LOS: C
 Intersection Capacity Utilization 73.4%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2038 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1307	558	885	576
v/c Ratio	0.82	0.78	0.60	0.38
Control Delay	27.9	24.5	25.6	21.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.5	25.6	21.9
Queue Length 50th (m)	106.7	72.7	69.8	40.6
Queue Length 95th (m)	124.5	113.7	95.5	57.8
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1747	777	1478	1511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.72	0.60	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Background>PM
 09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑↑	↑		↑↑	↑↑	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frb, ped/bikes	1.00	0.98		1.00	1.00	
Fpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3451	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3451	1404		3539	3618	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1245	620	0	885	576	0
RTOR Reduction (vph)	4	75	0	0	0	0
Lane Group Flow (vph)	1303	483	0	885	576	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	46.0	46.0		41.8	41.8	
Effective Green, g (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1587	645		1479	1512	
v/s Ratio Prot	c0.38			c0.25	0.16	
v/s Ratio Perm		0.34				
v/c Ratio	0.82	0.75		0.60	0.38	
Uniform Delay, d1	23.4	22.3		22.6	20.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	4.8		1.8	0.7	
Delay (s)	27.0	27.0		24.4	20.9	
Level of Service	C	C		C	C	
Approach Delay (s)	27.0			24.4	20.9	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		25.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

***F-4 2043 FUTURE
BACKGROUND
CONDITIONS***

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2043 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.986			0.992			0.862			0.877	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3405	0	1652	3390	0	1745	1555	0	1725	1601	0
Fit Permitted	0.950			0.950			0.732			0.622		
Satd. Flow (perm)	1677	3405	0	1643	3390	0	1330	1555	0	1127	1601	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10			6			155				32
Link Speed (k/h)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	820	82	112	487	27	252	13	155	15	7	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	902	0	112	514	0	252	168	0	15	39	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2043 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	60.6		13.4	70.3		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.06	0.50		0.11	0.59		0.24	0.24		0.24	0.24	
v/c Ratio	0.22	0.52		0.61	0.26		0.81	0.35		0.06	0.10	
Control Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	72.7	16.5		86.3	5.7		61.8	8.2		32.1	13.2	
LOS	E	B		F	A		E	A		C	B	
Approach Delay		17.8			20.1			40.3			18.4	
Approach LOS		B			C			D			B	
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green											
Natural Cycle:	85											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.81											
Intersection Signal Delay:	23.2						Intersection LOS: C					
Intersection Capacity Utilization:	64.5%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	1: Walnut Lane & Kingston Road											

Queues <2043 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	902	112	514	252	168	15	39
w/c Ratio	0.22	0.52	0.61	0.26	0.81	0.35	0.06	0.10
Control Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.7	16.5	86.3	5.7	61.8	8.2	32.1	13.2
Queue Length 50th (m)	5.4	50.0	27.8	9.1	56.2	2.4	2.7	1.3
Queue Length 95th (m)	m13.0	101.7	46.7	18.0	78.1	17.5	7.6	9.0
Internal Link Dist (m)		105.3	670.6		100.5		155.7	
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	1723	231	1988	452	631	383	565
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 w/c Ratio	0.21	0.52	0.48	0.26	0.56	0.27	0.04	0.07

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

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
1: Walnut Lane & Kingston Road 10-02-2023

	↖	→	↘	←	↙	↑	↘	↓	↙			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Future Volume (vph)	20	754	75	103	448	25	232	12	143	14	6	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.88	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3406		1652	3391		1726	1554		1721	1600	
Fit Permitted	0.95	1.00		0.95	1.00		0.73	1.00		0.62	1.00	
Satd. Flow (perm)	1685	3406		1652	3391		1330	1554		1128	1600	
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)	22	820	82	112	487	27	252	13	155	15	7	32
RTOR Reduction (vph)	0	5	0	0	3	0	0	118	0	0	24	0
Lane Group Flow (vph)	22	897	0	112	511	0	252	50	0	15	15	0
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3	
Effective Green, g (s)	4.8	60.5		13.4	69.1		28.3	28.3		28.3	28.3	
Actuated g/C Ratio	0.04	0.50		0.11	0.58		0.24	0.24		0.24	0.24	
Clearance Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	67	1717		184	1952		313	366		266	377	
v/s Ratio Prot	0.01	c0.26		c0.07	0.15			0.03			0.01	
v/s Ratio Perm							c0.19			0.01		
w/c Ratio	0.33	0.52		0.61	0.26		0.81	0.14		0.06	0.04	
Uniform Delay, d1	56.0	20.0		50.8	12.7		43.2	36.2		35.5	35.4	
Progression Factor	1.28	0.70		1.47	0.38		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	1.1		5.2	0.3		13.9	0.2		0.1	0.0	
Delay (s)	74.2	15.1		79.6	5.1		57.2	36.4		35.6	35.4	
Level of Service	E	B		E	A		E	D		D	D	
Approach Delay (s)		16.5			18.5			48.9			35.5	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 24.3 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.61
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 17.8
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Background>AM
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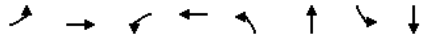
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Frt	0.986		0.981		0.900		0.879					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1564	3316	0	1645	3304	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950			0.950			0.540			0.726		
Satd. Flow (perm)	1554	3316	0	1639	3304	0	993	1769	0	1393	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			16			32			157	
Link Speed (k/h)	60		60		40		60					
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	826	88	85	602	87	40	16	32	142	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	914	0	85	689	0	40	48	0	142	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8		4			
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.65	0.44		0.80	0.35		0.26	0.16		0.66	0.48	
Control Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	13.6		96.3	10.0		45.6	19.8		60.6	14.4	
LOS	E	B		F	A		D	B		E	B	
Approach Delay	19.0				19.5		31.5				33.8	
Approach LOS	B				B		C				C	
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	112.8 (94%), 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:	21.9						Intersection LOS: C					
Intersection Capacity Utilization:	71.6%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2043 Future Background>AM
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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	914	85	689	40	48	142	195
w/c Ratio	0.65	0.44	0.80	0.35	0.26	0.16	0.66	0.48
Control Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	13.6	96.3	10.0	45.6	19.8	60.6	14.4
Queue Length 50th (m)	20.0	53.3	18.9	40.9	8.5	3.3	32.2	7.9
Queue Length 95th (m)	#39.1	87.8	#47.9	48.4	16.9	12.4	47.4	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2061	106	1987	328	606	460	686
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 w/c Ratio	0.59	0.44	0.80	0.35	0.12	0.08	0.31	0.28

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
3: Dixie Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Future Volume (vph)	80	760	81	78	554	80	37	15	29	131	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3315		1645	3304		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3315		1645	3304		993	1769		1392	1760	
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)	87	826	88	85	602	87	40	16	32	142	38	157
RTOR Reduction (vph)	0	5	0	0	6	0	0	27	0	0	133	0
Lane Group Flow (vph)	87	909	0	85	683	0	40	21	0	142	62	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Effective Green, g (s)	10.3	74.4		7.8	71.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2055		106	1979		154	275		216	274	
v/s Ratio Prot	0.06	c0.27		c0.05	0.21			0.01				0.04
v/s Ratio Perm							0.04			c0.10		
w/c Ratio	0.65	0.44		0.80	0.34		0.26	0.08		0.66	0.23	
Uniform Delay, d1	53.1	11.9		55.3	12.2		44.6	43.3		47.6	44.3	
Progression Factor	1.00	1.00		0.92	0.72		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.7		32.7	0.5		0.9	0.1		7.0	0.4	
Delay (s)	63.5	12.6		83.8	9.2		45.5	43.4		54.7	44.8	
Level of Service	E	B		F	A		D	D		D	D	
Approach Delay (s)		17.1			17.4			44.3			48.9	
Approach LOS		B			B			D			D	

Intersection Summary
HCM 2000 Control Delay 23.2 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.51
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 19.1
Intersection Capacity Utilization 71.6% ICU Level of Service C
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	178	491	196	148	420	42	115	379	125	76	656	91
Future Volume (vph)	178	491	196	148	420	42	115	379	125	76	656	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.273			0.506		
Satd. Flow (perm)	1638	3362	1511	1674	3510	1530	513	3700	1513	1064	3618	1522
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			174			137			136			119
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	193	534	213	161	457	46	125	412	136	83	713	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	193	534	213	161	457	46	125	412	136	83	713	99
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	18.3	37.4	37.4	13.5	32.6	32.6	53.6	43.5	37.4	53.0	41.9	41.9
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.44	0.31	0.24	0.16	0.56	0.16
Control Delay	47.5	33.8	17.4	87.0	39.5	0.3	24.6	28.7	6.2	18.7	33.8	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	17.4	87.0	39.5	0.3	24.6	28.7	6.2	18.7	33.8	3.7
LOS	D	C	B	F	D	A	C	C	A	B	C	A
Approach Delay		32.9			48.3			23.4				29.1
Approach LOS		C			D			C				C

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 105

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 33.0

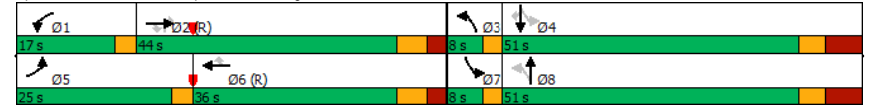
Intersection LOS: C

Intersection Capacity Utilization 93.1%

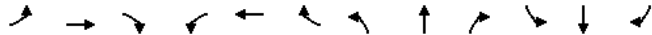
ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2043 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	193	534	213	161	457	46	125	412	136	83	713	99
w/c Ratio	0.77	0.51	0.36	0.84	0.48	0.09	0.44	0.31	0.24	0.16	0.56	0.16
Control Delay	47.5	33.8	17.4	87.0	39.5	0.3	24.6	28.7	6.2	18.7	33.8	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	33.8	17.4	87.0	39.5	0.3	24.6	28.7	6.2	18.7	33.8	3.7
Queue Length 50th (m)	44.6	66.2	26.9	37.6	48.0	0.0	16.5	37.1	0.0	10.6	71.1	0.0
Queue Length 95th (m)	51.5	81.8	54.5	#73.1	66.4	0.0	28.1	50.2	13.9	19.7	90.2	8.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1046	590	197	953	515	282	1340	564	510	1263	608
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.64	0.51	0.36	0.82	0.48	0.09	0.44	0.31	0.24	0.16	0.56	0.16

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
6: Liverpool Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	178	491	196	148	420	42	115	379	125	76	656	91
Future Volume (vph)	178	491	196	148	420	42	115	379	125	76	656	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1790	3700	1513	2012	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.27	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	514	3700	1513	1071	3618	1522
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)	193	534	213	161	457	46	125	412	136	83	713	99
RTOR Reduction (vph)	0	0	121	0	0	34	0	0	94	0	0	64
Lane Group Flow (vph)	193	534	92	161	457	12	125	412	42	83	713	35
Confl. Peds. (#/hr)	15	19	19		15	15		28	28		15	
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6		8	2		4	4
Actuated Green, G (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Effective Green, g (s)	18.3	36.8	36.8	13.5	32.0	32.0	48.5	43.5	36.8	46.5	42.5	42.5
Actuated g/C Ratio	0.15	0.31	0.31	0.11	0.27	0.27	0.40	0.36	0.31	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	252	1031	463	190	936	408	260	1341	463	446	1281	539
v/s Ratio Prot	c0.12	c0.16		c0.10	0.13		c0.02	0.11		0.01	c0.20	
v/s Ratio Perm			0.06			0.01	0.17		0.03	0.07		0.02
w/c Ratio	0.77	0.52	0.20	0.85	0.49	0.03	0.48	0.31	0.09	0.19	0.56	0.07
Uniform Delay, d1	48.8	34.3	30.7	52.2	37.1	32.5	24.3	27.4	29.7	23.5	31.2	25.6
Progression Factor	0.61	0.94	2.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.7	1.7	0.9	27.8	1.8	0.1	1.4	0.6	0.4	0.2	1.7	0.2
Delay (s)	41.7	33.9	64.4	80.1	38.9	32.7	25.7	28.0	30.0	23.7	32.9	25.8
Level of Service	D	C	E	F	D	C	C	C	C	C	C	C
Approach Delay (s)		42.4			48.5			28.0			31.3	
Approach LOS		D			D			C			C	

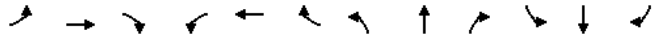
Intersection Summary
HCM 2000 Control Delay 37.5 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.60
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 93.1% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	566	272	146	832	24
Future Volume (vph)	10	17	36	194	19	59	53	566	272	146	832	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0	62.1	54.4	75.7	132.5	35.5				
Storage Lanes	1	0	1		1	1	1	1	1	1	1	1
Taper Length (m)	2.5		12.0			29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	0.99		0.97	0.99		0.96
Frt	0.897					0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.299			0.380		
Satd. Flow (perm)	0	3058	0	0	1858	1181	515	5036	1483	666	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (kh)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Conf. Peds. (#/hr)	7					7	10		11	11		10
Conf. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	615	296	159	904	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	615	296	159	904	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24	24	14	24	14	24	14	24	14	24	14	14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2043 Future Background>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-02-2023

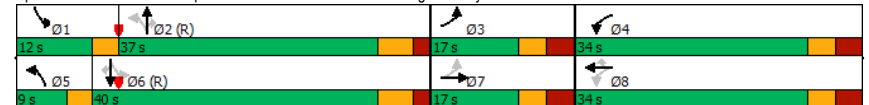


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.15	0.23	0.32	0.30	0.32	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	6.7	13.1	4.0	9.1	13.8	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	6.7	13.1	4.0	9.1	13.8	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.9			12.8	
Approach LOS		C			D			A			B	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 14.9
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues <2043 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	615	296	159	904	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.15	0.23	0.32	0.30	0.32	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	6.7	13.1	4.0	9.1	13.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	6.7	13.1	4.0	9.1	13.8	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.4	24.6	9.8	11.3	36.3	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.4	37.8	20.3	21.5	49.1	0.0
Internal Link Dist (m)	58.8		304.5		62.1		138.3		233.7		
Turn Bay Length (m)			57.0		62.1		54.4		75.7		132.5
Base Capacity (vph)	177	352	852	509	425	383	2621	913	534	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.15	0.23	0.32	0.30	0.32	0.03

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	566	272	146	832	24
Future Volume (vph)	10	17	36	194	19	59	53	566	272	146	832	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1642	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.30	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	517	5036	1483	668	5029	1458
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)	11	18	39	211	21	64	58	615	296	159	904	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	146	0	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	615	150	159	904	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	341	2558	753	496	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.18	
v/s Ratio Perm							0.01	0.09		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.17	0.24	0.20	0.32	0.33	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.2	13.8	13.5	8.1	12.8	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.75	0.89	1.49	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.2	0.2	0.6	0.4	0.3	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	7.9	12.4	20.7	8.4	13.1	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)	44.4			42.1			14.7			12.4		
Approach LOS	D			D			B			B		

Intersection Summary

HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2043 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	160	188	69	310	163	548	0	0	715	97
Future Volume (vph)	0	0	160	188	69	310	163	548	0	0	715	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0		125.0	50.0		0.0	0.0		0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1583	1700	1767	1551	1738	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.303					
Satd. Flow (perm)	0	0	1583	1700	1767	1551	552	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						336						105
Link Speed (kh)		50			50			50			50	
Link Distance (m)		379.4			226.7			372.2			162.3	
Travel Time (s)		27.3			16.3			26.8			11.7	
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	174	204	75	337	177	596	0	0	777	105
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	174	139	140	337	177	596	0	0	777	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4			9.4	
Detector 2 Size(m)						0.6		0.6			0.6	
Detector 2 Type						Cl+Ex		Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings

<2043 Future Background>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-02-2023

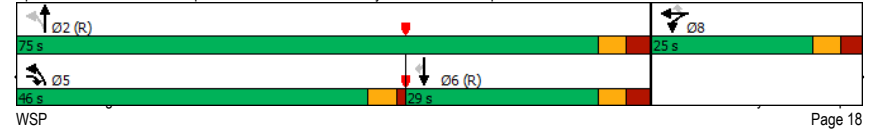


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			16.6	13.7	13.7	13.7	75.8	74.0			53.0	53.0
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.76	0.74			0.53	0.53
v/c Ratio			0.66	0.60	0.58	0.67	0.29	0.16			0.30	0.12
Control Delay			50.8	50.7	49.5	11.5	5.0	4.3			8.7	1.6
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			50.8	50.7	49.5	11.5	5.0	4.3			8.7	1.6
LOS			D	D	D	B	A	A			A	A
Approach Delay			50.8			28.9		4.5			7.9	
Approach LOS			D			C		A			A	


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	15.2
Intersection LOS:	B
Intersection Capacity Utilization:	45.9%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp




Queues <2043 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	174	139	140	337	177	596	777	105
v/c Ratio	0.66	0.60	0.58	0.67	0.29	0.16	0.30	0.12
Control Delay	50.8	50.7	49.5	11.5	5.0	4.3	8.7	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	50.7	49.5	11.5	5.0	4.3	8.7	1.6
Queue Length 50th (m)	32.0	27.1	27.2	0.2	7.5	10.3	19.3	0.1
Queue Length 95th (m)	49.6	44.3	44.3	23.5	16.3	17.3	24.5	2.1
Internal Link Dist (m)			202.7		348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	656	323	335	566	910	3651	2583	864
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	0.27	0.43	0.42	0.60	0.19	0.16	0.30	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	160	188	69	310	163	548	0	0	715	97
Future Volume (vph)	0	0	160	188	69	310	163	548	0	0	715	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Ftbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1583	1700	1767	1551	1736	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.30	1.00			1.00	1.00
Satd. Flow (perm)			1583	1700	1767	1551	554	4932			4877	1538
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	0	174	204	75	337	177	596	0	0	777	105
RTOR Reduction (vph)	0	0	0	0	0	290	0	0	0	0	0	49
Lane Group Flow (vph)	0	0	174	139	140	47	177	596	0	0	777	56
Confl. Peds. (#/hr)							7	14	14			7
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	5%	2%	0%	3%	5%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Effective Green, g (s)			16.6	13.7	13.7	13.7	74.0	74.0			52.9	52.9
Actuated g/C Ratio			0.17	0.14	0.14	0.14	0.74	0.74			0.53	0.53
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			262	232	242	212	606	3649			2579	813
v/s Ratio Prot			c0.11	c0.08	0.08		0.05	0.12			0.16	
v/s Ratio Perm						0.03	c0.17					0.04
v/c Ratio			0.66	0.60	0.58	0.22	0.29	0.16			0.30	0.07
Uniform Delay, d1			39.1	40.6	40.4	38.4	4.1	3.8			13.2	11.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.57	0.35
Incremental Delay, d2			6.2	4.1	3.3	0.5	0.3	0.1			0.3	0.2
Delay (s)			45.3	44.7	43.8	38.9	4.4	3.9			7.9	4.2
Level of Service			D	D	D	D	A	A			A	A
Approach Delay (s)			45.3			41.3		4.0			7.4	
Approach LOS			D			D		A			A	

Intersection Summary

HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

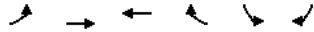
c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Background>AM

10: Kingston Road & Fairport Road

10-02-2023



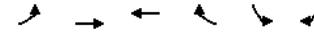
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕	↕		↔	↕	
Traffic Volume (vph)	96	714	648	99	182	229	
Future Volume (vph)	96	714	648	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Fr			0.980				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3379	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3379	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			17			249	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	776	704	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	776	812	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

<2043 Future Background>AM

10: Kingston Road & Fairport Road

10-02-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.33	0.39		0.72	0.52	
Control Delay	71.9	4.0	15.0		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	71.9	4.0	15.0		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		12.0	15.0		34.1		
Approach LOS		B	B		C		

Intersection Summary

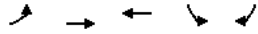
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.8
 Intersection LOS: B
 Intersection Capacity Utilization 51.1%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

<2043 Future Background>AM
10-02-2023

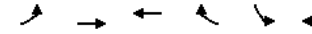


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	776	812	198	249
v/c Ratio	0.62	0.33	0.39	0.72	0.52
Control Delay	71.9	4.0	15.0	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	4.0	15.0	65.5	9.1
Queue Length 50th (m)	16.6	69.6	51.5	49.0	0.0
Queue Length 95th (m)	29.5	2.1	86.2	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2059	476	649
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	0.44	0.33	0.39	0.42	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2043 Future Background>AM
10-02-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↕↕
Traffic Volume (vph)	96	714	648	99	182	229
Future Volume (vph)	96	714	648	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Fr	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3379		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3379		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	776	704	108	198	249
RTOR Reduction (vph)	0	0	7	0	0	209
Lane Group Flow (vph)	104	776	805	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2053		276	271
v/s Ratio Prot	c0.06	0.23	c0.24		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.34	0.39		0.72	0.15
Uniform Delay, d1	55.7	8.1	13.1		51.9	47.0
Progression Factor	1.05	0.41	1.00		1.00	1.00
Incremental Delay, d2	5.9	0.4	0.6		8.6	0.3
Delay (s)	64.4	3.7	13.7		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	13.7		53.1	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>AM
10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↖
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	813	13	309	665	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	826	0	309	665	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>AM
10-02-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effct Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.52		0.85	0.27	0.78	0.20
Control Delay	14.7		57.6	12.5	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.7		57.6	12.5	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	14.7			26.8	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.8
 Intersection Capacity Utilization 64.9%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>AM
10-02-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	826	309	665	501	71
w/c Ratio	0.52	0.85	0.27	0.78	0.20
Control Delay	14.7	57.6	12.5	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	57.6	12.5	58.6	10.2
Queue Length 50th (m)	72.1	76.0	55.7	63.7	0.0
Queue Length 95th (m)	97.3	104.4	73.3	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.52	0.68	0.27	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>AM
10-02-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↖
Traffic Volume (vph)	748	12	284	612	461	65
Future Volume (vph)	748	12	284	612	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	813	13	309	665	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	825	0	309	665	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.24		c0.19	0.19	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.52		0.84	0.27	0.78	0.04
Uniform Delay, d1	25.6		47.8	6.9	50.2	43.2
Progression Factor	0.49		0.80	1.65	1.00	1.00
Incremental Delay, d2	1.1		15.3	0.2	5.8	0.1
Delay (s)	13.6		53.6	11.7	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	13.6			25.0	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	28.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2043 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3380	0	1805	1755	0	1643	1468	0
Flt Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3380	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			9			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1060	40	104	1065	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1100	0	104	1145	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

<2043 Future Background>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	18.0		18.0		20.0		20.0		20.0		20.0	
Pedestrian Calls (#/hr)	1		16		0		0		1		1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.57		0.63	0.56		0.76	0.29		0.24	0.43	
Control Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.5	16.7		79.4	11.5		74.1	11.5		48.1	12.9	
LOS	E	B		E	B		E	B		D	B	
Approach Delay	20.1		17.1		48.2		21.2					
Approach LOS	C		B		D		C					

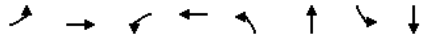
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 78.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



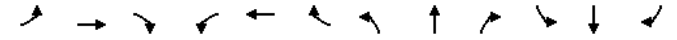
Queues <2043 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1100	104	1145	152	107	46	149
w/c Ratio	0.59	0.57	0.63	0.56	0.76	0.29	0.24	0.43
Control Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.5	16.7	79.4	11.5	74.1	11.5	48.1	12.9
Queue Length 50th (m)	19.3	80.7	21.9	78.2	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.7	106.9	38.9	165.1	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2036	278	469	264	432
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 w/c Ratio	0.50	0.57	0.51	0.56	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Future Volume (vph)	76	975	37	96	980	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3279		1671	3378		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3279		1671	3378		1249	1755		1185	1468	
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)	83	1060	40	104	1065	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	4	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1098	0	104	1141	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2031		200	282		190	236	
v/s Ratio Prot	0.05	0.33		c0.06	c0.34			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.57		0.63	0.56		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	16.6		56.3	15.6		52.2	46.4		47.6	46.9	
Progression Factor	0.86	0.84		1.13	0.61		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	1.2		7.3	1.1		15.5	0.1		0.7	0.3	
Delay (s)	55.4	15.2		71.2	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.0			15.7			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2043 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt		0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			167		241				196			172
Link Speed (kh)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings
13: Whites Road & Kingston Road

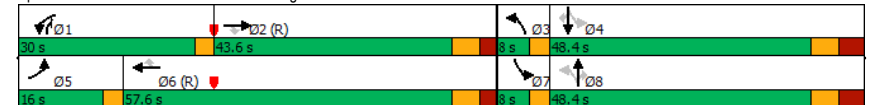
<2043 Future Background>AM
10-02-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	40.7	40.7	22.9	52.5	52.5	50.4	40.0	68.3	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.39	0.31	0.53	0.39	0.31	0.31
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	34.6		24.9		27.4		33.2					
Approach LOS	C		C		C		C					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 29.8 Intersection LOS: C
 Intersection Capacity Utilization 104.4% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2043 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	254	612	305	159	424	424	170	865	190
v/c Ratio	0.61	0.36	0.53	0.82	0.43	0.40	0.76	0.27	0.47	0.45	0.56	0.32
Control Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	36.6	21.3	63.8	18.7	5.0	53.8	34.6	10.3	31.1	39.2	7.8
Queue Length 50th (m)	21.2	39.4	31.5	47.9	63.2	20.2	26.2	30.0	30.9	28.1	67.8	3.2
Queue Length 95th (m)	38.4	55.3	63.5	79.7	50.7	9.2	#51.5	39.4	50.6	44.5	81.8	20.2
Internal Link Dist (m)		273.5		198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	1044	604	366	1418	758	208	1556	937	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.36	0.53	0.69	0.43	0.40	0.76	0.27	0.45	0.45	0.56	0.32

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2043 Future Background>AM
13: Whites Road & Kingston Road 10-02-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑↑	↑		↑↑↑	↑
Traffic Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Future Volume (vph)	78	344	294	234	563	281	146	390	390	156	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1527	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1527	906	5057	1574
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)	85	374	320	254	612	305	159	424	424	170	865	190
RTOR Reduction (vph)	0	0	115	0	0	144	0	0	101	0	0	119
Lane Group Flow (vph)	85	374	205	254	612	161	159	424	323	170	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Effective Green, g (s)	11.1	40.7	40.7	22.9	52.5	52.5	45.0	40.0	62.9	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	1044	489	311	1417	614	191	1556	738	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.14	c0.17		c0.03	0.08	0.08	0.02	0.17	
v/s Ratio Perm			0.13			0.11	c0.25		0.13	0.15		0.05
v/c Ratio	0.61	0.36	0.42	0.82	0.43	0.26	0.83	0.27	0.44	0.49	0.56	0.15
Uniform Delay, d1	57.4	34.5	35.3	51.5	28.0	25.8	37.0	34.0	22.0	31.5	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.89	0.63	0.55	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.0	2.6	13.2	0.8	0.9	25.5	0.4	0.4	1.1	1.4	0.6
Delay (s)	65.1	35.5	37.9	59.1	18.4	15.1	62.5	34.4	22.4	32.6	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		39.7			26.4			33.8			37.2	
Approach LOS		D			C			C			D	

Intersection Summary
HCM 2000 Control Delay 33.8 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.69
Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
Intersection Capacity Utilization 104.4% ICU Level of Service G
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

10-02-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↗↗	↗↗	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3387	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3387	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	636	291	0	753	453	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	665	262	0	753	453	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2043 Future Background>AM

14: Whites Road & Highway 401 EB Off Ramp

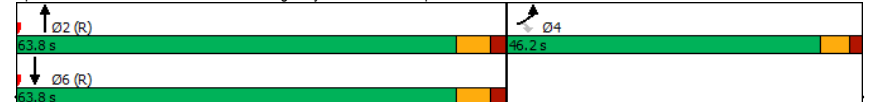
10-02-2023

	↖	↗	↖	↗	↘	↙
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
v/c Ratio	0.78	0.48		0.35	0.20	
Control Delay	44.3	6.7		10.5	9.2	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	44.3	6.7		10.5	9.2	
LOS	D	A		B	A	
Approach Delay	33.7			10.5	9.2	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.3
 Intersection Capacity Utilization 48.8%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

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Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	665	262	753	453
w/c Ratio	0.78	0.48	0.35	0.20
Control Delay	44.3	6.7	10.5	9.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.3	6.7	10.5	9.2
Queue Length 50th (m)	68.0	0.0	36.7	19.6
Queue Length 95th (m)	80.8	19.4	56.4	32.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1256	683	2150	2218
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.38	0.35	0.20
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	TTT	T		TTT	TTT	
Traffic Volume (vph)	585	268	0	693	417	0
Future Volume (vph)	585	268	0	693	417	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3390	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3390	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	636	291	0	753	453	0
RTOR Reduction (vph)	4	196	0	0	0	0
Lane Group Flow (vph)	661	66	0	753	453	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	27.7	27.7		70.1	70.1	
Effective Green, g (s)	27.7	27.7		70.1	70.1	
Actuated g/C Ratio	0.25	0.25		0.64	0.64	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	853	352		2150	2218	
v/s Ratio Prot	c0.20			c0.22	0.13	
v/s Ratio Perm		0.05				
v/c Ratio	0.78	0.19		0.35	0.20	
Uniform Delay, d1	38.3	32.3		9.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.5	0.2	
Delay (s)	42.7	32.6		9.8	8.5	
Level of Service	D	C		A	A	
Approach Delay (s)	39.8			9.8	8.5	
Approach LOS	D			A	A	
Intersection Summary						
HCM 2000 Control Delay		22.6		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.47				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		48.8%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

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	↖	→	↘	↙	←	↖	↙	↘	↗	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.98	
Frt		0.976			0.992			0.863			0.906	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3444	0	1685	3509	0	1745	1594	0	1725	1707	0
Flt Permitted	0.950			0.950			0.591			0.577		
Satd. Flow (perm)	1677	3444	0	1682	3509	0	1067	1594	0	1043	1707	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			6			96			27	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
Shared Lane Traffic (%)												
Lane Group Flow (vph)	39	1742	0	123	710	0	275	300	0	25	43	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2043 Future Background>PM
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	↖	→	↘	↙	←	↖	↙	↘	↗	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8				4	
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	32.6		8.0	32.6		8.0	37.2		37.2	37.2	
Total Split (s)	8.0	72.0		9.0	73.0		11.8	49.0		37.2	37.2	
Total Split (%)	6.2%	55.4%		6.9%	56.2%		9.1%	37.7%		28.6%	28.6%	
Maximum Green (s)	5.0	65.4		6.0	66.4		8.8	40.8		29.0	29.0	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.0	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		0.0	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		19.0			19.0			22.0			22.0	
Pedestrian Calls (#/hr)		8			4			2			9	
Act Effect Green (s)	5.0	81.3		6.0	83.9		30.1	24.9		14.4	14.4	
Actuated g/C Ratio	0.04	0.63		0.05	0.65		0.23	0.19		0.11	0.11	
v/c Ratio	0.61	0.81		1.60	0.31		0.91	0.79		0.22	0.20	
Control Delay	108.3	13.7		364.8	6.1		79.2	46.9		52.8	25.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	108.3	13.7		364.8	6.1		79.2	46.9		52.8	25.5	
LOS	F	B		F	A		E	D		D	C	
Approach Delay		15.8			59.0			62.4			35.6	
Approach LOS		B			E			D			D	

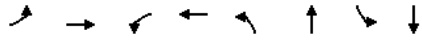
Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.60
Intersection Signal Delay:	35.5
Intersection LOS:	D
Intersection Capacity Utilization:	92.1%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2043 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	39	1742	123	710	275	300	25	43
w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.79	0.22	0.20
Control Delay	108.3	13.7	364.8	6.1	79.2	46.9	52.8	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	108.3	13.7	364.8	6.1	79.2	46.9	52.8	25.5
Queue Length 50th (m)	10.6	135.3	~46.0	7.1	65.8	51.9	6.1	3.8
Queue Length 95th (m)	m14.7	#280.7	#80.9	91.5	79.2	71.2	13.0	13.1
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	2163	77	2267	302	566	232	401
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 w/c Ratio	0.61	0.81	1.60	0.31	0.91	0.53	0.11	0.11

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.

HCM Signalized Intersection Capacity Analysis <2043 Future Background>PM
1: Walnut Lane & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑↑		↑↑	↑↑		↑↑	↑↑	
Traffic Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Future Volume (vph)	38	1420	270	119	653	36	267	26	265	24	16	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.98	
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.86		1.00	0.91	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3444		1685	3509		1728	1595		1717	1707	
Fit Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.58	1.00	
Satd. Flow (perm)	1685	3444		1685	3509		1074	1595		1043	1707	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	1464	278	123	673	37	275	27	273	25	16	27
RTOR Reduction (vph)	0	9	0	0	2	0	0	76	0	0	24	0
Lane Group Flow (vph)	39	1733	0	123	708	0	275	224	0	25	19	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Effective Green, g (s)	4.0	79.7		6.0	81.7		26.5	26.5		12.8	12.8	
Actuated g/C Ratio	0.03	0.61		0.05	0.63		0.20	0.20		0.10	0.10	
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	51	2111		77	2205		272	325		102	168	
v/s Ratio Prot	0.02	c0.50		c0.07	0.20		c0.08	0.14			0.01	
v/s Ratio Perm							c0.12			0.02		
w/c Ratio	0.76	0.82		1.60	0.32		1.01	0.69		0.25	0.11	
Uniform Delay, d1	62.5	19.6		62.0	11.2		50.9	47.9		54.1	53.4	
Progression Factor	1.33	0.51		1.47	0.48		1.00	1.00		1.00	1.00	
Incremental Delay, d2	38.4	2.8		316.0	0.3		57.4	5.9		1.3	0.3	
Delay (s)	121.8	12.7		407.4	5.7		108.3	53.9		55.4	53.7	
Level of Service	F	B		F	A		F	D		E	D	
Approach Delay (s)		15.1			65.0			79.9			54.3	
Approach LOS		B			E			E			D	

Intersection Summary

HCM 2000 Control Delay 40.1 HCM 2000 Level of Service D

HCM 2000 Volume to Capacity ratio 0.91

Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8

Intersection Capacity Utilization 92.1% ICU Level of Service F

Analysis Period (min) 15

c Critical Lane Group

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.991		0.977		0.977		0.920		0.885		0.885	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3394	0	1597	3418	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.676			0.678		
Satd. Flow (perm)	1578	3394	0	1594	3418	0	1254	1786	0	1294	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)	9				20		42		97			
Link Speed (k/h)	60		60		60		40		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	1693	0	42	956	0	117	123	0	149	126	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases							8	8			4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		40.1	40.1		40.1	40.1	
Total Split (s)	26.0	81.6		8.0	63.6		40.4	40.4		40.4	40.4	
Total Split (%)	20.0%	62.8%		6.2%	48.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	23.0	75.0		5.0	57.0		30.9	30.9		30.9	30.9	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.0	86.9		5.0	69.4		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.67		0.04	0.53		0.16	0.16		0.16	0.16	
v/c Ratio	0.85	0.75		0.69	0.52		0.59	0.39		0.73	0.35	
Control Delay	87.0	9.1		117.0	9.8		61.6	33.8		71.1	16.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	87.0	9.1		117.0	9.8		61.6	33.8		71.1	16.1	
LOS	F	A		F	A		E	C		E	B	
Approach Delay	17.9		14.3		47.3		45.9					
Approach LOS	B		B		D		D					

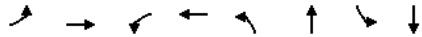
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 21.2
 Intersection Capacity Utilization 81.7%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service D

Splits and Phases: 3: Dixie Road & Kingston Road



Queues <2043 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	215	1693	42	956	117	123	149	126
w/c Ratio	0.85	0.75	0.69	0.52	0.59	0.39	0.73	0.35
Control Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	87.0	9.1	117.0	9.8	61.6	33.8	71.1	16.1
Queue Length 50th (m)	49.6	35.3	11.5	48.8	28.3	18.6	36.9	6.5
Queue Length 95th (m)	m#83.6	154.5	m#24.3	m65.4	44.4	34.0	55.5	22.0
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2272	61	1832	298	456	307	485
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 w/c Ratio	0.77	0.75	0.69	0.52	0.39	0.27	0.49	0.26

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.

HCM Signalized Intersection Capacity Analysis <2043 Future Background>PM
3: Dixie Road & Kingston Road 09-29-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Future Volume (vph)	204	1509	100	40	770	138	111	54	63	142	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3393		1597	3418		1762	1785		1813	1729	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3393		1597	3418		1254	1785		1294	1729	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	215	1588	105	42	811	145	117	57	66	149	29	97
RTOR Reduction (vph)	0	3	0	0	9	0	35	0	0	82	0	0
Lane Group Flow (vph)	215	1690	0	42	947	0	117	88	0	149	44	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Effective Green, g (s)	21.0	86.3		4.0	69.3		20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.16	0.66		0.03	0.53		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	255	2252		49	1822		198	282		205	273	
v/s Ratio Prot	c0.14	c0.50		0.03	0.28			0.05			0.03	
v/s Ratio Perm							0.09			c0.12		
w/c Ratio	0.84	0.75		0.86	0.52		0.59	0.31		0.73	0.16	
Uniform Delay, d1	52.9	14.6		62.7	19.6		50.8	48.4		52.0	47.2	
Progression Factor	1.27	0.47		1.19	0.42		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.8	1.6		71.5	1.0		4.7	0.6		12.1	0.3	
Delay (s)	83.0	8.4		146.2	9.2		55.4	49.0		64.1	47.5	
Level of Service	F	A		F	A		E	D		E	D	
Approach Delay (s)		16.8			15.0			52.2			56.5	
Approach LOS		B			B			D			E	

Intersection Summary

HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	279	1094	383	239	539	72	131	828	241	102	668	127
Future Volume (vph)	279	1094	383	239	539	72	131	828	241	102	668	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.262			0.163		
Satd. Flow (perm)	1654	3461	1479	1688	3579	1485	493	3773	1543	343	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			80			127			179			130
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	285	1116	391	244	550	73	134	845	246	104	682	130
Shared Lane Traffic (%)												
Lane Group Flow (vph)	285	1116	391	244	550	73	134	845	246	104	682	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2043 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	26.1	43.3	52.4	21.5	36.7	36.7	51.1	40.0	43.3	51.1	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.40	0.17	0.28	0.28	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.55	0.73	0.39	0.52	0.61	0.24
Control Delay	61.0	48.3	20.2	81.1	43.0	1.0	35.1	44.5	11.6	34.1	41.1	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	20.2	81.1	43.0	1.0	35.1	44.5	11.6	34.1	41.1	6.5
LOS	E	D	C	F	D	A	D	D	B	C	D	A
Approach Delay	44.2				50.2				36.9			
Approach LOS	D				D				D			

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 41.7 Intersection LOS: D
 Intersection Capacity Utilization 104.2% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2043 Future Background>PM

6: Liverpool Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	285	1116	391	244	550	73	134	845	246	104	682	130
v/c Ratio	0.84	0.97	0.60	0.87	0.55	0.14	0.55	0.73	0.39	0.52	0.61	0.24
Control Delay	61.0	48.3	20.2	81.1	43.0	1.0	35.1	44.5	11.6	34.1	41.1	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.0	48.3	20.2	81.1	43.0	1.0	35.1	44.5	11.6	34.1	41.1	6.5
Queue Length 50th (m)	62.7	159.5	74.5	61.3	63.7	0.0	21.4	101.6	12.0	16.2	78.2	0.0
Queue Length 95th (m)	m80.4	#192.2	m61.6	#104.4	85.6	1.0	35.3	124.7	33.5	27.9	98.2	14.2
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8		97.9		170.7		117.0		185.5		52.0	
Base Capacity (vph)	402	1153	649	289	1009	509	244	1160	634	199	1124	541
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.97	0.60	0.84	0.55	0.14	0.55	0.73	0.39	0.52	0.61	0.24

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<2043 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	279	1094	383	239	539	72	131	828	241	102	668	127
Future Volume (vph)	279	1094	383	239	539	72	131	828	241	102	668	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	3.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1804	3773	1543	2022	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.26	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	497	3773	1543	348	3654	1466
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	285	1116	391	244	550	73	134	845	246	104	682	130
RTOR Reduction (vph)	0	0	50	0	0	52	0	0	119	0	0	90
Lane Group Flow (vph)	285	1116	341	244	550	21	134	845	127	104	682	40
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6		8		2	4		4
Actuated Green, G (s)	26.1	43.3	48.3	19.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Effective Green, g (s)	26.1	43.3	48.3	21.5	36.7	36.7	45.0	40.0	43.3	45.0	40.0	40.0
Actuated g/C Ratio	0.20	0.33	0.37	0.17	0.28	0.28	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	338	1152	554	282	1010	419	222	1160	513	184	1124	451
v/s Ratio Prot	c0.17	c0.32	c0.02	c0.14	0.15		0.02	c0.22		0.02	0.19	
v/s Ratio Perm			0.20			0.01	0.19		0.08	0.17		0.03
v/c Ratio	0.84	0.97	0.62	0.87	0.54	0.05	0.60	0.73	0.25	0.57	0.61	0.09
Uniform Delay, d1	50.0	42.7	33.3	52.8	39.6	34.0	34.0	40.2	31.5	31.2	38.3	32.0
Progression Factor	0.93	0.76	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.9	15.2	1.3	23.0	2.1	0.2	4.6	4.0	1.1	3.9	2.4	0.4
Delay (s)	58.2	47.7	27.0	75.9	41.7	34.2	38.5	44.2	32.6	35.1	40.7	32.4
Level of Service	E	D	C	E	D	C	D	D	C	D	D	C
Approach Delay (s)		44.8			50.7			41.2			38.9	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay		43.8		HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio		0.86										
Actuated Cycle Length (s)		130.0		Sum of lost time (s)				22.2				
Intersection Capacity Utilization		104.2%		ICU Level of Service				G				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
8: Liverpool Road & Private Access/Pickering Parkway

<2043 Future Background>PM
09-29-2023

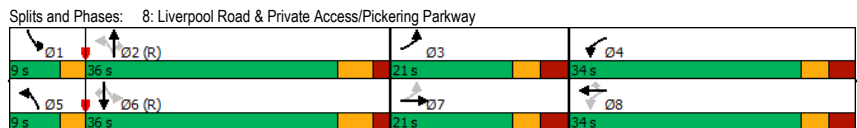
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	894	401	196	1048	46
Future Volume (vph)	87	69	130	412	58	174	116	894	401	196	1048	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			0.99		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950		0.950			0.950
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.186		0.242			
Satd. Flow (perm)	0	2959	0	0	1858	1399	320	5085	1502	432	5079	1482
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		134				179		413				144
Link Speed (k/h)		30			50			50				50
Link Distance (m)		82.8			328.5			162.3				257.7
Travel Time (s)		9.9			23.7			11.7				18.6
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	90	71	134	425	60	179	120	922	413	202	1080	47
Shared Lane Traffic (%)												
Lane Group Flow (vph)	90	205	0	425	60	179	120	922	413	202	1080	47
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8				3.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings <2043 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0
Minimum Split (s)	15.0	15.0		34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	21.0	21.0		34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0
Total Split (%)	21.0%	21.0%		34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4		27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				20	20		28	28		15	15	
Act Effect Green (s)	10.8	10.8		20.5	20.5	20.5	49.4	40.1	40.1	49.4	40.1	40.1
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.49	0.40	0.40	0.49	0.40	0.40
v/c Ratio	0.49	0.47		0.65	0.16	0.42	0.51	0.45	0.49	0.70	0.53	0.07
Control Delay	50.5	18.9		40.5	31.2	7.6	21.6	22.1	8.7	32.6	25.5	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	18.9		40.5	31.2	7.6	21.6	22.1	8.7	32.6	25.5	0.2
LOS	D	B		D	C	A	C	C	A	C	C	A
Approach Delay	28.5			30.8			18.3			25.7		
Approach LOS	C			C			B			C		

Intersection Summary
 Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 23.9 Intersection LOS: C
 Intersection Capacity Utilization 68.8% ICU Level of Service C
 Analysis Period (min) 15



Queues <2043 Future Background>PM
8: Liverpool Road & Private Access/Pickering Parkway 09-29-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	90	205	425	60	179	120	922	413	202	1080	47	
v/c Ratio	0.49	0.47	0.65	0.16	0.42	0.51	0.45	0.49	0.70	0.53	0.07	
Control Delay	50.5	18.9	40.5	31.2	7.6	21.6	22.1	8.7	32.6	25.5	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	50.5	18.9	40.5	31.2	7.6	21.6	22.1	8.7	32.6	25.5	0.2	
Queue Length 50th (m)	16.7	6.7	40.2	9.9	0.0	13.7	49.6	23.0	19.0	54.7	0.0	
Queue Length 95th (m)	30.9	16.6	50.0	18.5	15.4	m29.8	72.5	52.2	#55.1	83.1	0.0	
Internal Link Dist (m)	58.8		304.5			138.3			233.7			
Turn Bay Length (m)			57.0		62.1		54.4		75.7		132.5	35.5
Base Capacity (vph)	245	540	877	509	513	237	2041	850	289	2038	680	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.37	0.38	0.48	0.12	0.35	0.51	0.45	0.49	0.70	0.53	0.07	

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2043 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	894	401	196	1048	46
Future Volume (vph)	87	69	130	412	58	174	116	894	401	196	1048	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2929		3204	1858	1399	1643	5085	1504	1706	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.19	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	0	2929		0	1858	1399	322	5085	1504	434	5079	1485
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	71	134	425	60	179	120	922	413	202	1080	47
RTOR Reduction (vph)	0	120	0	0	0	142	0	0	247	0	0	28
Lane Group Flow (vph)	90	85	0	425	60	37	120	922	166	202	1080	19
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			8	2		2	6	
Actuated Green, G (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Effective Green, g (s)	10.8	10.8		20.5	20.5	20.5	46.2	40.2	40.2	46.2	40.2	40.2
Actuated g/C Ratio	0.11	0.11		0.20	0.20	0.20	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	184	316		656	380	286	228	2044	604	276	2041	596
v/s Ratio Prot	c0.05	0.03		c0.13	0.03		0.03	0.18		c0.04	0.21	
v/s Ratio Perm						0.03	0.21		0.11	c0.29		0.01
v/c Ratio	0.49	0.27		0.65	0.16	0.13	0.53	0.45	0.27	0.73	0.53	0.03
Uniform Delay, d1	42.0	41.0		36.4	32.7	32.5	16.4	21.8	20.1	18.2	22.7	18.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.91	0.91	2.34	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.5		2.2	0.2	0.2	2.0	0.7	1.0	9.6	1.0	0.1
Delay (s)	44.0	41.4		38.7	32.9	32.7	17.0	20.5	48.1	27.8	23.7	18.2
Level of Service	D	D		D	C	C	B	C	D	C	C	B
Approach Delay (s)		42.2			36.5			28.1			24.1	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		29.3			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.67										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)			22.5				
Intersection Capacity Utilization		68.8%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2043 Future Background>PM
09-29-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	237	278	168	293	121	1137	0	0	994	71
Future Volume (vph)	0	0	237	278	168	293	121	1137	0	0	994	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865			0.850						0.850
Flt Protected				0.950	0.987		0.950					
Satd. Flow (prot)	0	0	1662	1734	1801	1581	1825	5079	0	0	4972	1633
Flt Permitted				0.950	0.987		0.175					
Satd. Flow (perm)	0	0	1662	1734	1801	1581	1376	5079	0	0	4972	1509
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						85						82
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4			226.7		372.2				162.3	
Travel Time (s)		27.3			16.3		26.8				11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	255	299	181	315	130	1223	0	0	1069	76
Shared Lane Traffic (%)				21%								
Lane Group Flow (vph)	0	0	255	236	244	315	130	1223	0	0	1069	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7		3.7				3.7	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<2043 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023

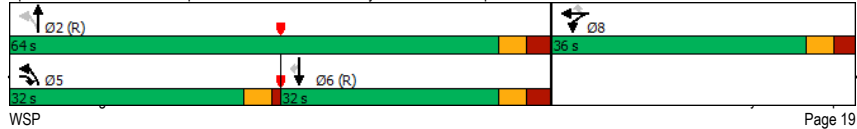


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type		Over	Split	NA	Perm	pm+pt	NA			NA	Perm	
Protected Phases		5	8	8			5	2			6	
Permitted Phases						8	2					6
Detector Phase		5	8	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)		5.0	8.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)		9.5	25.0	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)		32.0	36.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)		32.0%	36.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)		27.5	30.0	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)		3.5	3.3	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)		1.0	2.7	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.5	6.0	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag		Lead					Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode		None	None	None	None	None	C-Max	C-Max			C-Max	C-Max
Walk Time (s)			14.0	14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)			5.0	5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)			0	0	0	0		14			7	7
Act Effct Green (s)		20.5	21.3	21.3	21.3	21.3	68.2	66.4			41.4	41.4
Actuated g/C Ratio		0.20	0.21	0.21	0.21	0.21	0.68	0.66			0.41	0.41
v/c Ratio		0.75	0.64	0.64	0.78	0.24	0.36				0.52	0.11
Control Delay		50.6	42.8	42.4	39.7	7.9	8.6				24.9	11.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Delay		50.6	42.8	42.4	39.7	7.9	8.6				24.9	11.7
LOS		D	D	D	D	A	A				C	B
Approach Delay		50.6			41.4			8.6			24.0	
Approach LOS		D			D			A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 23.9
 Intersection LOS: C
 Intersection Capacity Utilization 60.0%
 ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2043 Future Background>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

09-29-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	255	236	244	315	130	1223	1069	76
v/c Ratio	0.75	0.64	0.64	0.78	0.24	0.36	0.52	0.11
Control Delay	50.6	42.8	42.4	39.7	7.9	8.6	24.9	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	42.8	42.4	39.7	7.9	8.6	24.9	11.7
Queue Length 50th (m)	46.7	44.0	45.4	42.6	7.7	34.6	38.6	1.0
Queue Length 95th (m)	67.4	62.2	63.5	65.2	18.2	54.8	78.4	m10.7
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	540	533	638	3371	2057	672
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	0.56	0.45	0.45	0.59	0.20	0.36	0.52	0.11

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2043 Future Background>PM
 09-29-2023

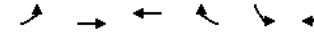


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	237	278	168	293	121	1137	0	0	994	71
Future Volume (vph)	0	0	237	278	168	293	121	1137	0	0	994	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.93
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1802	1581	1824	5079			4972	1515
Flt Permitted			1.00	0.95	0.99	1.00	0.17	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1802	1581	335	5079			4972	1515
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	0	255	299	181	315	130	1223	0	0	1069	76
RTOR Reduction (vph)	0	0	0	0	0	67	0	0	0	0	0	45
Lane Group Flow (vph)	0	0	255	236	244	248	130	1223	0	0	1069	31
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Effective Green, g (s)			20.5	21.3	21.3	21.3	66.4	66.4			41.4	41.4
Actuated g/C Ratio			0.20	0.21	0.21	0.21	0.66	0.66			0.41	0.41
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			340	369	383	336	527	3372			2058	627
v/s Ratio Prot			c0.15	0.14	0.14		0.05	0.24			c0.21	
v/s Ratio Perm						c0.16	0.11					0.02
v/c Ratio			0.75	0.64	0.64	0.74	0.25	0.36			0.52	0.05
Uniform Delay, d1			37.3	35.9	35.8	36.7	7.5	7.4			21.9	17.5
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.97	1.95
Incremental Delay, d2			9.0	3.6	3.5	8.2	0.2	0.3			0.8	0.1
Delay (s)			46.3	39.5	39.3	45.0	7.8	7.7			22.1	34.4
Level of Service			D	D	D	D	A	A			C	C
Approach Delay (s)		46.3			41.6			7.7			23.0	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2043 Future Background>PM
 09-29-2023



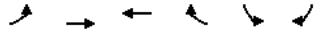
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1590	757	223	271	137	
Future Volume (vph)	205	1590	757	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		0.99			0.99	
Frt			0.966			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3346	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3346	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			40			143	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	214	1656	789	232	282	143	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	214	1656	1021	0	282	143	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2043 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023

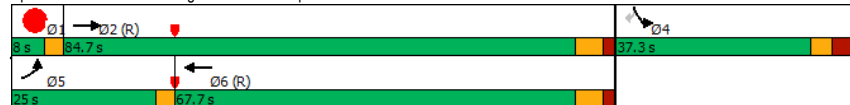


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases				4			
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0	7.0	5.0
Flash Dont Walk (s)	19.0		19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)	0		0		0	0	20
Act Effect Green (s)	20.2	86.8	68.4		24.8	24.8	
Actuated g/C Ratio	0.16	0.67	0.53		0.19	0.19	
v/c Ratio	0.85	0.72	0.57		0.82	0.32	
Control Delay	87.1	2.9	14.1		69.4	8.3	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	87.1	2.9	14.1		69.4	8.3	
LOS	F	A	B		E	A	
Approach Delay	12.5		14.1		48.9		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 17.7 Intersection LOS: B
 Intersection Capacity Utilization 70.9% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2043 Future Background>PM

10: Kingston Road & Fairport Road

09-29-2023



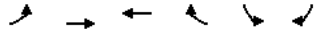
Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	214	1656	1021	282	143
v/c Ratio	0.85	0.72	0.57	0.82	0.32
Control Delay	87.1	2.9	14.1	69.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	87.1	2.9	14.1	69.4	8.3
Queue Length 50th (m)	47.8	5.7	108.9	69.5	0.0
Queue Length 95th (m)	m53.4	m6.0	81.5	96.9	16.4
Internal Link Dist (m)	400.0		872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	273	2293	1779	416	514
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	0.78	0.72	0.57	0.68	0.28

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2043 Future Background>PM
09-29-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔		↔	↔
Traffic Volume (vph)	205	1590	757	223	271	137
Future Volume (vph)	205	1590	757	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3345		1805	1751
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3345		1805	1751
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	214	1656	789	232	282	143
RTOR Reduction (vph)	0	0	19	0	0	116
Lane Group Flow (vph)	214	1656	1002	0	282	27
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.2	85.6	68.4		24.8	24.8
Effective Green, g (s)	20.2	85.6	68.4		24.8	24.8
Actuated g/C Ratio	0.16	0.66	0.53		0.19	0.19
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	251	2260	1759		344	334
v/s Ratio Prot	c0.13	c0.48	0.30		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.85	0.73	0.57		0.82	0.08
Uniform Delay, d1	53.5	14.7	20.8		50.5	43.2
Progression Factor	1.36	0.12	0.61		1.00	1.00
Incremental Delay, d2	12.3	1.0	1.2		14.1	0.1
Delay (s)	84.9	2.8	13.8		64.6	43.3
Level of Service	F	A	B		E	D
Approach Delay (s)		12.2	13.8		57.4	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			18.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.79			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			70.9%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

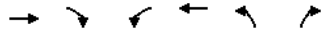
<2043 Future Background>PM
09-29-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔		↔	↔↔	↔↔	↔
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					84
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1727	23	188	723	676	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1750	0	188	723	676	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>PM
09-29-2023

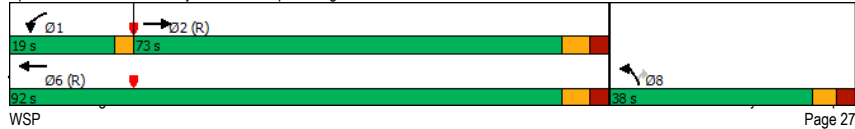


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
v/c Ratio	0.93		0.97	0.30	0.87	0.25
Control Delay	21.1		92.2	24.2	61.0	13.0
Queue Delay	0.2		0.0	0.0	0.0	0.0
Total Delay	21.3		92.2	24.2	61.0	13.0
LOS	C		F	C	E	B
Approach Delay	21.3			38.2	54.7	
Approach LOS	C			D	D	

Intersection Summary

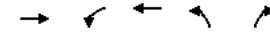
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.97
 Intersection Signal Delay: 33.4 Intersection LOS: C
 Intersection Capacity Utilization 92.2% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>PM
09-29-2023



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1750	188	723	676	102
v/c Ratio	0.93	0.97	0.30	0.87	0.25
Control Delay	21.1	92.2	24.2	61.0	13.0
Queue Delay	0.2	0.0	0.0	0.0	0.0
Total Delay	21.3	92.2	24.2	61.0	13.0
Queue Length 50th (m)	137.8	47.7	91.4	85.6	3.6
Queue Length 95th (m)	#274.7	#96.5	109.7	106.0	17.8
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1883	194	2433	853	446
Starvation Cap Reductn	7	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.93	0.97	0.30	0.79	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Background>PM
09-29-2023

	→	↖	↙	←	↘	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1692	23	184	709	662	100
Future Volume (vph)	1692	23	184	709	662	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	1727	23	188	723	676	102
RTOR Reduction (vph)	0	0	0	0	0	65
Lane Group Flow (vph)	1750	0	188	723	676	37
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	68.4		16.0	87.4	28.7	28.7
Effective Green, g (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1882		194	2432	782	351
v/s Ratio Prot	c0.49		c0.12	0.20	c0.19	
v/s Ratio Perm						0.02
v/c Ratio	0.93		0.97	0.30	0.86	0.10
Uniform Delay, d1	28.6		56.8	8.7	48.8	40.4
Progression Factor	0.45		0.66	2.65	1.00	1.00
Incremental Delay, d2	6.9		50.5	0.3	9.8	0.1
Delay (s)	19.8		87.8	23.3	58.6	40.5
Level of Service	B		F	C	E	D
Approach Delay (s)	19.8			36.6	56.2	
Approach LOS	B			D	E	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

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	↖	→	↙	↘	←	↗	↖	↗	↖	↗	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑		↖	↑↑		↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99		1.00					0.99
Frt		0.996			0.986			0.864				0.862
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3343	0	1705	3399	0	1770	1824	0	1725	1474	0
Fit Permitted	0.133			0.083			0.650			0.658		
Satd. Flow (perm)	232	3343	0	149	3399	0	1209	1824	0	1195	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			14			96				146
Link Speed (k/h)		60			60			30				40
Link Distance (m)		222.7			268.7			130.9				169.9
Travel Time (s)		13.4			16.1			15.7				15.3
Confl. Peds. (#/hr)	16		1	1		16	1					1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	133	1595	39	91	1192	123	202	15	141	84	13	146
Shared Lane Traffic (%)												
Lane Group Flow (vph)	133	1634	0	91	1315	0	202	156	0	84	159	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane					Yes							
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2			2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	

Lanes, Volumes, Timings

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12: Plaza Entrance/Delta Blvd & Kingston Road

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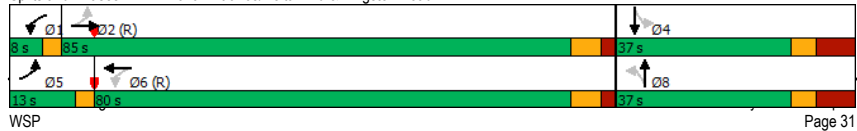


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	92.2	80.6		85.9	77.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.71	0.62		0.66	0.59		0.19	0.19		0.19	0.19	
v/c Ratio	0.51	0.79		0.58	0.65		0.89	0.37		0.37	0.40	
Control Delay	14.0	14.4		31.1	15.4		87.5	20.6		50.3	11.7	
Queue Delay	0.0	0.2		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.0	14.6		31.1	15.4		87.5	20.6		50.3	11.7	
LOS	B	B		C	B		F	C		D	B	
Approach Delay		14.6			16.4			58.4			25.0	
Approach LOS		B			B			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 20.1 Intersection LOS: C
 Intersection Capacity Utilization 96.1% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



WSP

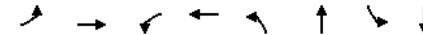
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Queues

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12: Plaza Entrance/Delta Blvd & Kingston Road

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	133	1634	91	1315	202	156	84	159
v/c Ratio	0.51	0.79	0.58	0.65	0.89	0.37	0.37	0.40
Control Delay	14.0	14.4	31.1	15.4	87.5	20.6	50.3	11.7
Queue Delay	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	14.6	31.1	15.4	87.5	20.6	50.3	11.7
Queue Length 50th (m)	8.2	101.2	4.0	184.6	49.7	12.7	18.5	2.7
Queue Length 95th (m)	m12.9	111.0	m13.2	187.7	#89.1	32.1	34.3	21.1
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	274	2073	158	2018	251	454	248	421
Starvation Cap Reductn	0	53	0	0	0	0	0	0
Spillback Cap Reductn	0	78	0	0	0	2	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.82	0.58	0.65	0.80	0.35	0.34	0.38

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.

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 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Future Volume (vph)	130	1563	38	89	1168	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0		6.9		3.0		6.9		10.0		10.0	
Lane Util. Factor	1.00		0.95		1.00		0.95		1.00		1.00	
Frb, ped/bikes	1.00		1.00		1.00		0.99		1.00		0.99	
Flpb, ped/bikes	1.00		1.00		1.00		1.00		1.00		1.00	
Frt	1.00		1.00		1.00		0.99		1.00		0.86	
Fit Protected	0.95		1.00		0.95		1.00		0.95		1.00	
Satd. Flow (prot)	1656		3344		1705		3399		1768		1825	
Fit Permitted	0.13		1.00		0.08		1.00		0.65		1.00	
Satd. Flow (perm)	231		3344		149		3399		1210		1825	
Peak-hour factor, PHF	0.98		0.98		0.98		0.98		0.98		0.98	
Adj. Flow (vph)	133		1595		39		91		1192		123	
RTOR Reduction (vph)	0		1		0		0		6		0	
Lane Group Flow (vph)	133		1633		0		91		1309		0	
Confl. Peds. (#/hr)	16		1		1		1		16		1	
Heavy Vehicles (%)	1%		2%		0%		0%		2%		0%	
Turn Type	pm+pt		NA		pm+pt		NA		Perm		NA	
Protected Phases	5		2		1		6		8		4	
Permitted Phases	2		6		8		4		4		4	
Actuated Green, G (s)	88.6		80.6		82.0		77.0		24.5		24.5	
Effective Green, g (s)	88.6		80.6		82.0		77.0		24.5		24.5	
Actuated g/C Ratio	0.68		0.62		0.63		0.59		0.19		0.19	
Clearance Time (s)	3.0		6.9		3.0		6.9		10.0		10.0	
Vehicle Extension (s)	3.0		0.2		3.0		0.2		3.0		3.0	
Lane Grp Cap (vph)	251		2073		153		2013		228		343	
v/s Ratio Prot	c0.03		c0.49		c0.02		0.39		0.04		0.03	
v/s Ratio Perm	0.32		0.35		c0.17		0.07		0.07		0.07	
v/c Ratio	0.53		0.79		0.59		0.65		0.89		0.23	
Uniform Delay, d1	12.3		18.3		16.3		17.6		51.4		44.7	
Progression Factor	1.61		0.66		1.89		0.76		1.00		1.00	
Incremental Delay, d2	1.0		1.6		5.2		1.4		30.9		0.3	
Delay (s)	20.9		13.7		36.1		14.8		82.3		45.1	
Level of Service	C		B		D		B		F		D	
Approach Delay (s)	14.2		16.2		66.1		45.2		45.2		45.2	
Approach LOS	B		B		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2043 Future Background>PM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0		87.1		35.0		72.0		35.0	
Storage Lanes	1		1		1		1		1		1	
Taper Length (m)	64.0		39.6		66.8		32.6		32.6		32.6	
Lane Util. Factor	1.00		0.95		1.00		0.95		1.00		0.91	
Ped Bike Factor	0.97		0.96		0.99		0.91		0.99		0.93	
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Fit Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1681		3400		1622		1733		3579		1654	
Fit Permitted	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (perm)	1635		3400		1549		1718		3579		1502	
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	187		153		59		192		192		192	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2		385.2		385.2	
Travel Time (s)	17.9		13.4		9.5		23.1		23.1		23.1	
Confl. Peds. (#/hr)	75		31		31		75		37		65	
Peak Hour Factor	0.97		0.97		0.97		0.97		0.97		0.97	
Heavy Vehicles (%)	3%		3%		3%		2%		2%		2%	
Bus Blockages (#/hr)	0		0		0		0		2		0	
Adj. Flow (vph)	160		970		369		238		787		505	
Shared Lane Traffic (%)	160		970		369		238		787		505	
Lane Group Flow (vph)	160		970		369		238		787		505	
Enter Blocked Intersection	No		No		No		No		No		No	
Lane Alignment	Left		Left		Right		Left		Left		Right	
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06		1.04		0.96		1.01		0.99		0.94	
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1		2		1		2		1		2	
Detector Template	Left		Thru		Right		Left		Thru		Right	
Leading Detector (m)	2.0		10.0		2.0		10.0		2.0		10.0	
Trailing Detector (m)	0.0		0.0		0.0		0.0		0.0		0.0	
Detector 1 Position(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Detector 1 Size(m)	2.0		0.6		2.0		2.0		0.6		2.0	
Detector 1 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Detector 1 Queue (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Detector 1 Delay (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2043 Future Background>PM

13: Whites Road & Kingston Road

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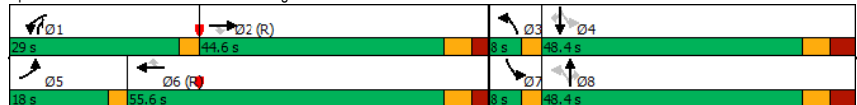


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	29.0		29.0	29.0		29.0	33.0		33.0		33.0	33.0
Pedestrian Calls (#/hr)	13		13	38		38	20		20		20	20
Act Effect Green (s)	14.5	41.4	41.4	22.2	49.1	49.1	50.4	40.0	67.6	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.39	0.31	0.52	0.39	0.31	0.31
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
LOS	F	D	C	F	B	B	D	D	C	D	D	A
Approach Delay	50.9			26.2			37.4			33.1		
Approach LOS	D			C			D			C		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 37.2 Intersection LOS: D
 Intersection Capacity Utilization 108.3% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2043 Future Background>PM

13: Whites Road & Kingston Road

09-29-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
v/c Ratio	0.86	0.90	0.60	0.81	0.58	0.76	0.80	0.44	0.83	0.74	0.41	0.32
Control Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	54.5	22.9	83.7	16.3	14.5	53.5	37.0	32.2	48.6	36.5	5.9
Queue Length 50th (m)	40.7	127.0	39.5	56.2	33.0	12.5	40.4	52.9	115.9	32.8	47.2	0.0
Queue Length 95th (m)	#77.2	#174.8	74.7	m79.0	65.6	m75.2	#72.8	65.1	159.2	#57.0	58.7	16.8
Internal Link Dist (m)	273.5			198.7			134.6			361.2		
Turn Bay Length (m)	127.0		123.0	87.1	35.0		72.0	35.0		88.5	47.0	
Base Capacity (vph)	193	1083	620	346	1351	662	292	1616	857	262	1570	609
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.90	0.60	0.69	0.58	0.76	0.80	0.44	0.79	0.74	0.41	0.32

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2043 Future Background>PM
09-29-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Future Volume (vph)	155	941	358	231	763	490	228	684	655	189	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1759	5255	1512	1739	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00	1.00	0.31	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	648	5255	1512	568	5105	1550
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	160	970	369	238	787	505	235	705	675	195	636	192
RTOR Reduction (vph)	0	0	127	0	0	95	0	0	31	0	0	133
Lane Group Flow (vph)	160	970	242	238	787	410	235	705	644	195	636	59
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Effective Green, g (s)	14.5	41.4	41.4	22.2	49.1	49.1	45.0	40.0	62.2	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.32	0.32	0.17	0.38	0.38	0.35	0.31	0.48	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	187	1082	493	295	1351	567	267	1616	723	241	1570	476
v/s Ratio Prot	0.10	c0.29		0.14	0.22		c0.03	0.13	c0.15	0.03	0.12	
v/s Ratio Perm			0.16			0.27	0.27		0.27	0.25		0.04
v/c Ratio	0.86	0.90	0.49	0.81	0.58	0.72	0.88	0.44	0.89	0.81	0.41	0.12
Uniform Delay, d1	56.7	42.3	35.8	51.8	32.3	34.6	38.5	36.0	30.8	37.0	35.6	32.4
Progression Factor	1.00	1.00	1.00	1.31	0.46	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.7	11.5	3.5	11.6	1.4	6.0	26.7	0.9	13.2	17.8	0.8	0.5
Delay (s)	86.5	53.8	39.2	79.5	16.1	17.5	65.2	36.8	44.0	54.8	36.4	32.9
Level of Service	F	D	D	E	B	B	E	D	D	D	D	C
Approach Delay (s)	53.7			26.4			44.0			39.2		
Approach LOS	D			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	41.0			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.89											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			21.4					
Intersection Capacity Utilization	108.3%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Background>PM
09-29-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.955					
Satd. Flow (prot)	3453	1427	0	3539	3618	0
Fit Permitted	0.955					
Satd. Flow (perm)	3453	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	138				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1245	620	0	885	576	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1307	558	0	885	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2043 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023

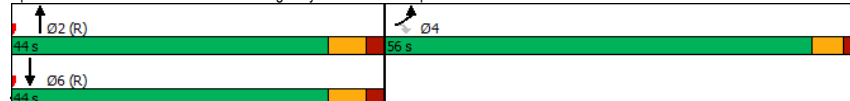


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
v/c Ratio	0.82	0.78		0.60	0.38	
Control Delay	27.9	24.5		25.6	21.9	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	27.9	24.5		25.6	21.9	
LOS	C	C		C	C	
Approach Delay	26.9			25.6	21.9	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 25.7 Intersection LOS: C
 Intersection Capacity Utilization 73.4% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2043 Future Background>PM

14: Whites Road & Highway 401 EB Off Ramp

09-29-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1307	558	885	576
v/c Ratio	0.82	0.78	0.60	0.38
Control Delay	27.9	24.5	25.6	21.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	27.9	24.5	25.6	21.9
Queue Length 50th (m)	106.7	72.7	69.8	40.6
Queue Length 95th (m)	124.5	113.7	95.5	57.8
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1747	777	1478	1511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.72	0.60	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Background>PM
 09-29-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↑↑↑	↑		↑↑	↑↑	
Traffic Volume (vph)	1183	589	0	841	547	0
Future Volume (vph)	1183	589	0	841	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Fpfb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3451	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3451	1404		3539	3618	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1245	620	0	885	576	0
RTOR Reduction (vph)	4	75	0	0	0	0
Lane Group Flow (vph)	1303	483	0	885	576	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	46.0	46.0		41.8	41.8	
Effective Green, g (s)	46.0	46.0		41.8	41.8	
Actuated g/C Ratio	0.46	0.46		0.42	0.42	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1587	645		1479	1512	
v/s Ratio Prot	c0.38			c0.25	0.16	
v/s Ratio Perm		0.34				
v/c Ratio	0.82	0.75		0.60	0.38	
Uniform Delay, d1	23.4	22.3		22.6	20.1	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	4.8		1.8	0.7	
Delay (s)	27.0	27.0		24.4	20.9	
Level of Service	C	C		C	C	
Approach Delay (s)	27.0			24.4	20.9	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		25.2		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.71				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		73.4%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

APPENDIX

G TTS DATA & MULTI-USE SHARE FACTOR

TTS Trip Distribution Summary

In order to inform the trip assignment stage of the analysis, information about the general trip distribution is required to inform the analysis. The distribution represents the proportion of trips to and away from the site in any given direction. The following pages summarize the general trip distribution results, which were calculated using Transportation Tomorrow Survey (TTS) 2016 trip origin and destination data. Trips were grouped under cardinal directions based on the relative angle between trip origin and destination, and appropriate adjustments were made to the calculation to conform to local geography and street grid.

The "TTS Directional Distribution Summary" on the next page presents a summary of the calculations described above, along with notes on any details specific to the analysis in this report. The table shows the total number of trips to and from the subject site categorized into general directions (North, Northeast, East etc.) and the percentage share of trips in each general direction in all directions.

The pages after show graphical illustrations of the categorizations for all Traffic Analysis Zones (TAZ) in the TTS survey area. Note that the latest survey zones were last updated in 2006.

These results are used as reference information for the trip assignment. They do not directly determine the trip assignment on the study network. The final trip assignments are completed based on a combination of local context, engineering experience, and engineering judgement, with the trip distribution information presented here to illustrate general travel behaviour.

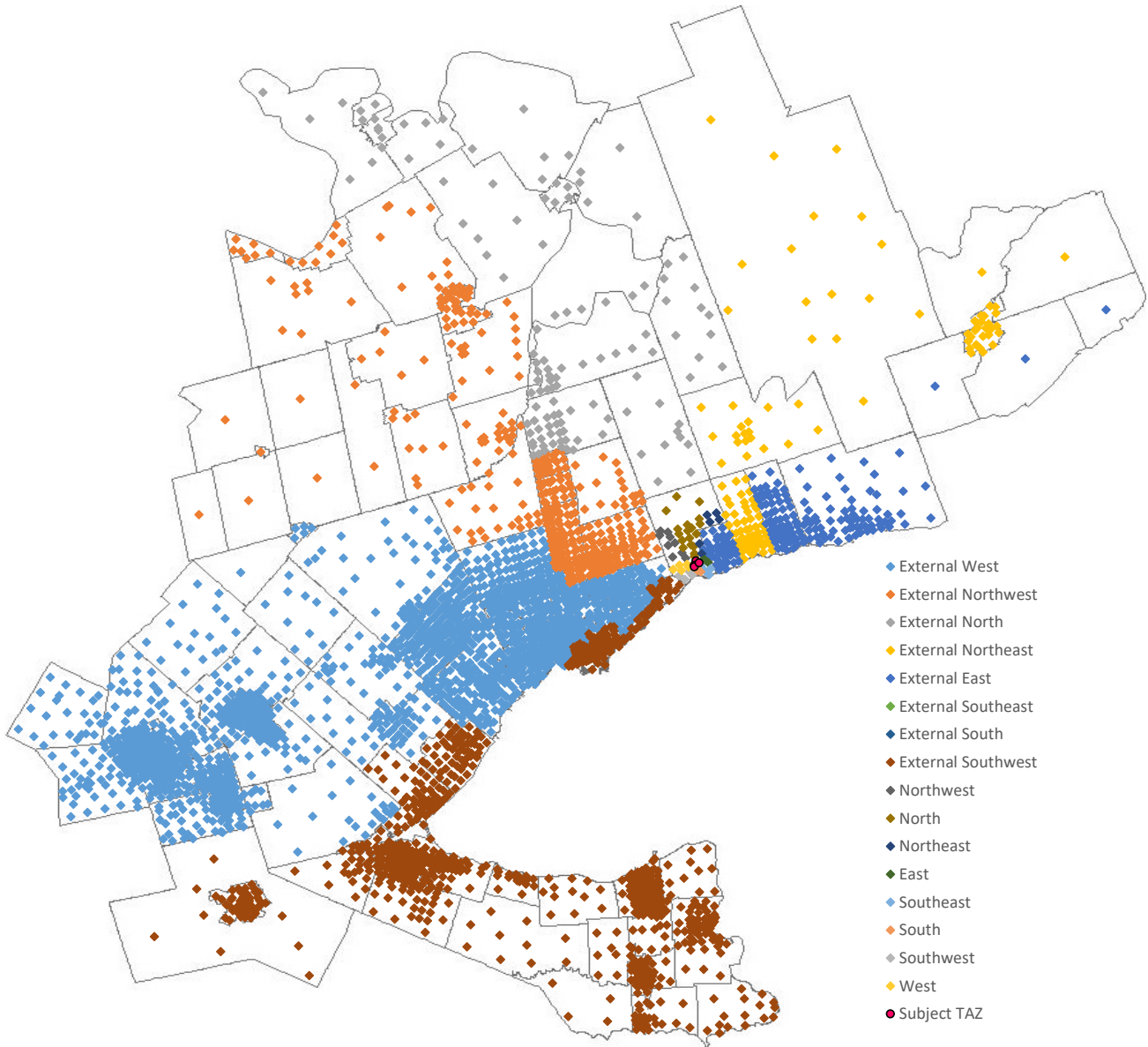
TTS Directional Distribution Summary: Tribute - Liverpool, Pickering

Notes:

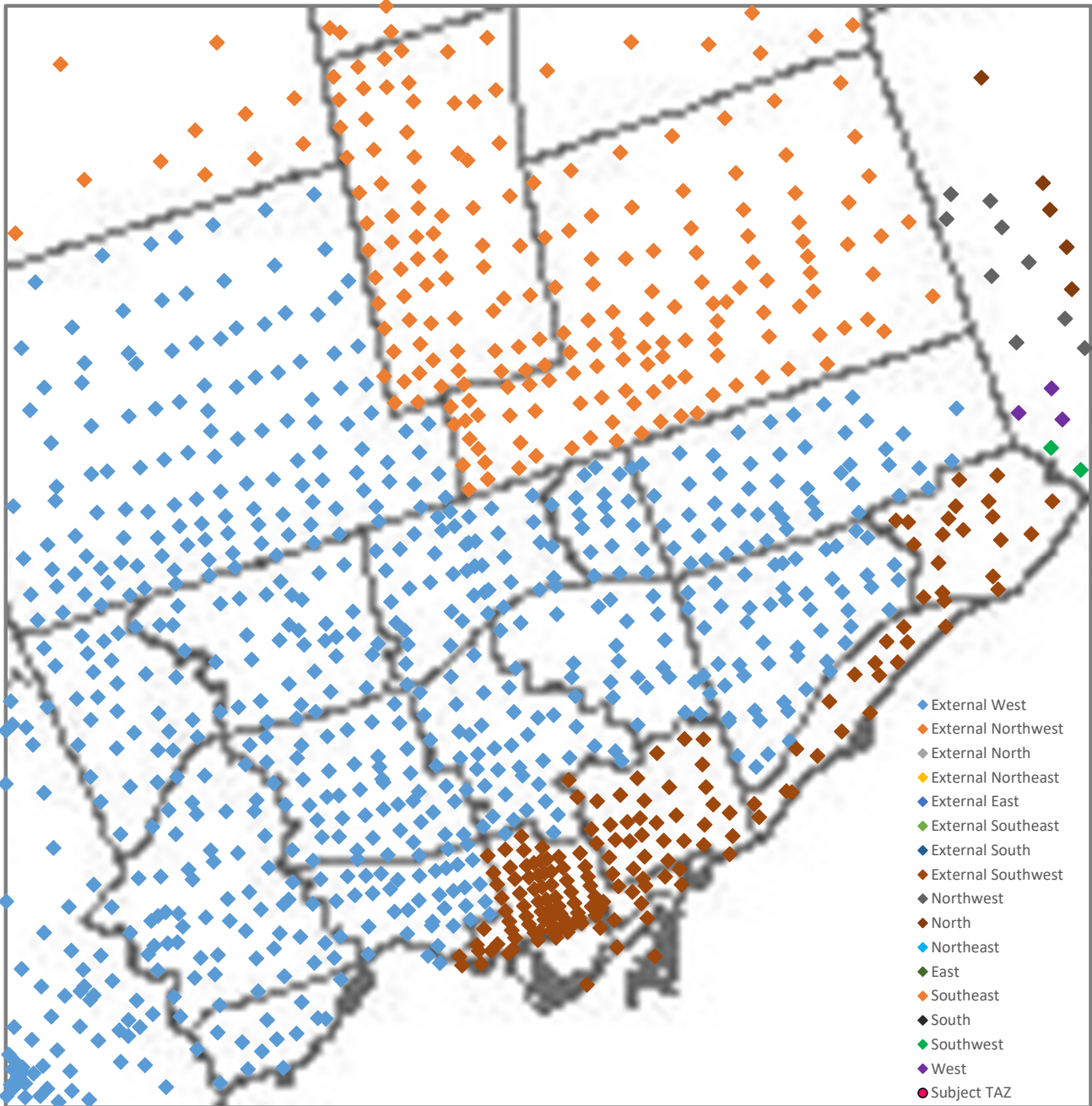
1. Directions determined based on centroid coordinates of destination/origin planning districts.
2. 'Internal' refers to local trips made within the home planning district(s), while 'External' refers to trips made to areas outside of the home planning district(s).

		Internal										External									
	Time Period	Direction	NW	N	NE	E	SE	S	SW	W	Total	NW	N	NE	E	SE	S	SW	W	Total	
Trips	A.M.	Inbound	0	111	0	13	21	0	0	0	145	0	0	0	42	0	0	0	0	0	42
		Outbound	0	446	53	13	260	151	208	137	1268	601	0	376	431	0	0	375	1149	2932	
	P.M.	Inbound	0	251	10	59	299	53	103	73	848	774	0	119	319	0	0	227	1556	2995	
		Outbound	0	47	10	94	96	87	29	25	388	0	0	53	204	0	0	68	38	363	
Percentage	A.M.	Inbound	0%	48%	0%	6%	9%	0%	0%	0%	63%	0%	0%	0%	18%	0%	0%	0%	0%	18%	
		Outbound	0%	10%	1%	0%	6%	3%	5%	3%	28%	13%	0%	8%	10%	0%	0%	8%	26%	65%	
	P.M.	Inbound	0%	6%	0%	1%	7%	1%	3%	2%	21%	19%	0%	3%	8%	0%	0%	6%	38%	74%	
		Outbound	0%	5%	1%	11%	11%	10%	3%	3%	45%	0%	0%	6%	24%	0%	0%	8%	4%	42%	

TAZ Directional Categorisation Visualisation (Complete TTS Survey Area)



TAZ Directional Categorisation Visualisation (City of Toronto)



Fri May 07 2021 23:28:22 GMT-0400 (Eastern Daylight Time) - Run Time: 2576ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime

Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of origin - gta06_orig In 1041

1043

1039

1040

and

Start time of trip - start_time In 0630-0930

and

Trip purpose of origin - purp_orig In H)

Trip 2016

Table:

	Pickering	Mode Splits
Transit excluding GO rail	456	8%
Cycle	10	0%
Auto driver	3082	56%
GO rail only	305	6%
Joint GO rail and local transit	461	8%
Auto passenger	365	7%
School bus	491	9%
Taxi passenger	48	1%
Walk	302	5%

Fri May 07 2021 23:22:53 GMT-0400 (Eastern Daylight Time) - Run Time: 2776ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of destination - gta06_dest In 1041

1043

1039

1040

and

Start time of trip - start_time In 1530-1830

and

Trip purpose of destination - purp_dest In H)

Trip 2016

Table:

	Pickering	Mode Splits
Transit excluding GO rail	177	4%
Cycle	9	0%
Auto driver	3005	65%
GO rail only	425	9%
Joint GO rail and local transit	311	7%
Auto passenger	284	6%
School bus	226	5%
Paid rideshare	33	1%
Walk	170	4%

Fri May 07 2021 23:29:44 GMT-0400 (Eastern Daylight Time) - Run Time: 2591ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of origin - gta06_orig In 1041 1043 1039 1040
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of origin - purp_orig In H)

Trip 2016

Table:

	Pickering	Mode Splits
Transit excluding GO rail	30	3%
Auto driver	738	83%
Auto passenger	118	13%

Tue Sep 19 2023 16:00:53 GMT-0400 (Eastern Daylight Time) - Run Time: 2527ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime

Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of destination - gta06_dest In 1041

1043

1039

1040

and

Start time of trip - start_time In 0630-0930

and

Trip purpose of destination - purp_dest In M)

Trip 2016

Table:

	PD 16 of Toronto	Pickering	Ajax	Clarington	Mode Splits
Auto driver	11	62	45	0	79%
Auto passenger	0	16	0	12	21%

Tue Sep 19 2023 16:45:48 GMT-0400 (Eastern Daylight Time) - Run Time: 2968ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of origin - gta06_orig In 1041 1043 1039 1040
and
Start time of trip - start_time In 0630-0930
and
Trip purpose of origin - purp_orig In M)

Trip 2016

Table:

	PD 16 of Tr Pickering	Ajax		Mode Splits
Auto driver	11	41	23	80%
Auto passenger	0	10	0	20%

Tue Sep 19 2023 16:04:54 GMT-0400 (Eastern Daylight Time) - Run Time: 3482ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of destination - gta06_dest In 1041 1043 1039 1040
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of destination - purp_dest In M)

Trip 2016

Table:

	PD 6 of To	PD 15 of Tor	Pickering	Ajax	Whitby	Oshawa	Mode Splits
Auto driver	8	29	498	110	13	13	93%
Auto passenger	8	0	38	0	0	0	7%

Tue Sep 19 2023 16:46:44 GMT-0400 (Eastern Daylight Time) - Run Time: 2712ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: Primary travel mode of trip - mode_prime
Column: Planning district of household - pd_hhld

Filters:

(2006 GTA zone of origin - gta06_orig In 1041 1043 1039 1040
and
Start time of trip - start_time In 1530-1830
and
Trip purpose of origin - purp_orig In M)

Trip 2016

Table:

	PD 6 of Tor	PD 15 of Tor	Scugog	Pickering	Ajax	Whitby	Oshawa	Clarington	Mode Splits
Transit excluding GO rail	0	0	0	0	19	0	0	0	0%
Cycle	0	0	0	9	0	0	0	0	1%
Auto driver	8	41	10	802	98	19	0	22	88%
GO rail only	0	0	0	0	0	0	13	0	0%
Auto passenger	8	10	10	102	0	0	0	0	11%

2028 Horizon Year

New Internal Trip Capture Methodology for Multi-Use Developments

Based on NCHRP Project 8-51

Note: Saturday is assumed to be the same as PM Peak Hour for Multi-Use Reductions, if Saturday Multi-Use is assumed, this must be disclosed
Do not modify values in Grey Cells

INPUTS

Volumes

Use	AM Volumes		PM Volumes		Saturday Volumes	
	Entering	Exiting	Entering	Exiting	Entering	Exiting
Office						
Retail	28	17	87	94		
Restaurant						
Cinema/ Entertainment						
Residential	85	242	240	147		
Hotel						

Proximity of Uses

Separation Distance (In Feet)

Use	Separation Distance (In Feet)					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail			0	0	0	0
Restaurant				0	0	0
Cinema/ Entertainment					0	0
Residential						0
Hotel						

OUTPUTS

AM Peak Hour Multi-Use Reduction Summary

	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel	In	In%
Office	0	0	0	0	0	0	0	0%
Retail	0	0	0	0	2	0	2	9%
Restaurant	0	0	0	0	0	0	0	0%
Cinema/ Entertainment	0	0	0	0	0	0	0	0%
Residential	0	2	0	0	0	0	2	2%
Hotel	0	0	0	0	0	0	0	0%
Out	0	2	0	0	2	0		
Out %	0%	10%	0%	0%	1%	0%		

PM Peak Hour Multi-Use Reduction Summary (Contains Proximity Factors)

	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel	In	In%
Office	0	0	0	0	0	0	0	0%
Retail	0	0	0	0	9	0	9	10%
Restaurant	0	0	0	0	0	0	0	0%
Cinema/ Entertainment	0	0	0	0	0	0	0	0%
Residential	0	24	0	0	0	0	24	10%
Hotel	0	0	0	0	0	0	0	0%
Out	0	24	0	0	9	0		
Out %	0%	26%	0%	0%	6%	0%		

Supporting Data

Percentages from ITE Journal August 2010: "Improved Estimation of Internal Trip Capture for Mixed-Use Developments"

AM From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		29%	31%		2%	75%
Retail	28%		14%		1%	14%
Restaurant	63%	13%			20%	9%
Cinema/ Entertainment						
Residential	1%	14%	4%			0%
Hotel	0%	0%	3%		0%	

AM To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		4%	14%		3%	3%
Retail	32%		8%		17%	4%
Restaurant	23%	50%			20%	6%
Cinema/ Entertainment						
Residential	0%	2%	5%			0%
Hotel	0%	0%	4%		0%	

PM (Saturday) From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		2%	3%	2%	4%	0%
Retail	20%		41%	21%	42%	16%
Restaurant	4%	29%		31%	21%	68%
Cinema/ Entertainment	0%	4%	8%		0%	68%
Residential	2%	26%	18%	8%		0%
Hotel	0%	5%	7%	2%	3%	2%

PM (Saturday) To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		31%	30%	6%	57%	0%
Retail	8%		50%	4%	10%	2%
Restaurant	2%	29%		3%	14%	5%
Cinema/ Entertainment	1%	26%	32%		0%	0%
Residential	4%	46%	16%	4%		0%
Hotel	0%	17%	71%	1%	12%	

PM (Saturday) Only From-To Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

PM (Saturday) Only To-From Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

Red numbers for those land use pairs with proximity factors

2033/2038/2043 Horizon Year

New Internal Trip Capture Methodology for Multi-Use Developments

Based on NCHRP Project 8-51

Note: Saturday is assumed to be the same as PM Peak Hour for Multi-Use Reductions, if Saturday Multi-Use is assumed, this must be disclosed
Do not modify values in Grey Cells

INPUTS

Volumes

Use	AM Volumes		PM Volumes		Saturday Volumes	
	Entering	Exiting	Entering	Exiting	Entering	Exiting
Office						
Retail	40	25	126	136		
Restaurant						
Cinema/ Entertainment						
Residential	368	1047	1039	637		
Hotel						

Proximity of Uses

Separation Distance (In Feet)

Use	Separation Distance (In Feet)					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail			0	0	0	0
Restaurant				0	0	0
Cinema/ Entertainment					0	0
Residential						0
Hotel						

OUTPUTS

AM Peak Hour Multi-Use Reduction Summary

	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel	In	In%
Office	0	0	0	0	0	0	0	0%
Retail	0	0	0	0	7	0	7	17%
Restaurant	0	0	0	0	0	0	0	0%
Cinema/ Entertainment	0	0	0	0	0	0	0	0%
Residential	0	3	0	0	0	0	3	1%
Hotel	0	0	0	0	0	0	0	0%
Out	0	3	0	0	7	0		
Out %	0%	14%	0%	0%	1%	0%		

PM Peak Hour Multi-Use Reduction Summary (Contains Proximity Factors)

	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel	In	In%
Office	0	0	0	0	0	0	0	0%
Retail	0	0	0	0	13	0	13	10%
Restaurant	0	0	0	0	0	0	0	0%
Cinema/ Entertainment	0	0	0	0	0	0	0	0%
Residential	0	35	0	0	0	0	35	3%
Hotel	0	0	0	0	0	0	0	0%
Out	0	35	0	0	13	0		
Out %	0%	26%	0%	0%	2%	0%		

Supporting Data

Percentages from ITE Journal August 2010: "Improved Estimation of Internal Trip Capture for Mixed-Use Developments"

AM From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		29%	31%		2%	75%
Retail	28%		14%		1%	14%
Restaurant	63%	13%			20%	9%
Cinema/ Entertainment						
Residential	1%	14%	4%			0%
Hotel	0%	0%	3%		0%	

AM To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		4%	14%		3%	3%
Retail	32%		8%		17%	4%
Restaurant	23%	50%			20%	6%
Cinema/ Entertainment						
Residential	0%	2%	5%			0%
Hotel	0%	0%	4%		0%	

PM (Saturday) From-To Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		2%	3%	2%	4%	0%
Retail	20%		41%	21%	42%	16%
Restaurant	4%	29%		31%	21%	68%
Cinema/ Entertainment	0%	4%	8%		0%	68%
Residential	2%	26%	18%	8%		0%
Hotel	0%	5%	7%	2%	3%	2%

PM (Saturday) To-From Percentages Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		31%	30%	6%	57%	0%
Retail	8%		50%	4%	10%	2%
Restaurant	2%	29%		3%	14%	5%
Cinema/ Entertainment	1%	26%	32%		0%	0%
Residential	4%	46%	16%	4%		0%
Hotel	0%	17%	71%	1%	12%	

PM (Saturday) Only From-To Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

PM (Saturday) Only To-From Proximity Factors Matrix						
To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office	1.00	1.00	1.00	1.00	1.00	1.00
Retail	1.00	1.00	1.00	1.00	1.00	1.00
Restaurant	1.00	1.00	1.00	1.00	1.00	1.00
Cinema/ Entertainment	1.00	1.00	1.00	1.00	1.00	1.00
Residential	1.00	1.00	1.00	1.00	1.00	1.00
Hotel	1.00	1.00	1.00	1.00	1.00	1.00

Red numbers for those land use pairs with proximity factors

APPENDIX

H FUTURE TOTAL CONDITIONS

APPENDIX

H-1 2028 FUTURE TOTAL CONDITIONS

Lanes, Volumes, Timings

<2028 Future Total>AM

1: Walnut Lane & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	775	56	43	448	25	192	9	190	14	0	29
Future Volume (vph)	20	775	56	43	448	25	192	9	190	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.990			0.992			0.857			0.850	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3423	0	1652	3390	0	1745	1544	0	1725	1534	0
Fit Permitted	0.950			0.950			0.736			0.498		
Satd. Flow (perm)	1677	3423	0	1643	3390	0	1337	1544	0	903	1534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			6			207			359	
Link Speed (kh)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	842	61	47	487	27	209	10	207	15	0	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	903	0	47	514	0	209	217	0	15	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8				4	

Lanes, Volumes, Timings

<2028 Future Total>AM

1: Walnut Lane & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	70.6		8.8	74.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.06	0.59		0.07	0.62		0.20	0.20		0.20	0.20	
v/c Ratio	0.22	0.45		0.39	0.25		0.77	0.45		0.08	0.05	
Control Delay	68.2	10.6		75.4	6.7		62.3	8.7		35.9	0.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	68.2	10.6		75.4	6.7		62.3	8.7		35.9	0.2	
LOS	E	B		E	A		E	A		D	A	
Approach Delay		12.0			12.5			35.0			11.6	
Approach LOS		B			B			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 17.1

Intersection LOS: B

Intersection Capacity Utilization 60.8%

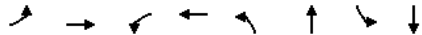
ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2028 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	903	47	514	209	217	15	32
w/c Ratio	0.22	0.45	0.39	0.25	0.77	0.45	0.08	0.05
Control Delay	68.2	10.6	75.4	6.7	62.3	8.7	35.9	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.2	10.6	75.4	6.7	62.3	8.7	35.9	0.2
Queue Length 50th (m)	5.5	34.2	11.5	10.7	46.9	1.9	2.9	0.0
Queue Length 95th (m)	m12.5	41.5	24.6	23.1	67.1	19.8	8.1	0.0
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	2015	225	2093	454	661	307	758
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 w/c Ratio	0.21	0.45	0.21	0.25	0.46	0.33	0.05	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	775	56	43	448	25	192	9	190	14	0	29
Future Volume (vph)	20	775	56	43	448	25	192	9	190	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6	3.0	6.6	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.98	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	1.00
Frt	1.00	0.99	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.85	1.00	0.85
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1685	3423	1652	3391	1726	1544	1722	1534	1722	1534	1722	1534
Fit Permitted	0.95	1.00	0.95	1.00	0.74	1.00	0.50	1.00	0.50	1.00	0.50	1.00
Satd. Flow (perm)	1685	3423	1652	3391	1338	1544	903	1534	903	1534	903	1534
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)	22	842	61	47	487	27	209	10	207	15	0	32
RTOR Reduction (vph)	0	3	0	0	2	0	165	0	0	25	0	0
Lane Group Flow (vph)	22	900	0	47	512	0	209	52	0	15	7	0
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6			8					4
Permitted Phases					8					4		
Actuated Green, G (s)	4.8	70.0		7.7	72.9		24.5	24.5		24.5		24.5
Effective Green, g (s)	4.8	70.0		7.7	72.9		24.5	24.5		24.5		24.5
Actuated g/C Ratio	0.04	0.58		0.06	0.61		0.20	0.20		0.20		0.20
Clearance Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2		8.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	67	1996		106	2060		273	315		184		313
v/s Ratio Prot	0.01	c0.26		c0.03	c0.15			0.03				0.00
v/s Ratio Perm							c0.16			0.02		
w/c Ratio	0.33	0.45		0.44	0.25		0.77	0.17		0.08		0.02
Uniform Delay, d1	56.0	14.1		54.1	10.9		45.0	39.3		38.6		38.2
Progression Factor	1.19	0.62		1.28	0.53		1.00	1.00		1.00		1.00
Incremental Delay, d2	2.7	0.7		2.8	0.3		12.1	0.2		0.2		0.0
Delay (s)	69.4	9.5		71.8	6.0		57.1	39.6		38.8		38.2
Level of Service	E	A		E	A		E	D		D		D
Approach Delay (s)		10.9			11.5			48.2				38.4
Approach LOS		B			B			D				D

Intersection Summary

HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2028 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	837	94	0	725	0	21
Future Volume (vph)	837	94	0	725	0	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3433	1516	0	3400	0	1808
Fit Permitted						
Satd. Flow (perm)	3433	1516	0	3400	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	5%	2%	0%
Adj. Flow (vph)	910	102	0	788	0	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	910	102	0	788	0	23
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2028 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	837	94	0	725	0	21
Future Volume (Veh/h)	837	94	0	725	0	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	910	102	0	788	0	23
Pedestrians						4
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.88		0.91	0.88
vC, conflicting volume			914		1308	459
vC1, stage 1 conf vol					914	
vC2, stage 2 conf vol					394	
vCu, unblocked vol			621		832	103
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	97
cM capacity (veh/h)			834		412	820

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	455	455	102	394	394	23
Volume Left	0	0	0	0	0	0
Volume Right	0	0	102	0	0	23
cSH	1700	1700	1700	1700	1700	820
Volume to Capacity	0.27	0.27	0.06	0.23	0.23	0.03
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	0.7
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.5
Lane LOS						A
Approach Delay (s)	0.0			0.0		9.5
Approach LOS						A

Intersection Summary

Average Delay 0.1
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Total>AM
10-18-2023

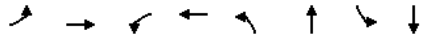
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	
Traffic Volume (vph)	80	785	81	78	564	82	44	15	29	137	35	144
Future Volume (vph)	80	785	81	78	564	82	44	15	29	137	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4		48.0			18.0			25.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00	1.00		1.00	1.00	0.99	1.00		0.99	1.00	
Frt	0.986		0.981		0.900		0.879					
Flt Protected	0.950		0.950			0.950			0.950			
Satd. Flow (prot)	1564	3316	0	1645	3304	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950		0.950			0.543			0.726			
Satd. Flow (perm)	1554	3316	0	1639	3304	0	999	1769	0	1393	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12			16			32				157
Link Speed (k/h)	60		60		40		60		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	853	88	85	613	89	48	16	32	149	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	941	0	85	702	0	48	48	0	149	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8		4.9			
Link Offset(m)	0.0		0.0		0.0		0.0		4.9			
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8		4			
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	74.0		7.8	71.5		19.1	19.1		19.1	19.1	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.65	0.46		0.80	0.36		0.30	0.16		0.67	0.47	
Control Delay	75.4	14.0		95.6	10.7		46.7	19.6		61.1	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	14.0		95.6	10.7		46.7	19.6		61.1	14.1	
LOS	E	B		F	B		D	B		E	B	
Approach Delay	19.2		19.9		33.1		34.5					
Approach LOS	B		B		C		C					
Intersection Summary												
Area Type:	Other											
Cycle Length:	120											
Actuated Cycle Length:	120											
Offset:	112.8 (94%), 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:	22.4						Intersection LOS: C					
Intersection Capacity Utilization:	72.3%						ICU Level of Service C					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2028 Future Total>AM
3: Dixie Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	941	85	702	48	48	149	195
w/c Ratio	0.65	0.46	0.80	0.36	0.30	0.16	0.67	0.47
Control Delay	75.4	14.0	95.6	10.7	46.7	19.6	61.1	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	14.0	95.6	10.7	46.7	19.6	61.1	14.1
Queue Length 50th (m)	20.0	56.4	18.6	40.3	10.2	3.3	33.7	7.9
Queue Length 95th (m)	#39.1	91.2	#47.3	45.9	19.5	12.4	49.6	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2048	106	1975	330	606	460	686
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 w/c Ratio	0.59	0.46	0.80	0.36	0.15	0.08	0.32	0.28

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
3: Dixie Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	80	785	81	78	564	82	44	15	29	137	35	144
Future Volume (vph)	80	785	81	78	564	82	44	15	29	137	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3316		1645	3304		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.54	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3316		1645	3304		1000	1769		1392	1760	
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)	87	853	88	85	613	89	48	16	32	149	38	157
RTOR Reduction (vph)	0	5	0	0	6	0	0	27	0	0	132	0
Lane Group Flow (vph)	87	936	0	85	696	0	48	21	0	149	63	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					
Actuated Green, G (s)	10.3	74.0		7.8	71.5		19.1	19.1		19.1	19.1	
Effective Green, g (s)	10.3	74.0		7.8	71.5		19.1	19.1		19.1	19.1	
Actuated g/C Ratio	0.09	0.62		0.06	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2044		106	1968		159	281		221	280	
v/s Ratio Prot	0.06	c0.28		c0.05	0.21			0.01			0.04	
v/s Ratio Perm							0.05			c0.11		
w/c Ratio	0.65	0.46		0.80	0.35		0.30	0.08		0.67	0.22	
Uniform Delay, d1	53.1	12.3		55.3	12.4		44.6	42.9		47.5	44.0	
Progression Factor	1.00	1.00		0.90	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.7		33.2	0.5		1.1	0.1		7.9	0.4	
Delay (s)	63.5	13.0		82.9	9.9		45.6	43.0		55.4	44.4	
Level of Service	E	B		F	A		D	D		E	D	
Approach Delay (s)		17.3			17.8			44.3			49.2	
Approach LOS		B			B			D			D	

Intersection Summary
 HCM 2000 Control Delay 23.5 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.52
 Actuated Cycle Length (s) 120.0 Sum of lost time (s) 19.1
 Intersection Capacity Utilization 72.3% ICU Level of Service C
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2028 Future Total>AM

10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	446	288	154	334	42	115	352	125	76	634	117
Future Volume (vph)	199	446	288	154	334	42	115	352	125	76	634	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8	97.9	170.7		117.0	185.5		52.0	49.0		60.5	
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.287			0.525		
Satd. Flow (perm)	1636	3362	1511	1673	3510	1530	539	3700	1513	1103	3618	1522
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			176			137			136			127
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	216	485	313	167	363	46	125	383	136	83	689	127
Shared Lane Traffic (%)												
Lane Group Flow (vph)	216	485	313	167	363	46	125	383	136	83	689	127
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2028 Future Total>AM

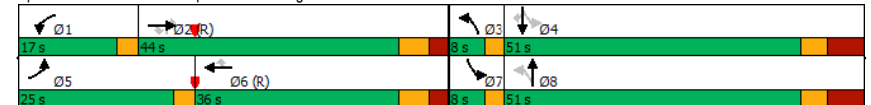
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	19.4	37.2	37.2	13.7	31.5	31.5	53.6	43.5	37.2	53.0	41.9	41.9
Actuated g/C Ratio	0.16	0.31	0.31	0.11	0.26	0.26	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.81	0.47	0.53	0.87	0.39	0.09	0.43	0.29	0.24	0.16	0.55	0.21
Control Delay	56.7	37.0	25.8	90.6	38.6	0.4	24.1	28.4	6.2	18.7	33.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.7	37.0	25.8	90.6	38.6	0.4	24.1	28.4	6.2	18.7	33.4	5.4
LOS	E	D	C	F	D	A	C	C	A	B	C	A
Approach Delay		37.7			50.6			22.9				28.1
Approach LOS		D			D			C				C

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 34.3
 Intersection Capacity Utilization 94.2%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2028 Future Total>AM
6: Liverpool Road & Kingston Road 10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	216	485	313	167	363	46	125	383	136	83	689	127
v/c Ratio	0.81	0.47	0.53	0.87	0.39	0.09	0.43	0.29	0.24	0.16	0.55	0.21
Control Delay	56.7	37.0	25.8	90.6	38.6	0.4	24.1	28.4	6.2	18.7	33.4	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.7	37.0	25.8	90.6	38.6	0.4	24.1	28.4	6.2	18.7	33.4	5.4
Queue Length 50th (m)	49.7	58.8	47.6	39.1	37.7	0.0	16.5	34.2	0.0	10.6	68.1	0.0
Queue Length 95th (m)	#80.1	74.1	76.1	#76.5	52.8	0.0	28.1	46.6	13.9	19.7	86.6	12.7
Internal Link Dist (m)		670.6		372.4			233.7				324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1043	590	197	922	502	293	1340	563	525	1263	614
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.47	0.53	0.85	0.39	0.09	0.43	0.29	0.24	0.16	0.55	0.21

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
6: Liverpool Road & Kingston Road 10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	199	446	288	154	334	42	115	352	125	76	634	117
Future Volume (vph)	199	446	288	154	334	42	115	352	125	76	634	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1789	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.29	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	541	3700	1513	1111	3618	1522
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)	216	485	313	167	363	46	125	383	136	83	689	127
RTOR Reduction (vph)	0	0	122	0	0	34	0	0	95	0	0	82
Lane Group Flow (vph)	216	485	191	167	363	12	125	383	41	83	689	45
Confl. Peds. (#/hr)	15	19	19			15	15		28	28		15
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			2		4	
Actuated Green, G (s)	19.4	36.6	36.6	13.7	30.9	30.9	48.5	43.5	36.6	46.5	42.5	42.5
Effective Green, g (s)	19.4	36.6	36.6	13.7	30.9	30.9	48.5	43.5	36.6	46.5	42.5	42.5
Actuated g/C Ratio	0.16	0.31	0.31	0.11	0.26	0.26	0.40	0.36	0.31	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	267	1025	460	193	903	393	270	1341	461	460	1281	539
v/s Ratio Prot	c0.13	c0.14		c0.10	0.10		c0.02	0.10		0.01	c0.19	
v/s Ratio Perm			0.13			0.01	0.17		0.03	0.06		0.03
v/c Ratio	0.81	0.47	0.41	0.87	0.40	0.03	0.46	0.29	0.09	0.18	0.54	0.08
Uniform Delay, d1	48.5	33.9	33.2	52.2	36.9	33.3	24.1	27.2	29.8	23.5	30.9	25.8
Progression Factor	0.73	1.06	1.54	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.2	1.4	2.5	30.8	1.3	0.1	1.3	0.5	0.4	0.2	1.6	0.3
Delay (s)	50.6	37.2	53.5	83.1	38.2	33.5	25.4	27.7	30.2	23.7	32.5	26.1
Level of Service	D	D	D	F	D	C	C	C	C	C	C	C
Approach Delay (s)		45.1			50.8			27.8			30.8	
Approach LOS		D			D			C			C	

Intersection Summary
HCM 2000 Control Delay 38.5 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.58
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 94.2% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	527	272	146	897	24
Future Volume (vph)	10	17	36	194	19	59	53	527	272	146	897	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	1.00		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.272			0.401		
Satd. Flow (perm)	0	3058	0	0	1858	1181	469	5036	1483	703	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	573	296	159	975	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	573	296	159	975	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2028 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

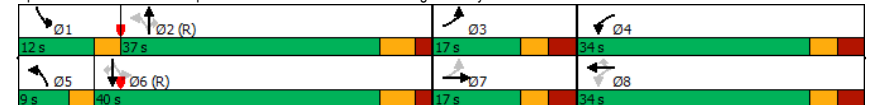


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.16	0.22	0.32	0.29	0.35	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	7.0	13.1	4.0	9.0	14.1	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	7.0	13.1	4.0	9.0	14.1	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.8			13.1	
Approach LOS		C			D			A			B	


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.56
Intersection Signal Delay:	15.0
Intersection Capacity Utilization:	55.7%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway




Queues <2028 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	573	296	159	975	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.16	0.22	0.32	0.29	0.35	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	7.0	13.1	4.0	9.0	14.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	7.0	13.1	4.0	9.0	14.1	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.5	22.7	9.5	11.3	39.8	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.7	35.2	19.5	21.5	53.5	0.0
Internal Link Dist (m)		58.8	304.5				138.3			233.7	
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	358	2621	913	555	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.16	0.22	0.32	0.29	0.35	0.03

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

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	527	272	146	897	24
Future Volume (vph)	10	17	36	194	19	59	53	527	272	146	897	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1642	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.27	1.00	1.00	0.40	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	471	5036	1483	705	5029	1458
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)	11	18	39	211	21	64	58	573	296	159	975	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	146	0	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	573	150	159	975	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	318	2558	753	516	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.11		c0.03	c0.19	
v/s Ratio Perm							0.01	0.09		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.18	0.22	0.20	0.31	0.36	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.2	13.7	13.5	8.0	13.0	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.77	0.89	1.50	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.3	0.2	0.6	0.3	0.4	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.1	12.4	20.7	8.4	13.4	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.8			12.6	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.38
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	177	188	69	310	118	510	0	0	764	120
Future Volume (vph)	0	0	177	188	69	310	118	510	0	0	764	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0		125.0	50.0		0.0	0.0		0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1108	1700	1767	1551	1460	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.269					
Satd. Flow (perm)	0	0	1108	1700	1767	1551	412	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						130
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	192	204	75	337	128	554	0	0	830	130
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	192	139	140	337	128	554	0	0	830	130
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4			9.4	
Detector 2 Size(m)						0.6		0.6			0.6	
Detector 2 Type						Cl+Ex		Cl+Ex			Cl+Ex	

Lanes, Volumes, Timings

<2028 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023

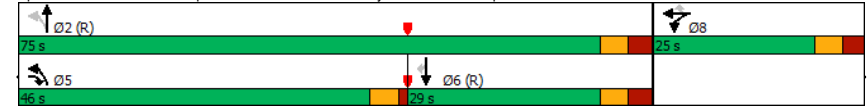


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			23.1	13.7	13.7	13.7	75.8	74.0			46.5	46.5
Actuated g/C Ratio			0.23	0.14	0.14	0.14	0.76	0.74			0.46	0.46
v/c Ratio			0.75	0.60	0.58	0.67	0.23	0.15			0.37	0.17
Control Delay			52.8	50.7	49.5	11.3	4.8	4.3			11.9	1.7
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			52.8	50.7	49.5	11.3	4.8	4.3			11.9	1.7
LOS			D	D	D	B	A	A			B	A
Approach Delay			52.8			28.9		4.4				10.6
Approach LOS			D			C		A				B


Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	70
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	16.8
Intersection LOS:	B
Intersection Capacity Utilization:	47.0%
ICU Level of Service:	A
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp




Queues <2028 Future Total>AM
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	192	139	140	337	128	554	830	130
w/c Ratio	0.75	0.60	0.58	0.67	0.23	0.15	0.37	0.17
Control Delay	52.8	50.7	49.5	11.3	4.8	4.3	11.9	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.8	50.7	49.5	11.3	4.8	4.3	11.9	1.7
Queue Length 50th (m)	34.8	27.1	27.2	0.0	5.3	9.5	20.5	0.2
Queue Length 95th (m)	52.0	44.3	44.3	23.2	12.6	16.1	38.2	2.3
Internal Link Dist (m)	202.7				348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	459	323	335	567	747	3651	2265	784
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 w/c Ratio	0.42	0.43	0.42	0.59	0.17	0.15	0.37	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↑	↑	↑	↑	↑	↑↑↑	↑	↑	↑↑↑	↑
Traffic Volume (vph)	0	0	177	188	69	310	118	510	0	0	764	120
Future Volume (vph)	0	0	177	188	69	310	118	510	0	0	764	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Ftbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1108	1700	1767	1551	1459	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.27	1.00			1.00	1.00
Satd. Flow (perm)			1108	1700	1767	1551	413	4932			4877	1538
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	0	192	204	75	337	128	554	0	0	830	130
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	70
Lane Group Flow (vph)	0	0	192	139	140	46	128	554	0	0	830	60
Confl. Peds. (#/hr)							7	14	14		7	
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			23.1	13.7	13.7	13.7	74.0	74.0			46.4	46.4
Effective Green, g (s)			23.1	13.7	13.7	13.7	74.0	74.0			46.4	46.4
Actuated g/C Ratio			0.23	0.14	0.14	0.14	0.74	0.74			0.46	0.46
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			255	232	242	212	547	3649			2262	713
v/s Ratio Prot			c0.17	c0.08	0.08		0.05	0.11			c0.17	
v/s Ratio Perm						0.03	0.12					0.04
w/c Ratio			0.75	0.60	0.58	0.22	0.23	0.15			0.37	0.08
Uniform Delay, d1			35.8	40.6	40.4	38.4	4.3	3.8			17.3	15.0
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.59	0.29
Incremental Delay, d2			11.9	4.1	3.3	0.5	0.2	0.1			0.4	0.2
Delay (s)			47.7	44.7	43.8	38.9	4.5	3.9			10.6	4.5
Level of Service			D	D	D	D	A	A			B	A
Approach Delay (s)			47.7			41.3		4.0			9.8	
Approach LOS			D			D		A			A	

Intersection Summary

HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

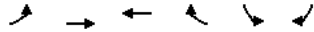
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Total>AM

10: Kingston Road & Fairport Road

10-18-2023



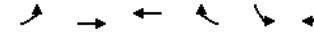
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕	↕		↕	↕	
Traffic Volume (vph)	96	739	664	99	182	229	
Future Volume (vph)	96	739	664	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Friction			0.980			0.850	
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3380	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3380	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			17			249	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	803	722	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	803	830	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

<2028 Future Total>AM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.34	0.40		0.72	0.52	
Control Delay	72.8	4.1	15.1		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	72.8	4.1	15.1		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		12.0	15.1		34.1		
Approach LOS		B	B		C		

Intersection Summary

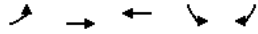
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.7
 Intersection LOS: B
 Intersection Capacity Utilization 51.6%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

<2028 Future Total>AM
10-18-2023

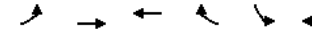


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	803	830	198	249
w/c Ratio	0.62	0.34	0.40	0.72	0.52
Control Delay	72.8	4.1	15.1	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	72.8	4.1	15.1	65.5	9.1
Queue Length 50th (m)	17.0	73.0	53.2	49.0	0.0
Queue Length 95th (m)	30.0	2.1	88.4	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2060	476	649
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	0.44	0.34	0.40	0.42	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2028 Future Total>AM
10-18-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕	↔	↔	↕↕
Traffic Volume (vph)	96	739	664	99	182	229
Future Volume (vph)	96	739	664	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3381		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3381		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	803	722	108	198	249
RTOR Reduction (vph)	0	0	7	0	0	209
Lane Group Flow (vph)	104	803	823	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2054		276	271
v/s Ratio Prot	c0.06	0.24	c0.24		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.35	0.40		0.72	0.15
Uniform Delay, d1	55.7	8.2	13.2		51.9	47.0
Progression Factor	1.07	0.41	1.00		1.00	1.00
Incremental Delay, d2	5.8	0.4	0.6		8.6	0.3
Delay (s)	65.4	3.7	13.8		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	13.8		53.1	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	773	12	284	628	461	65
Future Volume (vph)	773	12	284	628	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	840	13	309	683	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	853	0	309	683	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2028 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

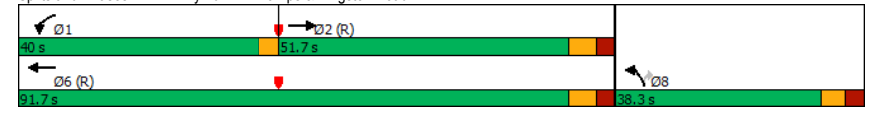
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effect Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.54		0.85	0.27	0.78	0.20
Control Delay	14.8		57.3	12.6	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	14.8		57.3	12.6	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	14.8			26.6	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.6
 Intersection Capacity Utilization 65.6%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Total>AM
10-18-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	853	309	683	501	71
w/c Ratio	0.54	0.85	0.27	0.78	0.20
Control Delay	14.8	57.3	12.6	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	57.3	12.6	58.6	10.2
Queue Length 50th (m)	75.4	76.1	58.0	63.7	0.0
Queue Length 95th (m)	101.6	104.2	75.7	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.54	0.68	0.27	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Total>AM
10-18-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕↔	↕↔	↕↔	↕↔
Traffic Volume (vph)	773	12	284	628	461	65
Future Volume (vph)	773	12	284	628	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	840	13	309	683	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	852	0	309	683	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.25		c0.19	0.19	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.54		0.84	0.27	0.78	0.04
Uniform Delay, d1	25.8		47.8	7.0	50.2	43.2
Progression Factor	0.49		0.80	1.66	1.00	1.00
Incremental Delay, d2	1.1		15.3	0.3	5.8	0.1
Delay (s)	13.7		53.4	11.8	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	13.7			24.8	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2028 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	1000	37	96	996	74	140	6	92	42	13	124
Future Volume (vph)	76	1000	37	96	996	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		1.00		0.99		0.98		1.00		0.98	
Frt	0.995		0.990		0.860		0.864					
Flt Protected	0.950		0.950		0.950		0.950					
Satd. Flow (prot)	1673	3280	0	1671	3380	0	1805	1755	0	1643	1468	0
Flt Permitted	0.950		0.950		0.662		0.688					
Satd. Flow (perm)	1662	3280	0	1671	3380	0	1249	1755	0	1185	1468	0
Right Turn on Red	Yes		Yes		Yes		Yes					
Satd. Flow (RTOR)	4		9		100		135					
Link Speed (kh)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13		6		3		3				6	
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1087	40	104	1083	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1127	0	104	1163	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

<2028 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases			8				4					
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	18.0		18.0		20.0		20.0		20.0		20.0	
Pedestrian Calls (#/hr)	1		16		0		0		1		1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.58		0.63	0.57		0.76	0.29		0.24	0.43	
Control Delay	65.3	16.9		79.5	11.4		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.3	16.9		79.5	11.4		74.1	11.5		48.1	12.9	
LOS	E	B		E	B		E	B		D	B	
Approach Delay	20.2		17.0		48.2		21.2					
Approach LOS	C		B		D		C					

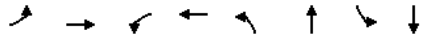
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 79.1%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



Queues <2028 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1127	104	1163	152	107	46	149
w/c Ratio	0.59	0.58	0.63	0.57	0.76	0.29	0.24	0.43
Control Delay	65.3	16.9	79.5	11.4	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.3	16.9	79.5	11.4	74.1	11.5	48.1	12.9
Queue Length 50th (m)	19.1	84.0	22.0	78.3	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.1	111.5	38.5	167.6	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2036	278	469	264	432
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 w/c Ratio	0.50	0.58	0.51	0.57	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	76	1000	37	96	996	74	140	6	92	42	13	124
Future Volume (vph)	76	1000	37	96	996	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3279		1671	3379		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3279		1671	3379		1249	1755		1185	1468	
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)	83	1087	40	104	1083	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	4	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1125	0	104	1159	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2032		200	282		190	236	
v/s Ratio Prot	0.05	c0.34		c0.06	0.34			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.58		0.63	0.57		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	16.8		56.3	15.7		52.2	46.4		47.6	46.9	
Progression Factor	0.86	0.84		1.14	0.60		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.9	1.2		7.3	1.1		15.5	0.1		0.7	0.3	
Delay (s)	55.2	15.4		71.4	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.1			15.6			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2028 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	248	563	284	146	390	409	162	796	175
Future Volume (vph)	78	344	294	248	563	284	146	390	409	162	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt		0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			159		244			195				172
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	270	612	309	159	424	445	176	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	270	612	309	159	424	445	176	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

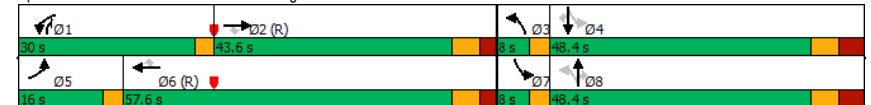
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	39.9	39.9	23.7	52.5	52.5	50.4	40.0	69.1	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.39	0.31	0.53	0.39	0.31	0.31
v/c Ratio	0.61	0.37	0.54	0.84	0.43	0.41	0.76	0.27	0.49	0.46	0.56	0.32
Control Delay	75.8	37.2	22.8	64.4	18.5	4.9	53.8	34.6	10.8	31.6	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	37.2	22.8	64.4	18.5	4.9	53.8	34.6	10.8	31.6	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	35.5		25.4		27.3		33.3					
Approach LOS	D		C		C		C					

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.84
Intersection Signal Delay:	30.0
Intersection Capacity Utilization:	105.5%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	G

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2028 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	270	612	309	159	424	445	176	865	190
v/c Ratio	0.61	0.37	0.54	0.84	0.43	0.41	0.76	0.27	0.49	0.46	0.56	0.32
Control Delay	75.8	37.2	22.8	64.4	18.5	4.9	53.8	34.6	10.8	31.6	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	37.2	22.8	64.4	18.5	4.9	53.8	34.6	10.8	31.6	39.2	7.8
Queue Length 50th (m)	21.2	40.1	34.1	50.0	62.0	20.0	26.2	30.0	33.8	29.2	67.8	3.2
Queue Length 95th (m)	38.4	55.3	65.6	#88.8	49.3	9.1	#51.5	39.4	55.7	45.9	81.8	20.2
Internal Link Dist (m)		273.5		198.7			134.6				361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	1023	590	366	1418	760	208	1556	936	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.37	0.54	0.74	0.43	0.41	0.76	0.27	0.48	0.46	0.56	0.32

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2028 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑↑	↑		↑↑↑	↑
Traffic Volume (vph)	78	344	294	248	563	284	146	390	409	162	796	175
Future Volume (vph)	78	344	294	248	563	284	146	390	409	162	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1527	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1527	906	5057	1574
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)	85	374	320	270	612	309	159	424	445	176	865	190
RTOR Reduction (vph)	0	0	110	0	0	145	0	0	99	0	0	119
Lane Group Flow (vph)	85	374	210	270	612	164	159	424	346	176	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	39.9	39.9	23.7	52.5	52.5	45.0	40.0	63.7	45.0	40.0	40.0
Effective Green, g (s)	11.1	39.9	39.9	23.7	52.5	52.5	45.0	40.0	63.7	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.31	0.31	0.18	0.40	0.40	0.35	0.31	0.49	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	1023	480	322	1417	614	191	1556	748	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.15	c0.17		c0.03	0.08	0.08	0.02	0.17	
v/s Ratio Perm			0.13			0.11	c0.25		0.14	0.16		0.05
v/c Ratio	0.61	0.37	0.44	0.84	0.43	0.27	0.83	0.27	0.46	0.51	0.56	0.15
Uniform Delay, d1	57.4	35.2	36.1	51.3	28.0	25.9	37.0	34.0	21.9	31.8	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.88	0.62	0.53	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.0	2.9	14.9	0.8	0.9	25.5	0.4	0.5	1.3	1.4	0.6
Delay (s)	65.1	36.2	38.9	59.9	18.1	14.7	62.5	34.4	22.3	33.0	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		40.5			26.7		33.5				37.3	
Approach LOS		D			C		C				D	

Intersection Summary
HCM 2000 Control Delay 34.0 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.70
Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
Intersection Capacity Utilization 105.5% ICU Level of Service G
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2028 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

	↖	↗	↙	↘	↑	↓
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↖↖	↖↖	
Traffic Volume (vph)	603	268	0	694	425	0
Future Volume (vph)	603	268	0	694	425	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.994	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3391	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3391	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	5	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	655	291	0	754	462	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	684	262	0	754	462	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2028 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

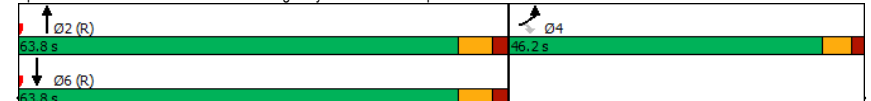
10-18-2023

	↖	↗	↙	↘	↑	↓
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	28.4	28.4		69.4	69.4	
Actuated g/C Ratio	0.26	0.26		0.63	0.63	
v/c Ratio	0.78	0.47		0.35	0.21	
Control Delay	43.7	6.5		10.9	9.6	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	43.7	6.5		10.9	9.6	
LOS	D	A		B	A	
Approach Delay	33.4			10.9	9.6	
Approach LOS	C			B	A	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 20.5
 Intersection Capacity Utilization 49.4%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Total>AM
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Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	684	262	754	462
w/c Ratio	0.78	0.47	0.35	0.21
Control Delay	43.7	6.5	10.9	9.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.7	6.5	10.9	9.6
Queue Length 50th (m)	69.8	0.0	37.4	20.5
Queue Length 95th (m)	82.6	19.2	57.4	33.2
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1257	683	2127	2195
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced w/c Ratio	0.54	0.38	0.35	0.21
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Total>AM
10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	←←	←		↑↑	↑↑	
Traffic Volume (vph)	603	268	0	694	425	0
Future Volume (vph)	603	268	0	694	425	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3391	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3391	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	655	291	0	754	462	0
RTOR Reduction (vph)	4	194	0	0	0	0
Lane Group Flow (vph)	680	68	0	754	462	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	28.4	28.4		69.4	69.4	
Effective Green, g (s)	28.4	28.4		69.4	69.4	
Actuated g/C Ratio	0.26	0.26		0.63	0.63	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	875	361		2128	2196	
v/s Ratio Prot	c0.20			c0.22	0.13	
v/s Ratio Perm		0.05				
w/c Ratio	0.78	0.19		0.35	0.21	
Uniform Delay, d1	37.9	31.8		9.6	8.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.3		0.5	0.2	
Delay (s)	42.3	32.1		10.1	8.9	
Level of Service	D	C		B	A	
Approach Delay (s)	39.4			10.1	8.9	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay		22.7		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.48				
Actuated Cycle Length (s)		110.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		49.4%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2028 Future Total>PM
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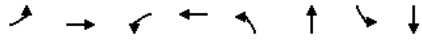
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	38	1445	225	32	653	36	171	7	237	24	0	26
Future Volume (vph)	38	1445	225	32	653	36	171	7	237	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.97	
Frt		0.980			0.992			0.855			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3460	0	1685	3509	0	1745	1577	0	1725	1583	0
Flt Permitted	0.950			0.950			0.589			0.595		
Satd. Flow (perm)	1677	3460	0	1682	3509	0	1063	1577	0	1075	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			6			91			255	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Conf. Peds. (#/hr)	5		7	7		5	14		5	5		14
Conf. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	41	1571	245	35	710	39	186	8	258	26	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1816	0	35	749	0	186	266	0	26	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases										8		4
Detector Phase	5	2			1	6				3	8	4
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0				5.0	8.0	8.0
Minimum Split (s)	8.0	32.6			8.0	32.6				8.0	37.2	37.2
Total Split (s)	8.0	72.0			9.0	73.0				11.8	49.0	37.2
Total Split (%)	6.2%	55.4%			6.9%	56.2%				9.1%	37.7%	28.6%
Maximum Green (s)	5.0	65.4			6.0	66.4				8.8	40.8	29.0
Yellow Time (s)	3.0	4.4			3.0	4.4				3.0	3.3	3.3
All-Red Time (s)	0.0	2.2			0.0	2.2				0.0	4.9	4.9
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Lost Time (s)	3.0	6.6			3.0	6.6				3.0	8.2	8.2
Lead/Lag	Lead	Lag			Lead	Lag				Lead		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	C-Max			None	C-Max				None	None	None
Walk Time (s)		7.0				7.0					7.0	7.0
Flash Dont Walk (s)		19.0				19.0					22.0	22.0
Pedestrian Calls (#/hr)		8				4					2	9
Act Effect Green (s)	5.0	86.4			5.9	85.4				28.6	23.4	13.4
Actuated g/C Ratio	0.04	0.66			0.05	0.66				0.22	0.18	0.10
v/c Ratio	0.64	0.79			0.46	0.32				0.65	0.74	0.24
Control Delay	104.7	10.4			97.6	5.7				53.5	44.0	54.8
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	104.7	10.4			97.6	5.7				53.5	44.0	54.8
LOS	F	B			F	A				D	D	A
Approach Delay		12.5				9.8				47.9		26.6
Approach LOS		B				A				D		C
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	130											
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green											
Natural Cycle:	120											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.79											
Intersection Signal Delay:	17.1						Intersection LOS: B					
Intersection Capacity Utilization:	81.1%						ICU Level of Service D					
Analysis Period (min):	15											
Splits and Phases:	1: Walnut Lane & Kingston Road											

Queues <2028 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1816	35	749	186	266	26	28
v/c Ratio	0.64	0.79	0.46	0.32	0.65	0.74	0.24	0.07
Control Delay	104.7	10.4	97.6	5.7	53.5	44.0	54.8	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	104.7	10.4	97.6	5.7	53.5	44.0	54.8	0.3
Queue Length 50th (m)	11.2	41.8	9.6	8.3	43.2	44.6	6.5	0.0
Queue Length 95th (m)	m13.7	#301.3	m15.2	91.7	53.5	61.4	13.4	0.0
Internal Link Dist (m)		105.3	670.6		100.5	155.7		
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	2304	77	2306	288	557	239	551
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	0.64	0.79	0.45	0.32	0.65	0.48	0.11	0.05

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.

HCM Signalized Intersection Capacity Analysis <2028 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1445	225	32	653	36	171	7	237	24	0	26
Future Volume (vph)	38	1445	225	32	653	36	171	7	237	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.97	
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.85		1.00	0.85	
Fit Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1685	3459		1685	3509		1728	1577		1717	1583	
Fit Permitted	0.95	1.00		0.95	1.00		0.59	1.00		0.60	1.00	
Satd. Flow (perm)	1685	3459		1685	3509		1072	1577		1076	1583	
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)	41	1571	245	35	710	39	186	8	258	26	0	28
RTOR Reduction (vph)	0	7	0	0	2	0	0	73	0	0	25	0
Lane Group Flow (vph)	41	1809	0	35	747	0	186	193	0	26	3	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	83.5		3.6	83.1		25.1	25.1		11.8	11.8	
Effective Green, g (s)	4.0	83.5		3.6	83.1		25.1	25.1		11.8	11.8	
Actuated g/C Ratio	0.03	0.64		0.03	0.64		0.19	0.19		0.09	0.09	
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	51	2221		46	2243		258	304		97	143	
v/s Ratio Prot	c0.02	c0.52		0.02	0.21		c0.06	0.12			0.00	
v/s Ratio Perm							c0.08			0.02		
v/c Ratio	0.80	0.81		0.76	0.33		0.72	0.63		0.27	0.02	
Uniform Delay, d1	62.6	17.4		62.8	10.7		48.1	48.2		55.1	53.8	
Progression Factor	1.27	0.39		1.32	0.47		1.00	1.00		1.00	1.00	
Incremental Delay, d2	42.8	2.2		48.4	0.4		9.5	4.3		1.5	0.1	
Delay (s)	122.5	9.0		131.0	5.4		57.6	52.5		56.6	53.9	
Level of Service	F	A		F	A		E	D		E	D	
Approach Delay (s)		11.5			11.0			54.6			55.2	
Approach LOS		B			B			D			E	

Intersection Summary
 HCM 2000 Control Delay 18.3 HCM 2000 Level of Service B
 HCM 2000 Volume to Capacity ratio 0.82
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8
 Intersection Capacity Utilization 81.1% ICU Level of Service D
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2028 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	1647	105	0	978	0	25
Future Volume (vph)	1647	105	0	978	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3500	1561	0	3500	0	1808
Fit Permitted						
Satd. Flow (perm)	3500	1561	0	3500	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	2%	2%	2%	0%
Adj. Flow (vph)	1790	114	0	1063	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1790	114	0	1063	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	55.5%		ICU Level of Service B			
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2028 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	1647	105	0	978	0	25
Future Volume (Veh/h)	1647	105	0	978	0	25
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1790	114	0	1063	0	27
Pedestrians						3
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL		TWLTL			
Median storage (veh)	2		2			
Upstream signal (m)	191		129			
pX, platoon unblocked			0.59		0.64	0.59
vC, conflicting volume			1793		2324	898
vC1, stage 1 conf vol					1793	
vC2, stage 2 conf vol					532	
vCu, unblocked vol			962		1283	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			420		189	644

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	895	895	114	532	532	27
Volume Left	0	0	0	0	0	0
Volume Right	0	0	114	0	0	27
cSH	1700	1700	1700	1700	1700	644
Volume to Capacity	0.53	0.53	0.07	0.31	0.31	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	10.8
Lane LOS						B
Approach Delay (s)	0.0			0.0		10.8
Approach LOS						B

Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization	55.5%		ICU Level of Service		B	
Analysis Period (min)	15					

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Total>PM
10-18-2023

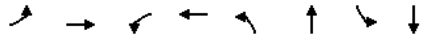
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1540	154	40	789	140	124	54	63	144	28	92
Future Volume (vph)	204	1540	154	40	789	140	124	54	63	144	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.986		0.977		0.920		0.885					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3373	0	1597	3418	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.674			0.676		
Satd. Flow (perm)	1578	3373	0	1594	3418	0	1250	1786	0	1290	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			20			42			100	
Link Speed (k/h)	60		60		40		60					
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	222	1674	167	43	858	152	135	59	68	157	30	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	1841	0	43	1010	0	135	127	0	157	130	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2028 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases							8	8			4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		40.1	40.1		40.1	40.1	
Total Split (s)	26.0	81.6		8.0	63.6		40.4	40.4		40.4	40.4	
Total Split (%)	20.0%	62.8%		6.2%	48.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	23.0	75.0		5.0	57.0		30.9	30.9		30.9	30.9	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.2	86.3		5.0	68.5		21.2	21.2		21.2	21.2	
Actuated g/C Ratio	0.16	0.66		0.04	0.53		0.16	0.16		0.16	0.16	
v/c Ratio	0.86	0.82		0.70	0.56		0.67	0.39		0.75	0.36	
Control Delay	86.1	10.0		117.2	12.6		65.7	34.0		72.2	15.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	86.1	10.0		117.2	12.6		65.7	34.0		72.2	15.8	
LOS	F	A		F	B		E	C		E	B	
Approach Delay	18.2		16.9		50.3		46.6					
Approach LOS	B		B		D		D					
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	130											
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green												
Natural Cycle:	120											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.86											
Intersection Signal Delay:	22.3						Intersection LOS: C					
Intersection Capacity Utilization:	84.4%						ICU Level of Service E					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

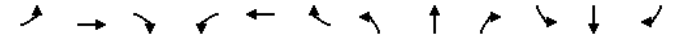
Queues <2028 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	222	1841	43	1010	135	127	157	130
w/c Ratio	0.86	0.82	0.70	0.56	0.67	0.39	0.75	0.36
Control Delay	86.1	10.0	117.2	12.6	65.7	34.0	72.2	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	86.1	10.0	117.2	12.6	65.7	34.0	72.2	15.8
Queue Length 50th (m)	52.0	36.7	11.7	50.4	32.9	19.4	38.8	6.6
Queue Length 95th (m)	m#72.7	#195.2	m#29.2	67.2	50.7	35.4	58.2	22.4
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2244	61	1810	297	456	306	487
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 w/c Ratio	0.80	0.82	0.70	0.56	0.45	0.28	0.51	0.27

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.

HCM Signalized Intersection Capacity Analysis <2028 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑		↑	↑		↑	↑	
Traffic Volume (vph)	204	1540	154	40	789	140	124	54	63	144	28	92
Future Volume (vph)	204	1540	154	40	789	140	124	54	63	144	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3374		1597	3419		1762	1786		1813	1729	
Fit Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3374		1597	3419		1250	1786		1289	1729	
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)	222	1674	167	43	858	152	135	59	68	157	30	100
RTOR Reduction (vph)	0	5	0	0	9	0	35	0	0	84	0	0
Lane Group Flow (vph)	222	1836	0	43	1001	0	135	92	0	157	46	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.2	85.7		4.0	68.5		21.2	21.2		21.2	21.2	
Effective Green, g (s)	21.2	85.7		4.0	68.5		21.2	21.2		21.2	21.2	
Actuated g/C Ratio	0.16	0.66		0.03	0.53		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	2224		49	1801		203	291		210	281	
v/s Ratio Prot	c0.14	c0.54		0.03	0.29			0.05			0.03	
v/s Ratio Perm							0.11			c0.12		
w/c Ratio	0.86	0.83		0.88	0.56		0.67	0.32		0.75	0.16	
Uniform Delay, d1	53.0	16.6		62.8	20.6		51.1	48.0		51.9	46.8	
Progression Factor	1.27	0.40		1.11	0.52		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.1	2.2		81.0	1.2		8.0	0.6		13.5	0.3	
Delay (s)	83.3	8.8		150.7	11.9		59.0	48.6		65.4	47.1	
Level of Service	F	A		F	B		E	D		E	D	
Approach Delay (s)		16.8			17.6			54.0			57.1	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay		22.9			HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)			19.1				
Intersection Capacity Utilization		84.4%			ICU Level of Service			E				
Analysis Period (min)		15										

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2028 Future Total>PM
10-18-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<2028 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	993	470	248	439	72	131	770	241	102	635	140
Future Volume (vph)	290	993	470	248	439	72	131	770	241	102	635	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.256			0.168		
Satd. Flow (perm)	1650	3461	1479	1687	3579	1485	481	3773	1543	353	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			127			192			150
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
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
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	315	1079	511	270	477	78	142	837	262	111	690	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	315	1079	511	270	477	78	142	837	262	111	690	152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2028 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effct Green (s)	27.8	42.8	51.9	22.0	35.0	35.0	51.1	40.0	42.8	51.1	40.0	40.0
Actuated g/C Ratio	0.21	0.33	0.40	0.17	0.27	0.27	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.87	0.95	0.80	0.93	0.50	0.16	0.59	0.72	0.41	0.55	0.61	0.27
Control Delay	63.5	45.7	31.1	91.9	43.0	1.7	37.5	44.3	11.6	35.2	41.2	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.5	45.7	31.1	91.9	43.0	1.7	37.5	44.3	11.6	35.2	41.2	6.5
LOS	E	D	C	F	D	A	D	D	B	D	D	A
Approach Delay	44.8			55.1			36.6			35.0		
Approach LOS	D			E			D			D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.95
 Intersection Signal Delay: 42.5 Intersection LOS: D
 Intersection Capacity Utilization 101.9% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2028 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	315	1079	511	270	477	78	142	837	262	111	690	152
v/c Ratio	0.87	0.95	0.80	0.93	0.50	0.16	0.59	0.72	0.41	0.55	0.61	0.27
Control Delay	63.5	45.7	31.1	91.9	43.0	1.7	37.5	44.3	11.6	35.2	41.2	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.5	45.7	31.1	91.9	43.0	1.7	37.5	44.3	11.6	35.2	41.2	6.5
Queue Length 50th (m)	69.3	152.9	116.4	69.1	55.7	0.0	22.7	100.4	12.6	17.3	79.3	0.4
Queue Length 95th (m)	m#98.0	#180.8	129.3	#120.4	73.7	2.4	37.2	123.1	34.9	29.5	99.5	15.6
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8	97.9	170.7	117.0	185.5		52.0	49.0			60.5	
Base Capacity (vph)	402	1139	640	289	962	492	240	1160	636	203	1124	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.95	0.80	0.93	0.50	0.16	0.59	0.72	0.41	0.55	0.61	0.27

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.

HCM Signalized Intersection Capacity Analysis
6: Liverpool Road & Kingston Road

<2028 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	290	993	470	248	439	72	131	770	241	102	635	140
Future Volume (vph)	290	993	470	248	439	72	131	770	241	102	635	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	3.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1804	3773	1543	2022	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.26	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	487	3773	1543	357	3654	1466
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)	315	1079	511	270	477	78	142	837	262	111	690	152
RTOR Reduction (vph)	0	0	48	0	0	57	0	0	129	0	0	104
Lane Group Flow (vph)	315	1079	463	270	477	21	142	837	133	111	690	48
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6	6	8		2	4		4
Actuated Green, G (s)	27.8	42.8	47.8	20.0	35.0	35.0	45.0	40.0	42.8	45.0	40.0	40.0
Effective Green, g (s)	27.8	42.8	47.8	22.0	35.0	35.0	45.0	40.0	42.8	45.0	40.0	40.0
Actuated g/C Ratio	0.21	0.33	0.37	0.17	0.27	0.27	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	1139	548	289	963	400	219	1160	508	187	1124	451
v/s Ratio Prot	c0.19	c0.31	c0.03	c0.16	0.13		0.02	c0.22		0.02	0.19	
v/s Ratio Perm			0.28			0.01	0.20		0.09	0.18		0.03
v/c Ratio	0.88	0.95	0.84	0.93	0.50	0.05	0.65	0.72	0.26	0.59	0.61	0.11
Uniform Delay, d1	49.4	42.5	37.7	53.3	40.1	35.2	34.9	40.0	32.0	31.2	38.4	32.2
Progression Factor	0.93	0.76	0.86	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.0	12.7	8.1	35.6	1.8	0.2	6.5	3.9	1.3	5.0	2.5	0.5
Delay (s)	60.8	45.1	40.7	88.9	41.9	35.5	41.4	43.9	33.3	36.2	40.9	32.7
Level of Service	E	D	D	F	D	D	D	D	C	D	D	C
Approach Delay (s)		46.5			56.7			41.4			39.1	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay		45.5			HCM 2000 Level of Service		D					
HCM 2000 Volume to Capacity ratio		0.87										
Actuated Cycle Length (s)		130.0			Sum of lost time (s)		22.2					
Intersection Capacity Utilization		101.9%			ICU Level of Service		G					
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings

8: Liverpool Road & Private Access/Pickering Parkway

<2028 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	832	401	196	1090	46
Future Volume (vph)	87	69	130	412	58	174	116	832	401	196	1090	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			0.99		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950		0.950			0.950
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.153		0.247			
Satd. Flow (perm)	0	2959	0	0	1858	1399	263	5085	1502	441	5079	1482
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		141				189		436				144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	95	75	141	448	63	189	126	904	436	213	1185	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	216	0	448	63	189	126	904	436	213	1185	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

<2028 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

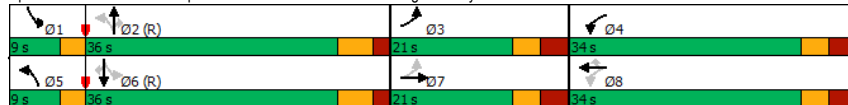


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0
Minimum Split (s)	15.0	15.0		34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	21.0	21.0		34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0
Total Split (%)	21.0%	21.0%		34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4		27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				20	20		28	28		15	15	
Act Effect Green (s)	11.0	11.0		20.9	20.9	20.9	48.9	39.6	39.6	48.9	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.49	0.40	0.40	0.49	0.40	0.40
v/c Ratio	0.51	0.48		0.67	0.16	0.43	0.60	0.45	0.51	0.73	0.59	0.07
Control Delay	51.0	18.9		40.8	31.2	7.5	27.4	22.3	9.0	35.4	26.8	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9		40.8	31.2	7.5	27.4	22.3	9.0	35.4	26.8	0.2
LOS	D	B		D	C	A	C	C	A	D	C	A
Approach Delay	28.7			31.0			18.8			27.1		
Approach LOS	C			C			B			C		

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	24.8
Intersection Capacity Utilization:	68.8%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<2028 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	95	216	448	63	189	126	904	436	213	1185	50
v/c Ratio	0.51	0.48	0.67	0.16	0.43	0.60	0.45	0.51	0.73	0.59	0.07
Control Delay	51.0	18.9	40.8	31.2	7.5	27.4	22.3	9.0	35.4	26.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9	40.8	31.2	7.5	27.4	22.3	9.0	35.4	26.8	0.2
Queue Length 50th (m)	17.7	7.1	42.3	10.3	0.0	14.7	49.5	26.0	20.8	62.8	0.0
Queue Length 95th (m)	32.2	17.3	52.8	19.3	15.9	m#37.7	71.2	53.7	#59.7	92.9	0.0
Internal Link Dist (m)	58.8		304.5			138.3			233.7		
Turn Bay Length (m)			57.0		62.1	54.4	75.7		132.5	35.5	
Base Capacity (vph)	245	546	877	509	520	211	2012	857	291	2010	673
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.40	0.51	0.12	0.36	0.60	0.45	0.51	0.73	0.59	0.07

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2028 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	832	401	196	1090	46
Future Volume (vph)	87	69	130	412	58	174	116	832	401	196	1090	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2931		3204	1858	1399	1643	5085	1503	1705	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.15	1.00	1.00	0.25	1.00	1.00
Satd. Flow (perm)	0	2931		0	1858	1399	264	5085	1503	444	5079	1485
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)	95	75	141	448	63	189	126	904	436	213	1185	50
RTOR Reduction (vph)	0	125	0	0	0	149	0	0	263	0	0	30
Lane Group Flow (vph)	95	91	0	448	63	40	126	904	173	213	1185	20
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Effective Green, g (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	322		669	388	292	203	2013	595	278	2011	588
v/s Ratio Prot	c0.06	0.03		c0.14	0.03		0.04	0.18		c0.05	0.23	
v/s Ratio Perm						0.03	0.25		0.11	c0.30		0.01
v/c Ratio	0.51	0.28		0.67	0.16	0.14	0.62	0.45	0.29	0.77	0.59	0.03
Uniform Delay, d1	41.9	40.9		36.4	32.4	32.2	17.3	22.2	20.6	19.2	23.8	18.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.93	0.91	2.43	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.5		2.6	0.2	0.2	5.4	0.7	1.1	11.9	1.3	0.1
Delay (s)	44.1	41.3		38.9	32.6	32.4	21.4	20.8	51.3	31.1	25.1	18.6
Level of Service	D	D		D	C	C	C	C	D	C	C	B
Approach Delay (s)		42.2			36.6			30.0			25.7	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		30.6										C
HCM 2000 Volume to Capacity ratio		0.70										
Actuated Cycle Length (s)		100.0						22.5				
Intersection Capacity Utilization		68.8%										C
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	221	278	263	293	76	1058	0	0	1016	88
Future Volume (vph)	0	0	221	278	263	293	76	1058	0	0	1016	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1		1	1	0	0		0		1
Taper Length (m)	2.5			2.5		30.0				2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865		0.850							0.850
Flt Protected				0.950	0.995		0.950					
Satd. Flow (prot)	0	0	1662	1734	1816	1581	1825	5079	0	0	4972	1633
Flt Permitted				0.950	0.995		0.161					
Satd. Flow (perm)	0	0	1662	1734	1816	1581	309	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes			Yes		Yes
Satd. Flow (RTOR)					85							96
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4			226.7		372.2				162.3	
Travel Time (s)		27.3			16.3		26.8				11.7	
Confl. Peds. (#/hr)							17			15	15	17
Confl. Bikes (#/hr)							6					7
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
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	240	302	286	318	83	1150	0	0	1104	96
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	0	240	272	316	318	83	1150	0	0	1104	96
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7		3.7				3.7	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<2028 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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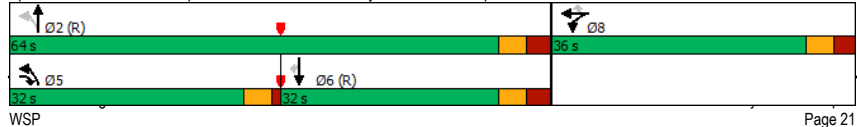


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8			5	2			6
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			32.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)			32.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)			27.5	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	C-Max	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		14			7	7
Act Effct Green (s)			19.6	23.3	23.3	23.3	66.2	64.4			40.3	40.3
Actuated g/C Ratio			0.20	0.23	0.23	0.23	0.66	0.64			0.40	0.40
v/c Ratio			0.74	0.67	0.75	0.74	0.17	0.35			0.55	0.14
Control Delay			50.7	42.9	46.4	35.6	8.0	9.2			25.9	12.3
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			50.7	42.9	46.4	35.6	8.0	9.2			25.9	12.3
LOS			D	D	D	D	A	A			C	B
Approach Delay			50.7			41.5		9.1			24.9	
Approach LOS			D			D		A			C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 25.4 Intersection LOS: C
 Intersection Capacity Utilization 61.9% ICU Level of Service B
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2028 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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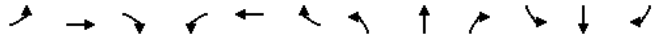
Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	240	272	316	318	83	1150	1104	96
v/c Ratio	0.74	0.67	0.75	0.74	0.17	0.35	0.55	0.14
Control Delay	50.7	42.9	46.4	35.6	8.0	9.2	25.9	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	42.9	46.4	35.6	8.0	9.2	25.9	12.3
Queue Length 50th (m)	44.0	50.5	60.0	42.1	5.2	34.2	39.4	1.3
Queue Length 95th (m)	64.1	72.1	83.1	66.2	12.4	51.0	82.0	m13.1
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	544	533	621	3272	2003	665
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	0.53	0.52	0.58	0.60	0.13	0.35	0.55	0.14

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2028 Future Total>PM
 10-18-2023

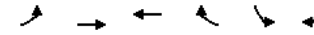


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↑	↑	↑	↑	↑	↑			↑	↑
Traffic Volume (vph)	0	0	221	278	263	293	76	1058	0	0	1016	88
Future Volume (vph)	0	0	221	278	263	293	76	1058	0	0	1016	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.93
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1816	1581	1824	5079			4972	1515
Flt Permitted			1.00	0.95	1.00	1.00	0.16	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1816	1581	309	5079			4972	1515
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	0	240	302	286	318	83	1150	0	0	1104	96
RTOR Reduction (vph)	0	0	0	0	0	65	0	0	0	0	0	57
Lane Group Flow (vph)	0	0	240	272	316	253	83	1150	0	0	1104	39
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			19.6	23.3	23.3	23.3	64.4	64.4			40.3	40.3
Effective Green, g (s)			19.6	23.3	23.3	23.3	64.4	64.4			40.3	40.3
Actuated g/C Ratio			0.20	0.23	0.23	0.23	0.64	0.64			0.40	0.40
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			325	404	423	368	495	3270			2003	610
v/s Ratio Prot			c0.14	0.16	c0.17		0.03	0.23			c0.22	
v/s Ratio Perm						0.16	0.07					0.03
v/c Ratio			0.74	0.67	0.75	0.69	0.17	0.35			0.55	0.06
Uniform Delay, d1			37.8	34.9	35.6	35.0	8.1	8.2			22.9	18.3
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.99	2.02
Incremental Delay, d2			8.5	4.4	7.1	5.3	0.2	0.3			0.9	0.2
Delay (s)			46.3	39.3	42.7	40.3	8.3	8.5			23.5	37.2
Level of Service			D	D	D	D	A	A			C	D
Approach Delay (s)		46.3			40.8			8.5			24.6	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2028 Future Total>PM
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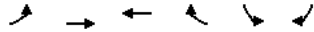
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↑	↑	↑	↑	↑	↑	
Traffic Volume (vph)	205	1674	789	223	271	137	
Future Volume (vph)	205	1674	789	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00				0.99
Frt			0.967				0.850
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3349	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3349	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)				38		149	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	223	1820	858	242	295	149	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	223	1820	1100	0	295	149	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2028 Future Total>PM

10: Kingston Road & Fairport Road

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.6	86.1	67.3		25.5	25.5	
Actuated g/C Ratio	0.16	0.66	0.52		0.20	0.20	
v/c Ratio	0.87	0.80	0.63		0.84	0.32	
Control Delay	82.7	4.6	15.6		70.3	8.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	82.7	4.6	15.6		70.3	8.1	
LOS	F	A	B		E	A	
Approach Delay	13.1		15.6		49.4		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 18.4

Intersection LOS: B

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2028 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023



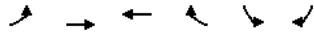
Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	223	1820	1100	295	149
v/c Ratio	0.87	0.80	0.63	0.84	0.32
Control Delay	82.7	4.6	15.6	70.3	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	82.7	4.6	15.6	70.3	8.1
Queue Length 50th (m)	50.5	6.7	116.0	72.7	0.0
Queue Length 95th (m)	m50.1	m8.0	115.8	102.0	16.9
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0			15.5	
Base Capacity (vph)	273	2274	1752	416	518
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	0.82	0.80	0.63	0.71	0.29

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2028 Future Total>PM
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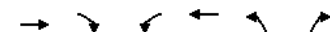


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔		↔	↔
Traffic Volume (vph)	205	1674	789	223	271	137
Future Volume (vph)	205	1674	789	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3349		1805	1751
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3349		1805	1751
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	1820	858	242	295	149
RTOR Reduction (vph)	0	0	18	0	0	120
Lane Group Flow (vph)	223	1820	1082	0	295	29
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.6	84.9	67.3		25.5	25.5
Effective Green, g (s)	20.6	84.9	67.3		25.5	25.5
Actuated g/C Ratio	0.16	0.65	0.52		0.20	0.20
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	256	2242	1733		354	343
v/s Ratio Prot	c0.14	c0.53	0.32		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.87	0.81	0.62		0.83	0.09
Uniform Delay, d1	53.4	16.7	22.3		50.2	42.7
Progression Factor	1.35	0.19	0.62		1.00	1.00
Incremental Delay, d2	9.4	1.0	1.5		15.4	0.1
Delay (s)	81.7	4.2	15.3		65.6	42.8
Level of Service	F	A	B		E	D
Approach Delay (s)		12.7	15.3		57.9	
Approach LOS		B	B		E	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

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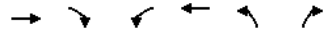
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔		↔	↔↔	↔↔	↔
Traffic Volume (vph)	1723	23	184	741	662	154
Future Volume (vph)	1723	23	184	741	662	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					129
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1873	25	200	805	720	167
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1898	0	200	805	720	167
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings

<2028 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023

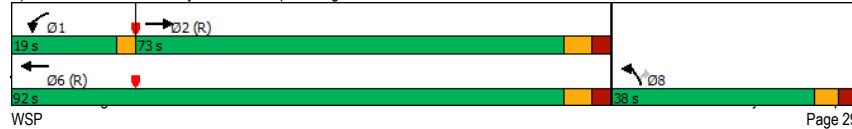


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	67.4		16.0	86.4	29.7	29.7
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
v/c Ratio	1.02		1.03	0.33	0.89	0.36
Control Delay	38.2		105.3	26.0	62.5	13.6
Queue Delay	0.9		0.0	0.0	0.0	0.0
Total Delay	39.1		105.3	26.0	62.5	13.6
LOS	D		F	C	E	B
Approach Delay	39.1			41.7	53.3	
Approach LOS	D			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 135
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.03
 Intersection Signal Delay: 43.1
 Intersection LOS: D
 Intersection Capacity Utilization 93.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road

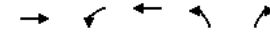


Queues

<2028 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

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Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1898	200	805	720	167
v/c Ratio	1.02	1.03	0.33	0.89	0.36
Control Delay	38.2	105.3	26.0	62.5	13.6
Queue Delay	0.9	0.0	0.0	0.0	0.0
Total Delay	39.1	105.3	26.0	62.5	13.6
Queue Length 50th (m)	-273.3	-54.8	106.1	91.1	7.6
Queue Length 95th (m)	#316.8	#103.9	121.8	#114.7	26.4
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1855	194	2404	853	481
Starvation Cap Reductn	5	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.03	1.03	0.33	0.84	0.35

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.

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2028 Future Total>PM
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	→	↖	↙	←	↘	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1723	23	184	741	662	154
Future Volume (vph)	1723	23	184	741	662	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1873	25	200	805	720	167
RTOR Reduction (vph)	0	0	0	0	0	100
Lane Group Flow (vph)	1898	0	200	805	720	67
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	67.4		16.0	86.4	29.7	29.7
Effective Green, g (s)	67.4		16.0	86.4	29.7	29.7
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1854		194	2404	809	363
v/s Ratio Prot	c0.53		c0.13	0.22	c0.20	
v/s Ratio Perm						0.04
v/c Ratio	1.02		1.03	0.33	0.89	0.19
Uniform Delay, d1	31.3		57.0	9.4	48.6	40.4
Progression Factor	0.44		0.64	2.65	1.00	1.00
Incremental Delay, d2	22.0		66.8	0.3	11.8	0.2
Delay (s)	35.9		103.4	25.2	60.3	40.7
Level of Service	D		F	C	E	D
Approach Delay (s)	35.9			40.8	56.6	
Approach LOS	D			D	E	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2028 Future Total>PM
10-18-2023

	↖	→	↙	↘	←	↖	↙	↘	↗	↖	↙	↘	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↑↑		↖	↑↑		↖	↙	↘	↖	↙	↘	
Traffic Volume (vph)	130	1594	38	89	1200	121	198	15	138	82	13	143	
Future Volume (vph)	130	1594	38	89	1200	121	198	15	138	82	13	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7	
Grade (%)		6%			0%			0%				0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	35.3			2.5			2.5			2.5			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		1.00			0.99		1.00					0.99	
Frt		0.997			0.986			0.864				0.862	
Fit Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1656	3346	0	1705	3399	0	1770	1824	0	1725	1474	0	
Fit Permitted	0.101			0.055			0.630			0.637			
Satd. Flow (perm)	176	3346	0	99	3399	0	1172	1824	0	1157	1474	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		3			13			88				136	
Link Speed (k/h)		60			60			30				40	
Link Distance (m)		222.7			268.7			130.9				169.9	
Travel Time (s)		13.4			16.1			15.7				15.3	
Confl. Peds. (#/hr)	16		1	1		16	1					1	
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	
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	141	1733	41	97	1304	132	215	16	150	89	14	155	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	141	1774	0	97	1436	0	215	166	0	89	169	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.6				3.6	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		1.6			1.6			1.6				1.6	
Two way Left Turn Lane					Yes								
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Number of Detectors	1	2			2		1	2		1	2		
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru		
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6		
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		

Lanes, Volumes, Timings

<2028 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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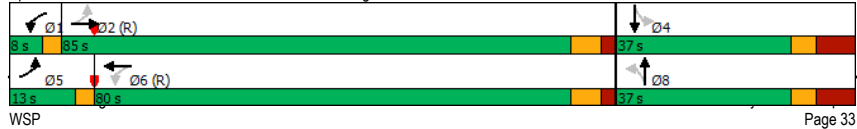


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	91.0	79.3		84.4	75.5		25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.70	0.61		0.65	0.58		0.20	0.20		0.20	0.20	
v/c Ratio	0.63	0.87		0.77	0.73		0.93	0.38		0.39	0.42	
Control Delay	21.0	16.8		64.2	17.2		93.7	23.7		50.3	14.8	
Queue Delay	0.0	3.8		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.0	20.7		64.2	17.2		93.7	23.7		50.3	14.8	
LOS	C	C		E	B		F	C		D	B	
Approach Delay		20.7			20.1			63.2			27.1	
Approach LOS		C			C			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 24.9 Intersection LOS: C
 Intersection Capacity Utilization 97.0% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

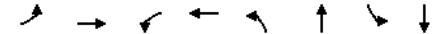


Queues

<2028 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	1774	97	1436	215	166	89	169
v/c Ratio	0.63	0.87	0.77	0.73	0.93	0.38	0.39	0.42
Control Delay	21.0	16.8	64.2	17.2	93.7	23.7	50.3	14.8
Queue Delay	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.0	20.7	64.2	17.2	93.7	23.7	50.3	14.8
Queue Length 50th (m)	14.9	124.4	9.2	202.5	54.0	16.7	19.7	6.9
Queue Length 95th (m)	m15.9	m120.4	m#25.0	225.2	#99.2	37.2	36.4	27.1
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	237	2042	126	1978	243	448	240	413
Starvation Cap Reductn	0	48	0	0	0	0	0	0
Spillback Cap Reductn	0	197	0	0	0	4	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.96	0.77	0.73	0.88	0.37	0.37	0.41

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2028 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Traffic Volume (vph)	130	1594	38	89	1200	121	198	15	138	82	13	143
Future Volume (vph)	130	1594	38	89	1200	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3345	1705	3400	1768	1825	1725	1475	1725	1475	1725	1475
Fit Permitted	0.10	1.00	0.05	1.00	0.63	1.00	0.64	1.00	0.64	1.00	0.64	1.00
Satd. Flow (perm)	177	3345	98	3400	1173	1825	1157	1475	1157	1475	1157	1475
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)	141	1733	41	97	1304	132	215	16	150	89	14	155
RTOR Reduction (vph)	0	1	0	0	5	0	0	71	0	0	109	0
Lane Group Flow (vph)	141	1773	0	97	1431	0	215	95	0	89	60	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	4	4
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	87.3	79.3	80.5	75.5	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Effective Green, g (s)	87.3	79.3	80.5	75.5	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Actuated g/C Ratio	0.67	0.61	0.62	0.58	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	218	2040	122	1974	232	362	229	292	229	292	229	292
v/s Ratio Prot	c0.04	c0.53	c0.03	0.42	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04
v/s Ratio Perm	0.39		0.46		c0.18		0.08		0.08			
v/c Ratio	0.65	0.87	0.80	0.72	0.93	0.26	0.39	0.21	0.39	0.21	0.39	0.21
Uniform Delay, d1	16.3	21.0	22.6	19.7	51.2	44.1	45.3	43.5	45.3	43.5	45.3	43.5
Progression Factor	1.60	0.67	1.77	0.75	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.4	2.0	24.8	2.0	39.1	0.4	1.1	0.4	1.1	0.4	1.1	0.4
Delay (s)	28.4	16.1	64.8	16.7	90.3	44.5	46.3	43.9	46.3	43.9	46.3	43.9
Level of Service	C	B	E	B	F	D	D	D	D	D	D	D
Approach Delay (s)	17.1		19.7		70.3		44.7		44.7		44.7	
Approach LOS	B		B		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2028 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	262	763	492	228	684	684	191	617	186
Future Volume (vph)	155	941	358	262	763	492	228	684	684	191	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0		39.6			66.8			32.6			
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Fit Protected	0.950		0.950			0.950		0.950		0.950		0.950
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950		0.950			0.329		0.290		0.290		0.290
Satd. Flow (perm)	1638	3400	1549	1719	3579	1502	604	5255	1470	523	5105	1550
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	162		146		146		59		59		202	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2		385.2		385.2	
Travel Time (s)	17.9		13.4		9.5		23.1		23.1		23.1	
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
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
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Adj. Flow (vph)	168	1023	389	285	829	535	248	743	743	208	671	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	1023	389	285	829	535	248	743	743	208	671	202
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2028 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	29.0		29.0	29.0		29.0	33.0		33.0		33.0	33.0
Pedestrian Calls (#/hr)	13		13	38		38	20		20		20	20
Act Effect Green (s)	14.7	39.2	39.2	24.4	48.9	48.9	50.4	40.0	69.8	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.30	0.30	0.19	0.38	0.38	0.39	0.31	0.54	0.39	0.31	0.31
v/c Ratio	0.89	1.00	0.67	0.88	0.62	0.82	0.89	0.46	0.89	0.84	0.43	0.33
Control Delay	98.3	73.1	29.5	86.1	19.0	19.3	66.6	37.4	36.9	59.7	36.9	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	73.1	29.5	86.1	19.0	19.3	66.6	37.4	36.9	59.7	36.9	5.8
LOS	F	E	C	F	B	B	E	D	D	E	D	A
Approach Delay	65.0			30.7			41.4			35.5		
Approach LOS	E			C			D			D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 43.6

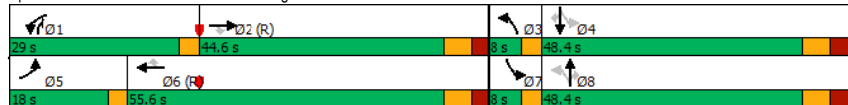
Intersection Capacity Utilization 110.0%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service H

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2028 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	168	1023	389	285	829	535	248	743	743	208	671	202
v/c Ratio	0.89	1.00	0.67	0.88	0.62	0.82	0.89	0.46	0.89	0.84	0.43	0.33
Control Delay	98.3	73.1	29.5	86.1	19.0	19.3	66.6	37.4	36.9	59.7	36.9	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	73.1	29.5	86.1	19.0	19.3	66.6	37.4	36.9	59.7	36.9	5.8
Queue Length 50th (m)	42.9	~148.8	52.5	66.0	42.0	16.5	43.0	56.2	133.4	35.2	50.2	0.0
Queue Length 95th (m)	#82.5	#190.0	89.4	m#108.1	m79.9	m#113.5	#85.3	68.7	#206.2	#69.3	62.1	17.2
Internal Link Dist (m)	273.5		198.7		134.6		361.2					
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	193	1025	580	346	1345	655	278	1616	857	249	1570	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.00	0.67	0.82	0.62	0.82	0.89	0.46	0.87	0.84	0.43	0.33

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2028 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	262	763	492	228	684	684	191	617	186
Future Volume (vph)	155	941	358	262	763	492	228	684	684	191	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.95	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1760	5255	1515	1741	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.33	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	610	5255	1515	531	5105	1550
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)	168	1023	389	285	829	535	248	743	743	208	671	202
RTOR Reduction (vph)	0	0	113	0	0	91	0	0	30	0	0	140
Lane Group Flow (vph)	168	1023	276	285	829	444	248	743	713	208	671	62
Confl. Peds. (#/hr)	75	31	31	75	37	65	65	65	65	65	65	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.7	39.2	39.2	24.4	48.9	48.9	45.0	40.0	64.4	45.0	40.0	40.0
Effective Green, g (s)	14.7	39.2	39.2	24.4	48.9	48.9	45.0	40.0	64.4	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.30	0.30	0.19	0.38	0.38	0.35	0.31	0.50	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	190	1025	467	325	1346	564	255	1616	750	230	1570	476
v/s Ratio Prot	0.10	c0.30		0.16	0.23		c0.04	0.14	c0.18	0.03	0.13	
v/s Ratio Perm			0.18			0.30	c0.30		0.29	0.28		0.04
v/c Ratio	0.88	1.00	0.59	0.88	0.62	0.79	0.97	0.46	0.95	0.90	0.43	0.13
Uniform Delay, d1	56.8	45.4	38.6	51.3	32.9	35.9	40.5	36.3	31.3	39.0	35.9	32.5
Progression Factor	1.00	1.00	1.00	1.30	0.53	0.42	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.0	27.6	5.4	16.4	1.4	7.5	48.4	0.9	21.6	34.5	0.9	0.6
Delay (s)	91.8	73.0	44.0	83.2	18.8	22.4	88.9	37.2	52.9	73.5	36.7	33.0
Level of Service	F	E	D	F	B	C	F	D	D	E	D	C
Approach Delay (s)	67.9			31.1			51.3			43.1		
Approach LOS	E			C			D			D		
Intersection Summary												
HCM 2000 Control Delay	48.7		HCM 2000 Level of Service				D					
HCM 2000 Volume to Capacity ratio	0.98											
Actuated Cycle Length (s)	130.0		Sum of lost time (s)				21.4					
Intersection Capacity Utilization	110.0%		ICU Level of Service				H					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Total>PM
10-18-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1207	589	0	847	564	0
Future Volume (vph)	1207	589	0	847	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3450	1427	0	3539	3618	0
Fit Permitted	0.954					
Satd. Flow (perm)	3450	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	121				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1312	640	0	921	613	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1376	576	0	921	613	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2028 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

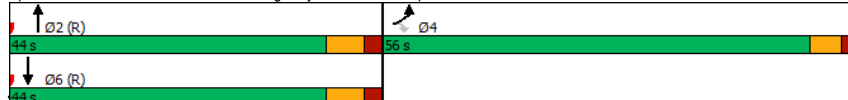


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	47.2	47.2		40.6	40.6	
Actuated g/C Ratio	0.47	0.47		0.41	0.41	
v/c Ratio	0.84	0.79		0.64	0.42	
Control Delay	28.5	26.1		27.1	23.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	28.5	26.1		27.1	23.0	
LOS	C	C		C	C	
Approach Delay	27.8			27.1	23.0	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 26.8
 Intersection LOS: C
 Intersection Capacity Utilization 74.2%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2028 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1376	576	921	613
v/c Ratio	0.84	0.79	0.64	0.42
Control Delay	28.5	26.1	27.1	23.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	28.5	26.1	27.1	23.0
Queue Length 50th (m)	112.7	78.6	75.6	44.8
Queue Length 95th (m)	135.5	125.6	100.4	61.7
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1745	768	1438	1470
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.79	0.75	0.64	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2028 Future Total>PM
 10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↑↑	↑↑	
Traffic Volume (vph)	1207	589	0	847	564	0
Future Volume (vph)	1207	589	0	847	564	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3452	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3452	1404		3539	3618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1312	640	0	921	613	0
RTOR Reduction (vph)	4	64	0	0	0	0
Lane Group Flow (vph)	1372	512	0	921	613	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	47.2	47.2		40.6	40.6	
Effective Green, g (s)	47.2	47.2		40.6	40.6	
Actuated g/C Ratio	0.47	0.47		0.41	0.41	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1629	662		1436	1468	
v/s Ratio Prot	c0.40			c0.26	0.17	
v/s Ratio Perm		0.36				
v/c Ratio	0.84	0.77		0.64	0.42	
Uniform Delay, d1	23.1	22.0		23.9	21.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	5.6		2.2	0.9	
Delay (s)	27.3	27.6		26.1	22.1	
Level of Service	C	C		C	C	
Approach Delay (s)	27.4			26.1	22.1	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		26.1		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.75				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		74.2%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

APPENDIX

H-2 2033 FUTURE TOTAL CONDITIONS

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2033 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.990			0.992			0.854			0.850	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3423	0	1652	3390	0	1745	1537	0	1725	1534	0
Fit Permitted	0.950			0.950			0.736			0.163		
Satd. Flow (perm)	1677	3423	0	1643	3390	0	1337	1537	0	296	1534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			6			287			359	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	857	61	111	487	27	241	10	398	15	0	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	918	0	111	514	0	241	408	0	15	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

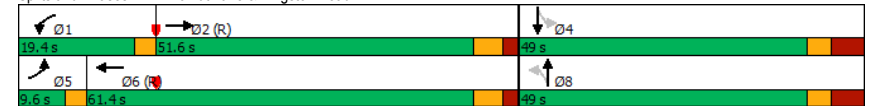
<2033 Future Total>AM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	61.4		13.3	71.1		27.5	27.5		27.5	27.5	
Actuated g/C Ratio	0.06	0.51		0.11	0.59		0.23	0.23		0.23	0.23	
v/c Ratio	0.22	0.52		0.61	0.26		0.79	0.71		0.22	0.05	
Control Delay	70.1	15.4		80.8	8.2		60.9	18.9		42.4	0.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.1	15.4		80.8	8.2		60.9	18.9		42.4	0.1	
LOS	E	B		F	A		E	B		D	A	
Approach Delay		16.7			21.1			34.5			13.6	
Approach LOS		B			C			C			B	

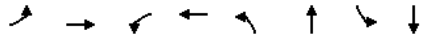
Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 23.0 Intersection LOS: C
 Intersection Capacity Utilization 68.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2033 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	918	111	514	241	408	15	32
w/c Ratio	0.22	0.52	0.61	0.26	0.79	0.71	0.22	0.05
Control Delay	70.1	15.4	80.8	8.2	60.9	18.9	42.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.1	15.4	80.8	8.2	60.9	18.9	42.4	0.1
Queue Length 50th (m)	5.4	35.6	27.2	13.0	53.8	25.3	2.9	0.0
Queue Length 95th (m)	m11.7	87.1	46.2	26.6	74.6	54.7	8.6	0.0
Internal Link Dist (m)		105.3	670.6		100.5	155.7		
Turn Bay Length (m)	26.0		37.0		63.2	18.5		
Base Capacity (vph)	104	1756	231	2010	454	712	100	758
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 w/c Ratio	0.21	0.52	0.48	0.26	0.53	0.57	0.15	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <2033 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6	3.0	6.6	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.98	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1685	3423	1652	3391	1726	1536	1723	1534	1723	1534	1723	1534
Fit Permitted	0.95	1.00	0.95	1.00	0.74	1.00	0.16	1.00	0.16	1.00	0.16	1.00
Satd. Flow (perm)	1685	3423	1652	3391	1338	1536	296	1534	296	1534	296	1534
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)	22	857	61	111	487	27	241	10	398	15	0	32
RTOR Reduction (vph)	0	3	0	0	3	0	221	0	0	25	0	0
Lane Group Flow (vph)	22	915	0	111	511	0	241	187	0	15	7	0
Confl. Peds. (#/hr)	4	8	8	4	9	2	2	2	2	2	2	9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6			8					4
Permitted Phases					8					4		
Actuated Green, G (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Effective Green, g (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Actuated g/C Ratio	0.04	0.51	0.11	0.58	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	6.6	3.0	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	67	1751	183	1975	306	352	67	351	67	351	67	351
v/s Ratio Prot	0.01	c0.27	c0.07	0.15			0.12			0.00		
v/s Ratio Perm					c0.18				0.05			
w/c Ratio	0.33	0.52	0.61	0.26	0.79	0.53	0.22	0.02	0.22	0.02	0.22	0.02
Uniform Delay, d1	56.0	19.5	50.9	12.3	43.5	40.6	37.6	35.8	37.6	35.8	37.6	35.8
Progression Factor	1.23	0.66	1.35	0.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	1.0	5.2	0.3	12.6	1.5	1.7	0.0	1.7	0.0	1.7	0.0
Delay (s)	71.5	14.0	73.9	7.4	56.1	42.1	39.3	35.8	39.3	35.8	39.3	35.8
Level of Service	E	B	E	A	E	D	D	D	D	D	D	D
Approach Delay (s)		15.3		19.2		47.3		36.9		36.9		36.9
Approach LOS		B		B		D		D		D		D

Intersection Summary

HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2033 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	837	162	0	755	0	34
Future Volume (vph)	837	162	0	755	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3433	1516	0	3400	0	1808
Fit Permitted						
Satd. Flow (perm)	3433	1516	0	3400	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	5%	2%	0%
Adj. Flow (vph)	910	176	0	821	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	910	176	0	821	0	37
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.1%
Analysis Period (min) 15
ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2033 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	837	162	0	755	0	34
Future Volume (Veh/h)	837	162	0	755	0	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	910	176	0	821	0	37
Pedestrians						4
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.87		0.90	0.87
vC, conflicting volume			914		1324	459
vC1, stage 1 conf vol					914	
vC2, stage 2 conf vol					410	
vCu, unblocked vol			599		813	75
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			842		419	846

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	455	455	176	410	410	37
Volume Left	0	0	0	0	0	0
Volume Right	0	0	176	0	0	37
cSH	1700	1700	1700	1700	1700	846
Volume to Capacity	0.27	0.27	0.10	0.24	0.24	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.5
Lane LOS						A
Approach Delay (s)	0.0			0.0		9.5
Approach LOS						A

Intersection Summary

Average Delay 0.2
Intersection Capacity Utilization 33.1%
Analysis Period (min) 15
ICU Level of Service A

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Frt	0.987		0.980		0.900		0.879					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1564	3320	0	1645	3301	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950			0.950			0.551			0.726		
Satd. Flow (perm)	1554	3320	0	1640	3301	0	1014	1769	0	1393	1759	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			17			32			157	
Link Speed (k/h)	60		60		40		60					
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	914	88	85	640	96	66	16	32	162	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1002	0	85	736	0	66	48	0	162	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		4.9					
Link Offset(m)	0.0		0.0		0.0		4.9					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

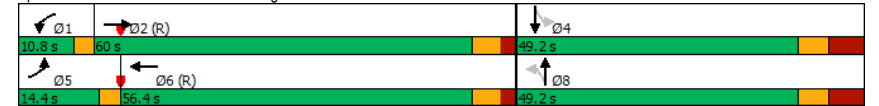
<2033 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	8		4		8		8		4		4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	6		1		7		7		4		4	
Act Effect Green (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.09	0.61		0.06	0.59		0.17	0.17		0.17	0.17	
v/c Ratio	0.65	0.49		0.80	0.38		0.39	0.15		0.70	0.46	
Control Delay	75.4	15.0		96.6	11.2		49.2	19.3		62.0	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	15.0		96.6	11.2		49.2	19.3		62.0	13.7	
LOS	E	B		F	B		D	B		E	B	
Approach Delay	19.8		20.1		36.6		35.6					
Approach LOS	B		C		D		D					

Intersection Summary

Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	112.8 (94%), 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:	23.1
Intersection LOS:	C
Intersection Capacity Utilization:	73.8%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 3: Dixie Road & Kingston Road

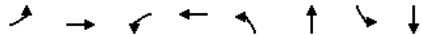


Queues

<2033 Future Total>AM

3: Dixie Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	1002	85	736	66	48	162	195
w/c Ratio	0.65	0.49	0.80	0.38	0.39	0.15	0.70	0.46
Control Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Length 50th (m)	20.0	63.4	18.8	44.4	14.1	3.2	36.6	7.8
Queue Length 95th (m)	#39.1	99.4	#48.0	50.7	25.3	12.4	53.8	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2026	106	1949	335	606	460	686
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 w/c Ratio	0.59	0.49	0.80	0.38	0.20	0.08	0.35	0.28

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<2033 Future Total>AM

3: Dixie Road & Kingston Road

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3319		1645	3302		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.55	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3319		1645	3302		1014	1769		1392	1760	
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)	87	914	88	85	640	96	66	16	32	162	38	157
RTOR Reduction (vph)	0	4	0	0	7	0	0	27	0	0	131	0
Lane Group Flow (vph)	87	998	0	85	729	0	66	21	0	162	64	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Effective Green, g (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.09	0.61		0.06	0.59		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2021		106	1942		169	294		232	293	
v/s Ratio Prot	0.06	c0.30		c0.05	0.22			0.01			0.04	
v/s Ratio Perm							0.07			c0.12		
w/c Ratio	0.65	0.49		0.80	0.38		0.39	0.07		0.70	0.22	
Uniform Delay, d1	53.1	13.1		55.3	13.1		44.6	42.2		47.2	43.2	
Progression Factor	1.00	1.00		0.92	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.9		33.0	0.5		1.5	0.1		8.8	0.4	
Delay (s)	63.5	14.0		84.0	10.5		46.1	42.3		56.0	43.6	
Level of Service	E	B		F	B		D	D		E	D	
Approach Delay (s)		17.9			18.1			44.5			49.2	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2033 Future Total>AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	257	469	396	167	334	42	115	361	125	76	687	176
Future Volume (vph)	257	469	396	167	334	42	115	361	125	76	687	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.253			0.520		
Satd. Flow (perm)	1636	3362	1511	1674	3510	1530	475	3700	1513	1093	3618	1522
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)			160			137			136			191
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	279	510	430	182	363	46	125	392	136	83	747	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	510	430	182	363	46	125	392	136	83	747	191
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2033 Future Total>AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	21.7	36.9	36.9	14.0	29.2	29.2	53.6	43.5	36.9	53.0	41.9	41.9
Actuated g/C Ratio	0.18	0.31	0.31	0.12	0.24	0.24	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.47	0.29	0.24	0.16	0.59	0.29
Control Delay	72.6	32.6	30.0	99.9	40.2	0.4	25.6	28.5	6.2	18.7	34.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.0	99.9	40.2	0.4	25.6	28.5	6.2	18.7	34.4	5.0
LOS	E	C	C	F	D	A	C	C	A	B	C	A
Approach Delay		40.8			55.5			23.3				27.6
Approach LOS		D			E			C				C

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 36.2

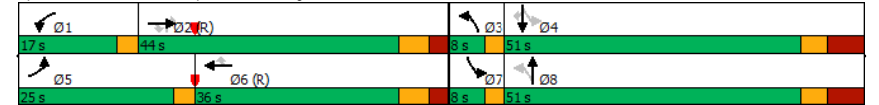
Intersection LOS: D

Intersection Capacity Utilization 97.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2033 Future Total>AM
6: Liverpool Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	279	510	430	182	363	46	125	392	136	83	747	191
w/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.47	0.29	0.24	0.16	0.59	0.29
Control Delay	72.6	32.6	30.0	99.9	40.2	0.4	25.6	28.5	6.2	18.7	34.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.0	99.9	40.2	0.4	25.6	28.5	6.2	18.7	34.4	5.0
Queue Length 50th (m)	66.6	56.3	70.0	43.1	38.3	0.0	16.5	35.1	0.0	10.6	75.4	0.0
Queue Length 95th (m)	#112.0	73.6	100.0	#85.8	52.8	0.0	28.1	47.6	13.9	19.7	95.2	15.1
Internal Link Dist (m)		670.6		372.4			233.7			324.6		
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1033	575	197	855	476	266	1340	559	521	1263	655
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.92	0.49	0.75	0.92	0.42	0.10	0.47	0.29	0.24	0.16	0.59	0.29

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2033 Future Total>AM
6: Liverpool Road & Kingston Road 10-18-2023



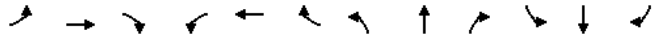
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔	↔	↔	↔↔	↔	↔↔	↔	↔	↔	↔↔	↔
Traffic Volume (vph)	257	469	396	167	334	42	115	361	125	76	687	176
Future Volume (vph)	257	469	396	167	334	42	115	361	125	76	687	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1790	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.25	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	477	3700	1513	1102	3618	1522
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)	279	510	430	182	363	46	125	392	136	83	747	191
RTOR Reduction (vph)	0	0	112	0	0	35	0	0	95	0	0	123
Lane Group Flow (vph)	279	510	318	182	363	11	125	392	41	83	747	68
Confl. Peds. (#/hr)	15	19	19			15	15		28	28		15
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			2		4	
Actuated Green, G (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Effective Green, g (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Actuated g/C Ratio	0.18	0.30	0.30	0.12	0.24	0.24	0.40	0.36	0.30	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	1017	457	197	836	364	247	1341	457	457	1281	539
v/s Ratio Prot	c0.17	0.15		0.11	0.10		c0.02	0.11		0.01	c0.21	
v/s Ratio Perm			c0.21			0.01	0.18		0.03	0.06		0.04
w/c Ratio	0.93	0.50	0.70	0.92	0.43	0.03	0.51	0.29	0.09	0.18	0.58	0.13
Uniform Delay, d1	48.4	34.4	37.0	52.5	38.8	35.1	24.5	27.3	30.0	23.5	31.5	26.2
Progression Factor	0.76	0.91	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	31.3	1.5	7.3	42.9	1.6	0.2	1.6	0.6	0.4	0.2	1.9	0.5
Delay (s)	68.0	32.8	42.7	95.4	40.5	35.2	26.2	27.8	30.4	23.7	33.5	26.7
Level of Service	E	C	D	F	D	D	C	C	C	C	C	C
Approach Delay (s)		44.4			57.0			28.0			31.4	
Approach LOS		D			E			C			C	
Intersection Summary												
HCM 2000 Control Delay		39.6							D			
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		120.0						22.2				
Intersection Capacity Utilization		97.4%						ICU Level of Service	F			
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings

<2033 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	540	272	146	1073	24
Future Volume (vph)	10	17	36	194	19	59	53	540	272	146	1073	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	1.00		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.210			0.393		
Satd. Flow (perm)	0	3058	0	0	1858	1181	362	5036	1483	689	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	587	296	159	1166	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	587	296	159	1166	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2033 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

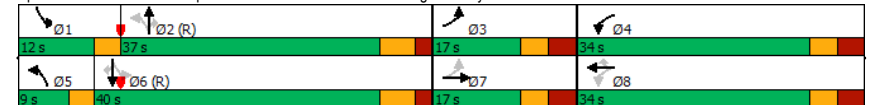


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.20	0.22	0.32	0.30	0.41	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	7.5	13.1	4.0	9.0	14.8	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	7.5	13.1	4.0	9.0	14.8	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.9			13.9	
Approach LOS		C			D			A			B	


Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 15.3
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway




Queues <2033 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	587	296	159	1166	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.20	0.22	0.32	0.30	0.41	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	7.5	13.1	4.0	9.0	14.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	7.5	13.1	4.0	9.0	14.8	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.5	23.3	9.6	11.3	50.0	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	5.5	36.1	19.6	21.5	66.1	0.0
Internal Link Dist (m)		58.8	304.5			138.3		233.7			
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	298	2621	913	547	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.19	0.22	0.32	0.29	0.41	0.03

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

HCM Signalized Intersection Capacity Analysis <2033 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑↑	↑	↑↑↑	↑↑↑	↑
Traffic Volume (vph)	10	17	36	194	19	59	53	540	272	146	1073	24
Future Volume (vph)	10	17	36	194	19	59	53	540	272	146	1073	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1643	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.21	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	363	5036	1483	692	5029	1458
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)	11	18	39	211	21	64	58	587	296	159	1166	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	0	146	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	587	150	159	1166	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	263	2558	753	509	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.23	
v/s Ratio Perm							0.01	0.11		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.22	0.23	0.20	0.31	0.43	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.3	13.7	13.5	8.1	13.7	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.77	0.89	1.50	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.4	0.2	0.6	0.4	0.5	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.3	12.4	20.7	8.4	14.1	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.8			13.4	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.42
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	437	188	69	310	145	522	0	0	886	173
Future Volume (vph)	0	0	437	188	69	310	145	522	0	0	886	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0		125.0	50.0		0.0	0.0		0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1108	1700	1767	1551	1460	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.147					
Satd. Flow (perm)	0	0	1108	1700	1767	1551	225	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						188
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	475	204	75	337	158	567	0	0	963	188
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	475	139	140	337	158	567	0	0	963	188
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4				9.4
Detector 2 Size(m)						0.6		0.6				0.6
Detector 2 Type						Cl+Ex		Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2033 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023

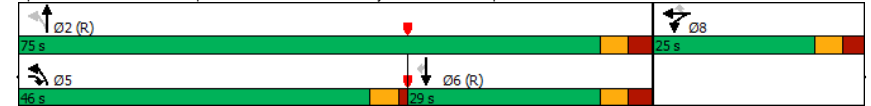


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			46.8	13.7	13.7	13.7	75.8	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.76	0.74			0.23	0.23
v/c Ratio			0.92	0.60	0.58	0.67	0.21	0.16			0.87	0.38
Control Delay			51.3	50.7	49.5	11.3	5.1	4.3			37.0	5.4
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			51.3	50.7	49.5	11.3	5.1	4.3			37.0	5.4
LOS			D	D	D	B	A	A			D	A
Approach Delay			51.3			28.9		4.5			31.8	
Approach LOS			D			C		A			C	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	27.6
Intersection LOS:	C
Intersection Capacity Utilization:	65.2%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2033 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	475	139	140	337	158	567	963	188
v/c Ratio	0.92	0.60	0.58	0.67	0.21	0.16	0.87	0.38
Control Delay	51.3	50.7	49.5	11.3	5.1	4.3	37.0	5.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	50.7	49.5	11.3	5.1	4.3	37.0	5.4
Queue Length 50th (m)	82.3	27.1	27.2	0.0	6.7	9.7	67.7	10.5
Queue Length 95th (m)	#158.6	44.3	44.3	23.2	17.5	16.5	#88.0	8.3
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	518	323	335	567	749	3651	1107	494
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	0.92	0.43	0.42	0.59	0.21	0.16	0.87	0.38

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<2033 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	437	188	69	310	145	522	0	0	886	173
Future Volume (vph)	0	0	437	188	69	310	145	522	0	0	886	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1108	1700	1767	1551	1460	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.15	1.00			1.00	1.00
Satd. Flow (perm)			1108	1700	1767	1551	226	4932			4877	1538
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	0	475	204	75	337	158	567	0	0	963	188
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	145
Lane Group Flow (vph)	0	0	475	139	140	46	158	567	0	0	963	43
Confl. Peds. (#/hr)							7	14	14		7	
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Effective Green, g (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.74	0.74			0.23	0.23
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			518	232	242	212	744	3649			1107	349
v/s Ratio Prot			c0.43	c0.08	0.08		0.10	0.11			c0.20	
v/s Ratio Perm						0.03	0.06					0.03
v/c Ratio			0.92	0.60	0.58	0.22	0.21	0.16			0.87	0.12
Uniform Delay, d1			24.8	40.6	40.4	38.4	5.8	3.8			37.2	30.7
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.74	0.65
Incremental Delay, d2			21.0	4.1	3.3	0.5	0.1	0.1			8.9	0.7
Delay (s)			45.8	44.7	43.8	38.9	5.9	3.9			36.4	20.8
Level of Service			D	D	D	D	A	A			D	C
Approach Delay (s)			45.8			41.3		4.3			33.8	
Approach LOS			D			D		A			C	

Intersection Summary

HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

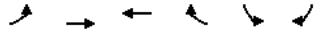
c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Total>AM

10: Kingston Road & Fairport Road

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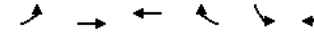
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↔	↕	
Traffic Volume (vph)	96	795	706	99	182	229	
Future Volume (vph)	96	795	706	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Fr			0.981				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3384	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3384	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			15				249
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	864	767	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	864	875	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

<2033 Future Total>AM

10: Kingston Road & Fairport Road

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.37	0.42		0.72	0.52	
Control Delay	74.8	4.3	15.5		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	74.8	4.3	15.5		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		11.8	15.5		34.1		
Approach LOS		B	B		C		

Intersection Summary

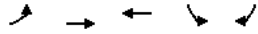
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 52.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

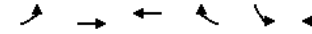
<2033 Future Total>AM
10-18-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	864	875	198	249
w/c Ratio	0.62	0.37	0.42	0.72	0.52
Control Delay	74.8	4.3	15.5	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	74.8	4.3	15.5	65.5	9.1
Queue Length 50th (m)	17.8	81.0	57.2	49.0	0.0
Queue Length 95th (m)	30.9	2.1	94.8	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2062	476	649
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	0.44	0.37	0.42	0.42	0.38
Intersection Summary					

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2033 Future Total>AM
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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↔	↕↕
Traffic Volume (vph)	96	795	706	99	182	229
Future Volume (vph)	96	795	706	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3386		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3386		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	864	767	108	198	249
RTOR Reduction (vph)	0	0	6	0	0	209
Lane Group Flow (vph)	104	864	869	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2057		276	271
v/s Ratio Prot	c0.06	0.26	c0.26		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.38	0.42		0.72	0.15
Uniform Delay, d1	55.7	8.4	13.5		51.9	47.0
Progression Factor	1.11	0.42	1.00		1.00	1.00
Incremental Delay, d2	5.6	0.4	0.6		8.6	0.3
Delay (s)	67.6	3.9	14.1		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	14.1		53.1	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay		20.3		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.50				
Actuated Cycle Length (s)		130.0		Sum of lost time (s)		16.6
Intersection Capacity Utilization		52.7%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings

<2033 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔		↖	↗↗	↖↖	↗
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	901	13	309	728	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	914	0	309	728	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2033 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

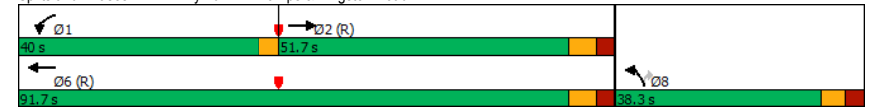
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effct Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.58		0.85	0.29	0.78	0.20
Control Delay	15.1		56.7	13.0	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	15.1		56.7	13.0	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	15.1			26.0	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.1 Intersection LOS: C
 Intersection Capacity Utilization 67.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Total>AM
10-18-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	914	309	728	501	71
w/c Ratio	0.58	0.85	0.29	0.78	0.20
Control Delay	15.1	56.7	13.0	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	56.7	13.0	58.6	10.2
Queue Length 50th (m)	83.0	75.7	63.4	63.7	0.0
Queue Length 95th (m)	111.5	104.0	82.6	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.58	0.68	0.29	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Total>AM
10-18-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕↔	↕↔	↕↔	↕
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	901	13	309	728	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	913	0	209	728	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.26		c0.19	0.21	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.58		0.84	0.29	0.78	0.04
Uniform Delay, d1	26.4		47.8	7.1	50.2	43.2
Progression Factor	0.48		0.79	1.67	1.00	1.00
Incremental Delay, d2	1.3		15.2	0.3	5.8	0.1
Delay (s)	14.0		52.8	12.2	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	14.0			24.3	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

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12: Plaza Entrance/Delta Blvd & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3381	0	1805	1755	0	1643	1468	0
Fit Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3381	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			8			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1148	40	104	1128	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1188	0	104	1208	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

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12: Plaza Entrance/Delta Blvd & Kingston Road

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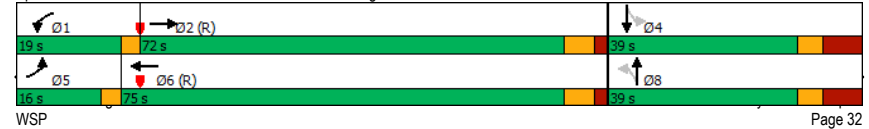


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0					
Flash Dont Walk (s)	18.0		18.0		20.0		20.0					
Pedestrian Calls (#/hr)	1		16		0		0				1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.62		0.63	0.59		0.76	0.29		0.24	0.43	
Control Delay	65.7	17.4		80.2	11.4		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.7	17.5		80.2	11.4		74.1	11.5		48.1	12.9	
LOS	E	B		F	B		E	B		D	B	
Approach Delay	20.6		16.9		48.2		21.2					
Approach LOS	C		B		D		C					

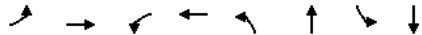
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 80.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



Queues <2033 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1188	104	1208	152	107	46	149
w/c Ratio	0.59	0.62	0.63	0.59	0.76	0.29	0.24	0.43
Control Delay	65.7	17.4	80.2	11.4	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.7	17.5	80.2	11.4	74.1	11.5	48.1	12.9
Queue Length 50th (m)	18.6	92.2	22.3	78.7	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.2	121.5	39.2	174.0	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2037	278	469	264	432
Starvation Cap Reductn	0	75	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 w/c Ratio	0.50	0.64	0.51	0.59	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2033 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑↑		↑	↑		↑	↑	↑
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3280		1671	3381		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3280		1671	3381		1249	1755		1185	1468	
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)	83	1148	40	104	1128	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	3	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1186	0	104	1205	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2033		200	282		190	236	
v/s Ratio Prot	0.05	c0.36		c0.06	0.36			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.62		0.63	0.59		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	17.3		56.3	16.0		52.2	46.4		47.6	46.9	
Progression Factor	0.87	0.84		1.15	0.58		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	1.4		7.3	1.2		15.5	0.1		0.7	0.3	
Delay (s)	55.8	15.9		72.0	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.5			15.5			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Fit Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			144		249				191			172
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

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13: Whites Road & Kingston Road

<2033 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	38.2	38.2	25.4	52.5	52.5	50.4	40.0	70.8	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.39	0.31	0.54	0.39	0.31	0.31
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	37.3		27.2		27.1		33.4					
Approach LOS	D		C		C		C					

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

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

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 30.8

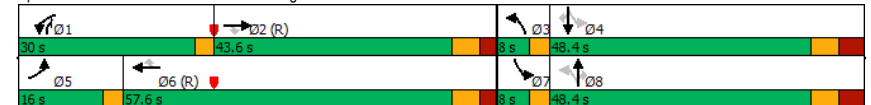
Intersection LOS: C

Intersection Capacity Utilization 108.2%


ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 13: Whites Road & Kingston Road



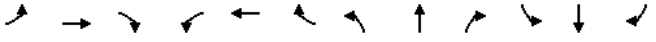
Queues <2033 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Length 50th (m)	21.2	40.8	38.6	58.8	58.8	19.2	26.2	30.0	41.6	31.6	67.8	3.2
Queue Length 95th (m)	38.4	55.3	69.7	#121.0	47.2	8.7	#51.5	39.4	68.2	49.1	81.8	20.2
Internal Link Dist (m)		273.5			198.7			134.6			361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	979	561	366	1418	763	208	1556	935	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.38	0.57	0.84	0.43	0.41	0.76	0.27	0.53	0.50	0.56	0.32

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2033 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑↑	↑		↑↑↑	↑
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	0.91	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1528	1741	5057	1574
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1528	906	5057	1574
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)	85	374	320	309	612	315	159	424	492	189	865	190
RTOR Reduction (vph)	0	0	102	0	0	148	0	0	95	0	0	119
Lane Group Flow (vph)	85	374	218	309	612	167	159	424	397	189	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Effective Green, g (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.35	0.31	0.50	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	979	459	345	1417	614	191	1556	768	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.17	0.17		c0.03	0.08	0.10	0.02	0.17	
v/s Ratio Perm			c0.14			0.11	c0.25		0.16	0.17		0.05
v/c Ratio	0.61	0.38	0.48	0.90	0.43	0.27	0.83	0.27	0.52	0.55	0.56	0.15
Uniform Delay, d1	57.4	36.5	37.7	51.0	28.0	25.9	37.0	34.0	21.7	32.3	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.86	0.59	0.50	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.1	3.5	21.2	0.8	0.9	25.5	0.4	0.6	1.8	1.4	0.6
Delay (s)	65.1	37.6	41.2	65.2	17.4	13.9	62.5	34.4	22.3	34.0	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		42.1			28.4			33.0			37.4	
Approach LOS		D			C			C			D	

Intersection Summary
 HCM 2000 Control Delay 34.6 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.72
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
 Intersection Capacity Utilization 108.2% ICU Level of Service G
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings

<2033 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↖↖	↖↖	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.994	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3391	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3391	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	701	291	0	758	484	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	730	262	0	758	484	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2033 Future Total>AM

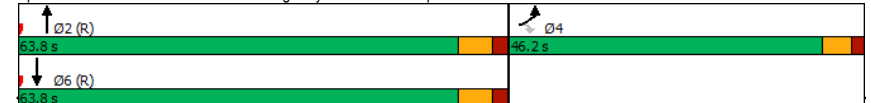
14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
v/c Ratio	0.79	0.46		0.36	0.23	
Control Delay	43.3	6.2		11.7	10.4	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	43.3	6.2		11.7	10.4	
LOS	D	A		B	B	
Approach Delay	33.5			11.7	10.4	
Approach LOS	C			B	B	

Intersection Summary	
Area Type:	Other
Cycle Length:	110
Actuated Cycle Length:	110
Offset:	79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	60
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.79
Intersection Signal Delay:	21.1
Intersection Capacity Utilization:	50.6%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Total>AM
10-18-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	730	262	758	484
w/c Ratio	0.79	0.46	0.36	0.23
Control Delay	43.3	6.2	11.7	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.3	6.2	11.7	10.4
Queue Length 50th (m)	74.5	0.0	39.3	22.6
Queue Length 95th (m)	87.4	18.7	59.8	36.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1257	683	2082	2148
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.38	0.36	0.23
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Total>AM
10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	TTT	T		TT	TT	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3392	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3392	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	701	291	0	758	484	0
RTOR Reduction (vph)	3	191	0	0	0	0
Lane Group Flow (vph)	727	71	0	758	484	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	29.9	29.9		67.9	67.9	
Effective Green, g (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	922	380		2082	2148	
v/s Ratio Prot	c0.21			c0.22	0.14	
v/s Ratio Perm		0.05				
v/c Ratio	0.79	0.19		0.36	0.23	
Uniform Delay, d1	37.1	30.7		10.4	9.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.2		0.5	0.2	
Delay (s)	41.7	31.0		10.9	9.6	
Level of Service	D	C		B	A	
Approach Delay (s)	38.8			10.9	9.6	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay			23.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.2
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.97	
Frt		0.980			0.992			0.853			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3460	0	1685	3509	0	1745	1573	0	1725	1583	0
Flt Permitted	0.950			0.950			0.640			0.375		
Satd. Flow (perm)	1677	3460	0	1682	3509	0	1155	1573	0	679	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			6			91				247
Link Speed (k/h)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	5		7	7		5	14		5	5		14
Conf. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	41	1582	245	68	710	39	236	8	414	26	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1827	0	68	749	0	236	422	0	26	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

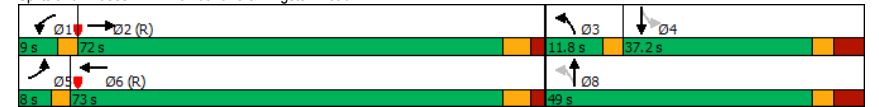
<2033 Future Total>PM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases										8		4
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	32.6		8.0	32.6		8.0	37.2		37.2	37.2	
Total Split (s)	8.0	72.0		9.0	73.0		11.8	49.0		37.2	37.2	
Total Split (%)	6.2%	55.4%		6.9%	56.2%		9.1%	37.7%		28.6%	28.6%	
Maximum Green (s)	5.0	65.4		6.0	66.4		8.8	40.8		29.0	29.0	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.0	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		0.0	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0			22.0		22.0	22.0	
Pedestrian Calls (#/hr)		8			4			2		9	9	
Act Effect Green (s)	5.0	72.9		6.0	75.5		38.5	33.3		21.0	21.0	
Actuated g/C Ratio	0.04	0.56		0.05	0.58		0.30	0.26		0.16	0.16	
v/c Ratio	0.64	0.94		0.88	0.37		0.59	0.90		0.24	0.06	
Control Delay	99.7	22.0		133.8	10.9		43.2	58.2		49.2	0.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	99.7	22.0		133.8	10.9		43.2	58.2		49.2	0.3	
LOS	F	C		F	B		D	E		D	A	
Approach Delay		23.7			21.1			52.8			23.8	
Approach LOS		C			C			D			C	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	28.7
Intersection LOS:	C
Intersection Capacity Utilization:	89.2%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2033 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1827	68	749	236	422	26	28
v/c Ratio	0.64	0.94	0.88	0.37	0.59	0.90	0.24	0.06
Control Delay	99.7	22.0	133.8	10.9	43.2	58.2	49.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.7	22.0	133.8	10.9	43.2	58.2	49.2	0.3
Queue Length 50th (m)	10.3	189.0	14.1	73.1	48.6	83.8	5.8	0.0
Queue Length 95th (m)	m12.9	m#297.4	m#42.4	91.0	67.5	118.4	13.9	0.0
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	1947	77	2039	399	556	151	545
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	0.64	0.94	0.88	0.37	0.59	0.76	0.17	0.05

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.

HCM Signalized Intersection Capacity Analysis <2033 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00		1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00		0.97
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00		1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.85		1.00		0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1685	3460		1685	3509		1726	1573		1719		1583
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.38		1.00
Satd. Flow (perm)	1685	3460		1685	3509		1163	1573		679		1583
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)	41	1582	245	68	710	39	236	8	414	26	0	28
RTOR Reduction (vph)	0	9	0	0	3	0	0	67	0	0	24	0
Lane Group Flow (vph)	41	1818	0	68	746	0	236	356	0	26	4	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm		NA
Protected Phases	5	2		1	6		3	8				4
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Effective Green, g (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Actuated g/C Ratio	0.03	0.55		0.05	0.56		0.27	0.27		0.15		0.15
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	51	1895		77	1975		367	423		101		236
v/s Ratio Prot	0.02	c0.53		c0.04	0.21		0.06	c0.23				0.00
v/s Ratio Perm							0.11			0.04		
v/c Ratio	0.80	0.96		0.88	0.38		0.64	0.84		0.26		0.02
Uniform Delay, d1	62.6	28.0		61.7	15.8		40.7	44.9		48.9		47.2
Progression Factor	1.28	0.52		1.08	0.66		1.00	1.00		1.00		1.00
Incremental Delay, d2	35.8	8.0		59.6	0.5		3.8	14.0		1.4		0.0
Delay (s)	115.6	22.7		126.3	10.9		44.6	58.8		50.3		47.2
Level of Service	F	C		F	B		D	E		D		D
Approach Delay (s)		24.7			20.5			53.7				48.7
Approach LOS		C			C			D				D

Intersection Summary
 HCM 2000 Control Delay 29.7 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.93
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8
 Intersection Capacity Utilization 89.2% ICU Level of Service E
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2033 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	1647	181	0	1024	0	35
Future Volume (vph)	1647	181	0	1024	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3500	1561	0	3500	0	1808
Fit Permitted						
Satd. Flow (perm)	3500	1561	0	3500	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	2%	2%	2%	0%
Adj. Flow (vph)	1790	197	0	1113	0	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1790	197	0	1113	0	38
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2033 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	1647	181	0	1024	0	35
Future Volume (Veh/h)	1647	181	0	1024	0	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1790	197	0	1113	0	38
Pedestrians						3
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.46		0.51	0.46
vC, conflicting volume			1793		2350	898
vC1, stage 1 conf vol					1793	
vC2, stage 2 conf vol					556	
vCu, unblocked vol			360		734	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			545		295	497

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	895	895	197	556	556	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	197	0	0	38
cSH	1700	1700	1700	1700	1700	497
Volume to Capacity	0.53	0.53	0.12	0.33	0.33	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	12.8
Lane LOS						B
Approach Delay (s)	0.0			0.0		12.8
Approach LOS						B

Intersection Summary	
Average Delay	0.2
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.978		0.978		0.978		0.920		0.885			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3338	0	1597	3421	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.674			0.676		
Satd. Flow (perm)	1578	3338	0	1595	3421	0	1250	1786	0	1290	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			19			42			100	
Link Speed (k/h)	60		60		60		40		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	222	1752	303	43	905	154	166	59	68	161	30	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	2055	0	43	1059	0	166	127	0	161	130	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases							8	8			4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		40.1	40.1		40.1	40.1	
Total Split (s)	26.0	81.6		8.0	63.6		40.4	40.4		40.4	40.4	
Total Split (%)	20.0%	62.8%		6.2%	48.9%		31.1%	31.1%		31.1%	31.1%	
Maximum Green (s)	23.0	75.0		5.0	57.0		30.9	30.9		30.9	30.9	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.2	85.1		5.0	67.3		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.16	0.65		0.04	0.52		0.17	0.17		0.17	0.17	
v/c Ratio	0.86	0.94		0.70	0.60		0.77	0.37		0.73	0.34	
Control Delay	81.3	15.1		115.1	13.7		73.5	32.9		68.5	15.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	81.3	15.1		115.1	13.7		73.5	32.9		68.5	15.2	
LOS	F	B		F	B		E	C		E	B	
Approach Delay	21.6		17.7		55.9		44.7					
Approach LOS	C		B		E		D					

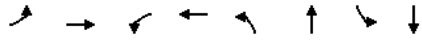
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 24.7
 Intersection LOS: C
 Intersection Capacity Utilization 91.7%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 3: Dixie Road & Kingston Road



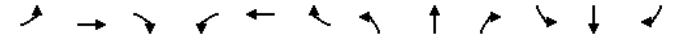
Queues <2033 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	222	2055	43	1059	166	127	161	130
w/c Ratio	0.86	0.94	0.70	0.60	0.77	0.37	0.73	0.34
Control Delay	81.3	15.1	115.1	13.7	73.5	32.9	68.5	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.3	15.1	115.1	13.7	73.5	32.9	68.5	15.2
Queue Length 50th (m)	51.7	36.8	11.5	56.5	41.0	19.1	39.4	6.6
Queue Length 95th (m)	m62.4	#78.4	m#29.0	76.8	61.4	35.1	59.2	22.2
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2193	61	1779	297	456	306	487
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 w/c Ratio	0.80	0.94	0.70	0.60	0.56	0.28	0.53	0.27

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.

HCM Signalized Intersection Capacity Analysis <2033 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	↑
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3338		1597	3422		1762	1786		1813	1729	
Fit Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3338		1597	3422		1250	1786		1289	1729	
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)	222	1752	303	43	905	154	166	59	68	161	30	100
RTOR Reduction (vph)	0	9	0	0	9	0	35	0	0	83	0	0
Lane Group Flow (vph)	222	2046	0	43	1050	0	166	92	0	161	47	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Effective Green, g (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.16	0.65		0.03	0.52		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	2169		49	1771		215	307		222	297	
v/s Ratio Prot	c0.14	c0.61		0.03	0.31			0.05			0.03	
v/s Ratio Perm							c0.13			0.12		
w/c Ratio	0.86	0.94		0.88	0.59		0.77	0.30		0.73	0.16	
Uniform Delay, d1	53.0	20.6		62.8	21.8		51.4	47.0		50.9	45.8	
Progression Factor	1.24	0.38		1.08	0.53		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.2	5.3		80.5	1.4		15.7	0.6		11.1	0.3	
Delay (s)	79.1	13.1		148.1	13.0		67.1	47.5		62.0	46.0	
Level of Service	E	B		F	B		E	D		E	D	
Approach Delay (s)		19.6			18.2			58.6			54.9	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay	24.7		HCM 2000 Level of Service				C					
HCM 2000 Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)	130.0				Sum of lost time (s)				19.1			
Intersection Capacity Utilization	91.7%		ICU Level of Service				F					
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2033 Future Total>PM
10-18-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1049	546	267	439	72	131	789	241	102	668	171
Future Volume (vph)	313	1049	546	267	439	72	131	789	241	102	668	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.233			0.156		
Satd. Flow (perm)	1650	3461	1479	1689	3579	1485	439	3773	1543	328	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			127			188			175
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
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
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	340	1140	593	290	477	78	142	858	262	111	726	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	1140	593	290	477	78	142	858	262	111	726	186
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2033 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

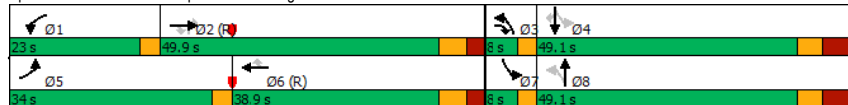


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	29.0	42.8	51.9	22.0	33.8	33.8	51.1	40.0	42.8	51.1	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.40	0.17	0.26	0.26	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.63	0.74	0.41	0.57	0.65	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	40.4	44.9	12.0	37.0	42.1	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	40.4	44.9	12.0	37.0	42.1	7.3
LOS	E	D	D	F	D	A	D	D	B	D	D	A
Approach Delay	49.0			61.8			37.6			35.2		
Approach LOS	D			E			D			D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 135
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 45.6 Intersection LOS: D
 Intersection Capacity Utilization 104.5% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2033 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	340	1140	593	290	477	78	142	858	262	111	726	186
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.63	0.74	0.41	0.57	0.65	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	40.4	44.9	12.0	37.0	42.1	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	40.4	44.9	12.0	37.0	42.1	7.3
Queue Length 50th (m)	76.5	~146.0	126.6	~75.4	56.4	0.0	22.7	103.6	13.3	17.3	84.5	2.0
Queue Length 95th (m)	m90.4	m#182.7	m#155.6	#132.1	73.7	2.4	37.2	127.3	35.9	29.5	105.5	18.8
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8	97.9	170.7	117.0	185.5		52.0	49.0				60.5
Base Capacity (vph)	402	1139	640	289	931	480	225	1160	634	194	1124	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.00	0.93	1.00	0.51	0.16	0.63	0.74	0.41	0.57	0.65	0.33

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.

HCM Signalized Intersection Capacity Analysis

<2033 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	313	1049	546	267	439	72	131	789	241	102	668	171
Future Volume (vph)	313	1049	546	267	439	72	131	789	241	102	668	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	1.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1805	3773	1543	2023	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	443	3773	1543	333	3654	1466
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)	340	1140	593	290	477	78	142	858	262	111	726	186
RTOR Reduction (vph)	0	0	48	0	0	58	0	0	126	0	0	121
Lane Group Flow (vph)	340	1140	545	290	477	20	142	858	136	111	726	65
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6	8		2	4			4
Actuated Green, G (s)	29.0	42.8	47.8	20.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Effective Green, g (s)	29.0	42.8	47.8	22.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.37	0.17	0.26	0.26	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	376	1139	548	289	930	386	205	1160	508	180	1124	451
v/s Ratio Prot	c0.20	c0.33	c0.04	c0.17	0.13		0.03	c0.23		0.02	0.20	
v/s Ratio Perm			0.33			0.01	0.21		0.09	0.19		0.04
v/c Ratio	0.90	1.00	0.99	1.00	0.51	0.05	0.69	0.74	0.27	0.62	0.65	0.14
Uniform Delay, d1	49.1	43.6	41.0	54.0	41.1	36.1	35.6	40.3	32.1	31.4	38.9	32.6
Progression Factor	1.01	0.71	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.5	18.4	24.7	53.8	2.0	0.3	9.7	4.3	1.3	6.2	2.9	0.7
Delay (s)	63.3	49.3	57.2	107.8	43.1	36.3	45.2	44.6	33.4	37.6	41.8	33.3
Level of Service	E	D	E	F	D	D	D	D	C	D	D	C
Approach Delay (s)		53.8			64.7			42.3			39.8	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay	50.0		HCM 2000 Level of Service				D					
HCM 2000 Volume to Capacity ratio	0.92											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)				22.2				
Intersection Capacity Utilization	104.5%		ICU Level of Service				G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

<2033 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	852	401	196	1225	46
Future Volume (vph)	87	69	130	412	58	174	116	852	401	196	1225	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			1.00		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950		0.950			0.950
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.115		0.238			
Satd. Flow (perm)	0	2959	0	0	1858	1399	198	5085	1502	425	5079	1482
Right Turn on Red			Yes			Yes		Yes			Yes	Yes
Satd. Flow (RTOR)		141				189		436				144
Link Speed (k/h)	30			50			50			50		
Link Distance (m)	82.8			328.5			162.3			257.7		
Travel Time (s)	9.9			23.7			11.7			18.6		
Confl. Peds. (#/hr)	21		21	21		21	21	21	21	21	21	21
Confl. Bikes (#/hr)	2		2	5		5	5	5	5	5	5	6
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	95	75	141	448	63	189	126	926	436	213	1332	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	216	0	448	63	189	126	926	436	213	1332	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	6.0		6.0		3.8		3.8		3.8		3.8	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24	24	14	24	14	24	14	24	14	24	14	14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2033 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

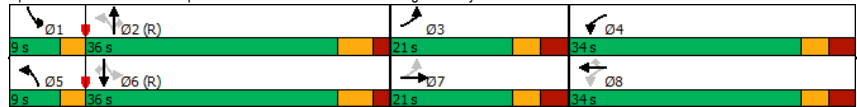


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0
Minimum Split (s)	15.0	15.0		34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	21.0	21.0		34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0
Total Split (%)	21.0%	21.0%		34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4		27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				20	20		28	28		15	15	
Act Effect Green (s)	11.0	11.0		20.9	20.9	20.9	48.9	39.6	39.6	48.9	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.49	0.40	0.40	0.49	0.40	0.40
v/c Ratio	0.51	0.48		0.67	0.16	0.43	0.69	0.46	0.51	0.75	0.66	0.07
Control Delay	51.0	18.9		40.8	31.2	7.5	33.5	20.0	8.4	37.1	28.4	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9		40.8	31.2	7.5	33.5	20.0	8.4	37.1	28.4	0.2
LOS	D	B		D	C	A	C	C	A	D	C	A
Approach Delay	28.7			31.0			17.8			28.7		
Approach LOS	C			C			B			C		

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	25.1
Intersection Capacity Utilization:	68.8%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<2033 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	95	216	448	63	189	126	926	436	213	1332	50	
v/c Ratio	0.51	0.48	0.67	0.16	0.43	0.69	0.46	0.51	0.75	0.66	0.07	
Control Delay	51.0	18.9	40.8	31.2	7.5	33.5	20.0	8.4	37.1	28.4	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	51.0	18.9	40.8	31.2	7.5	33.5	20.0	8.4	37.1	28.4	0.2	
Queue Length 50th (m)	17.7	7.1	42.3	10.3	0.0	7.3	50.7	32.0	20.8	73.4	0.0	
Queue Length 95th (m)	32.2	17.3	52.8	19.3	15.9	m#39.6	72.9	54.3	#61.0	107.4	0.0	
Internal Link Dist (m)	58.8		304.5			138.3			233.7			
Turn Bay Length (m)			57.0		62.1		54.4		75.7		132.5	35.5
Base Capacity (vph)	245	546	877	509	520	183	2012	857	284	2010	673	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	0.40	0.51	0.12	0.36	0.69	0.46	0.51	0.75	0.66	0.07	

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2033 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	852	401	196	1225	46
Future Volume (vph)	87	69	130	412	58	174	116	852	401	196	1225	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2931		3204	1858	1399	1644	5085	1503	1706	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.11	1.00	1.00	0.24	1.00	1.00
Satd. Flow (perm)	0	2931		0	1858	1399	198	5085	1503	428	5079	1485
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)	95	75	141	448	63	189	126	926	436	213	1332	50
RTOR Reduction (vph)	0	125	0	0	0	149	0	0	263	0	0	30
Lane Group Flow (vph)	95	91	0	448	63	40	126	926	173	213	1332	20
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Effective Green, g (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	322		669	388	292	177	2013	595	271	2011	588
v/s Ratio Prot	c0.06	0.03		c0.14	0.03		0.04	0.18		c0.05	0.26	
v/s Ratio Perm						0.03	0.28		0.11	c0.31		0.01
v/c Ratio	0.51	0.28		0.67	0.16	0.14	0.71	0.46	0.29	0.79	0.66	0.03
Uniform Delay, d1	41.9	40.9		36.4	32.4	32.2	18.1	22.3	20.6	19.4	24.7	18.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.82	0.81	2.25	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.5		2.6	0.2	0.2	11.7	0.7	1.1	13.9	1.7	0.1
Delay (s)	44.1	41.3		38.9	32.6	32.4	26.6	18.7	47.6	33.3	26.5	18.6
Level of Service	D	D		D	C	C	C	B	D	C	C	B
Approach Delay (s)		42.2			36.6			27.8			27.1	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		30.1										C
HCM 2000 Volume to Capacity ratio		0.71										
Actuated Cycle Length (s)		100.0							22.5			
Intersection Capacity Utilization		68.8%										C
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	427	278	487	293	125	1084	0	0	1113	128
Future Volume (vph)	0	0	427	278	487	293	125	1084	0	0	1113	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1		1	1	0	0	0	0	0	1
Taper Length (m)	2.5		2.5		30.0		2.5					
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865		0.850							0.850
Flt Protected			0.950	0.997	0.950							
Satd. Flow (prot)	0	0	1662	1734	1820	1581	1825	5079	0	0	4972	1633
Flt Permitted			0.950	0.997	0.132							
Satd. Flow (perm)	0	0	1662	1734	1820	1581	254	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes				Yes	
Satd. Flow (RTOR)					85							139
Link Speed (k/h)		50		50		50		50			50	
Link Distance (m)		379.4		226.7		372.2		162.3			162.3	
Travel Time (s)		27.3		16.3		26.8		11.7			11.7	
Confl. Peds. (#/hr)						17		15		15		17
Confl. Bikes (#/hr)						6		7				7
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
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	464	302	529	318	136	1178	0	0	1210	139
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	0	464	272	559	318	136	1178	0	0	1210	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7		3.7		3.7		3.7			3.7	
Link Offset(m)		0.0		0.0		0.0		0.0			0.0	
Crosswalk Width(m)		1.6		1.6		1.6		1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2033 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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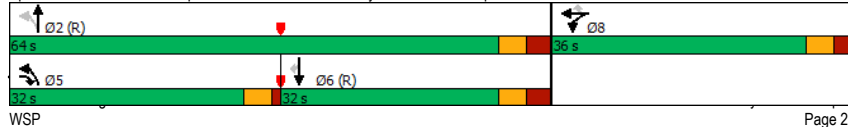


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases		5	8	8				5	2		6	
Permitted Phases						8	2					6
Detector Phase		5	8	8	8	5	2				6	6
Switch Phase												
Minimum Initial (s)		5.0	8.0	8.0	8.0	5.0	15.0				15.0	15.0
Minimum Split (s)		9.5	25.0	25.0	25.0	9.5	24.3				24.3	24.3
Total Split (s)		32.0	36.0	36.0	36.0	32.0	64.0				32.0	32.0
Total Split (%)		32.0%	36.0%	36.0%	36.0%	32.0%	64.0%				32.0%	32.0%
Maximum Green (s)		27.5	30.0	30.0	30.0	27.5	57.7				25.7	25.7
Yellow Time (s)		3.5	3.3	3.3	3.3	3.5	3.3				3.3	3.3
All-Red Time (s)		1.0	2.7	2.7	2.7	1.0	3.0				3.0	3.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Lost Time (s)		4.5	6.0	6.0	6.0	4.5	6.3				6.3	6.3
Lead/Lag		Lead				Lead					Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0				3.0	3.0
Recall Mode		None	None	None	None	None	C-Max				C-Max	C-Max
Walk Time (s)			14.0	14.0	14.0		13.0				13.0	13.0
Flash Dont Walk (s)			5.0	5.0	5.0		5.0				5.0	5.0
Pedestrian Calls (#/hr)			0	0	0		14				7	7
Act Effct Green (s)		27.5	30.0	30.0	30.0	59.5	57.7				25.7	25.7
Actuated g/C Ratio		0.28	0.30	0.30	0.30	0.60	0.58				0.26	0.26
v/c Ratio		1.02	0.52	1.02	0.60	0.23	0.40				0.95	0.28
Control Delay		83.4	33.4	80.6	26.9	10.0	12.2				47.5	13.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0
Total Delay		83.4	33.4	80.6	26.9	10.0	12.2				47.5	13.1
LOS		F	C	F	C	A	B				D	B
Approach Delay		83.4			54.6		11.9				43.9	
Approach LOS		F			D		B				D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 41.2
 Intersection LOS: D
 Intersection Capacity Utilization 87.6%
 ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



WSP

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Queues

<2033 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	464	272	559	318	136	1178	1210	139
v/c Ratio	1.02	0.52	1.02	0.60	0.23	0.40	0.95	0.28
Control Delay	83.4	33.4	80.6	26.9	10.0	12.2	47.5	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	33.4	80.6	26.9	10.0	12.2	47.5	13.1
Queue Length 50th (m)	~92.3	45.8	~122.1	38.1	10.7	43.0	46.3	1.6
Queue Length 95th (m)	#154.3	72.1	#187.8	66.2	18.8	52.4	#107.5	m17.0
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	546	533	583	2930	1277	491
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	1.02	0.52	1.02	0.60	0.23	0.40	0.95	0.28

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.

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 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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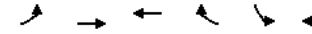


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	427	278	487	293	125	1084	0	0	1113	128
Future Volume (vph)	0	0	427	278	487	293	125	1084	0	0	1113	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.92
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1820	1581	1825	5079			4972	1509
Flt Permitted			1.00	0.95	1.00	1.00	0.13	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1820	1581	254	5079			4972	1509
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	0	464	302	529	318	136	1178	0	0	1210	139
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	0	103
Lane Group Flow (vph)	0	0	464	272	559	259	136	1178	0	0	1210	36
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Effective Green, g (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Actuated g/C Ratio			0.28	0.30	0.30	0.30	0.58	0.58			0.26	0.26
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			457	520	546	474	578	2930			1277	387
v/s Ratio Prot			c0.28	0.16	c0.31		0.06	0.23			c0.24	
v/s Ratio Perm						0.16	0.07					0.02
v/c Ratio			1.02	0.52	1.02	0.55	0.24	0.40			0.95	0.09
Uniform Delay, d1			36.2	29.1	35.0	29.3	12.6	11.6			36.5	28.3
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.92	2.23
Incremental Delay, d2			46.0	1.0	44.7	1.3	0.2	0.4			13.0	0.4
Delay (s)			82.3	30.0	79.7	30.6	12.8	12.1			46.7	63.4
Level of Service			F	C	E	C	B	B			D	E
Approach Delay (s)		82.3			54.3			12.1			48.4	
Approach LOS		F			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2033 Future Total>PM
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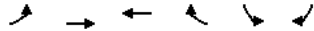
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1872	861	223	271	137	
Future Volume (vph)	205	1872	861	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00			0.99	
Frt			0.969			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3356	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3356	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			34			149	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	223	2035	936	242	295	149	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	223	2035	1178	0	295	149	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2033 Future Total>PM

10: Kingston Road & Fairport Road

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.6	86.1	67.3		25.5	25.5	
Actuated g/C Ratio	0.16	0.66	0.52		0.20	0.20	
v/c Ratio	0.87	0.89	0.67		0.84	0.32	
Control Delay	79.4	9.0	15.1		70.3	8.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	79.4	9.0	15.1		70.3	8.1	
LOS	E	A	B		E	A	
Approach Delay	16.0		15.1		49.4		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 19.5 Intersection LOS: B
 Intersection Capacity Utilization 78.7% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2033 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	223	2035	1178	295	149
v/c Ratio	0.87	0.89	0.67	0.84	0.32
Control Delay	79.4	9.0	15.1	70.3	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	79.4	9.0	15.1	70.3	8.1
Queue Length 50th (m)	51.0	282.0	126.0	72.7	0.0
Queue Length 95th (m)	m50.3	m272.1	161.5	102.0	16.9
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0			15.5	
Base Capacity (vph)	273	2274	1754	416	518
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	0.82	0.89	0.67	0.71	0.29

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2033 Future Total>PM
10-18-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↕
Traffic Volume (vph)	205	1872	861	223	271	137
Future Volume (vph)	205	1872	861	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frb, ped/bikes	1.00	1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3357		1805	1751
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3357		1805	1751
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	2035	936	242	295	149
RTOR Reduction (vph)	0	0	16	0	0	120
Lane Group Flow (vph)	223	2035	1162	0	295	29
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.6	84.9	67.3		25.5	25.5
Effective Green, g (s)	20.6	84.9	67.3		25.5	25.5
Actuated g/C Ratio	0.16	0.65	0.52		0.20	0.20
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	256	2242	1737		354	343
v/s Ratio Prot	c0.14	c0.59	0.35		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.87	0.91	0.67		0.83	0.09
Uniform Delay, d1	53.4	19.2	23.1		50.2	42.7
Progression Factor	1.33	0.30	0.56		1.00	1.00
Incremental Delay, d2	7.7	1.7	1.7		15.4	0.1
Delay (s)	78.6	7.5	14.7		65.6	42.8
Level of Service	E	A	B		E	D
Approach Delay (s)		14.5	14.7		57.9	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			78.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2033 Future Total>PM
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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					218
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1951	25	200	884	720	303
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1976	0	200	884	720	303
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings

<2033 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

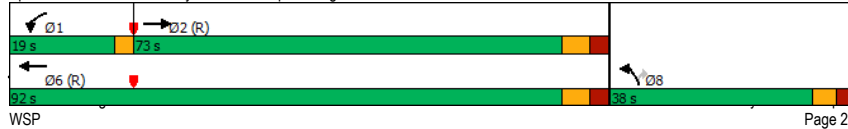
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	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	67.3		16.0	86.3	29.8	29.8
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
v/c Ratio	1.07		1.03	0.37	0.89	0.57
Control Delay	53.5		103.8	26.8	62.0	17.1
Queue Delay	0.9		0.0	0.0	0.0	0.0
Total Delay	54.5		103.8	26.8	62.0	17.1
LOS	D		F	C	E	B
Approach Delay	54.5			41.0	48.7	
Approach LOS	D			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 49.4 Intersection LOS: D
 Intersection Capacity Utilization 95.0% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



WSP

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Queues

<2033 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

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	→	↖	↙	←	↘	↗
Lane Group	EBT	WBL	WBT	NBL	NBR	
Lane Group Flow (vph)	1976	200	884	720	303	
v/c Ratio	1.07	1.03	0.37	0.89	0.57	
Control Delay	53.5	103.8	26.8	62.0	17.1	
Queue Delay	0.9	0.0	0.0	0.0	0.0	
Total Delay	54.5	103.8	26.8	62.0	17.1	
Queue Length 50th (m)	-296.0	-54.4	117.8	91.1	17.6	
Queue Length 95th (m)	#338.5	#104.2	136.0	#114.7	46.7	
Internal Link Dist (m)	244.7		400.0	192.6		
Turn Bay Length (m)		47.5			52.0	
Base Capacity (vph)	1851	194	2401	853	548	
Starvation Cap Reductn	4	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	1.07	1.03	0.37	0.84	0.55	

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.

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 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

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	→	↖	↙	←	↘	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕		↕	↕↕	↕↕	↕
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1951	25	200	884	720	303
RTOR Reduction (vph)	0	0	0	0	0	168
Lane Group Flow (vph)	1976	0	200	884	720	135
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	67.3		16.0	86.3	29.8	29.8
Effective Green, g (s)	67.3		16.0	86.3	29.8	29.8
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1851		194	2401	812	364
v/s Ratio Prot	c0.55		c0.13	0.24	c0.20	
v/s Ratio Perm						0.08
v/c Ratio	1.07		1.03	0.37	0.89	0.37
Uniform Delay, d1	31.4		57.0	9.7	48.5	42.2
Progression Factor	0.44		0.64	2.64	1.00	1.00
Incremental Delay, d2	36.7		65.5	0.3	11.4	0.6
Delay (s)	50.5		101.8	26.0	59.9	42.8
Level of Service	D		F	C	E	D
Approach Delay (s)	50.5			40.0	54.9	
Approach LOS	D			D	D	

Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2033 Future Total>PM
10-18-2023

	↖	→	↙	↘	←	↗	↖	↗	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↕	↕↕		↕	↕↕		↕	↕	↕	↕	↕	↕	
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143	
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7	
Grade (%)		6%			0%			0%				0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	35.3			2.5			2.5			2.5			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		1.00			0.99		1.00					0.99	
Frt		0.997			0.987			0.864				0.862	
Fit Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1656	3346	0	1705	3403	0	1770	1824	0	1725	1474	0	
Fit Permitted	0.084			0.053			0.630			0.637			
Satd. Flow (perm)	146	3346	0	95	3403	0	1172	1824	0	1157	1474	0	
Right Turn on Red			Yes			Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		3			13			85				129	
Link Speed (k/h)		60			60			30				40	
Link Distance (m)		222.7			268.7			130.9				169.9	
Travel Time (s)		13.4			16.1			15.7				15.3	
Confl. Peds. (#/hr)	16		1	1		16	1					1	
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	
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	141	1811	41	97	1383	132	215	16	150	89	14	155	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	141	1852	0	97	1515	0	215	166	0	89	169	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.6				3.6	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		1.6			1.6			1.6				1.6	
Two way Left Turn Lane					Yes								
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Number of Detectors	1	2			2		1	2		1	2		
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru		
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6		
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		

Lanes, Volumes, Timings

<2033 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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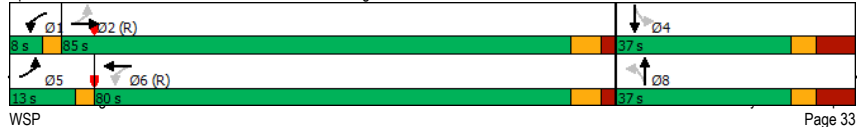


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	91.0	79.3		84.2	75.3		25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.70	0.61		0.65	0.58		0.20	0.20		0.20	0.20	
v/c Ratio	0.68	0.91		0.79	0.77		0.93	0.39		0.39	0.43	
Control Delay	23.0	17.2		67.5	17.6		93.7	24.4		50.3	16.3	
Queue Delay	0.0	24.3		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay	23.0	41.5		67.5	17.7		93.7	24.4		50.3	16.3	
LOS	C	D		E	B		F	C		D	B	
Approach Delay		40.2			20.7			63.5			28.0	
Approach LOS		D			C			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 34.1 Intersection LOS: C
 Intersection Capacity Utilization 99.0% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

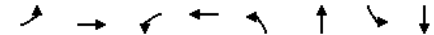


Queues

<2033 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	1852	97	1515	215	166	89	169
v/c Ratio	0.68	0.91	0.79	0.77	0.93	0.39	0.39	0.43
Control Delay	23.0	17.2	67.5	17.6	93.7	24.4	50.3	16.3
Queue Delay	0.0	24.3	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	23.0	41.5	67.5	17.7	93.7	24.4	50.3	16.3
Queue Length 50th (m)	16.3	132.0	9.5	214.6	54.0	17.4	19.7	8.4
Queue Length 95th (m)	m16.1	m126.5	m#27.1	237.0	#99.2	37.9	36.4	29.0
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	218	2042	123	1975	243	446	240	408
Starvation Cap Reductn	0	47	0	38	0	0	0	0
Spillback Cap Reductn	0	274	0	0	0	6	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.05	0.79	0.78	0.88	0.38	0.37	0.41

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2033 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frb, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3345	1705	3403	1768	1825	1725	1475	1725	1475	1725	1475
Fit Permitted	0.08	1.00	0.05	1.00	0.63	1.00	0.64	1.00	0.64	1.00	0.64	1.00
Satd. Flow (perm)	147	3345	95	3403	1173	1825	1157	1475	1157	1475	1157	1475
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)	141	1811	41	97	1383	132	215	16	150	89	14	155
RTOR Reduction (vph)	0	1	0	0	5	0	68	0	0	103	0	0
Lane Group Flow (vph)	141	1851	0	97	1510	0	215	98	0	89	66	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Effective Green, g (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Actuated g/C Ratio	0.67	0.61	0.62	0.58	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	2040	120	1971	232	362	229	292	229	292	229	292
v/s Ratio Prot	c0.05	c0.55	c0.03	0.44	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
v/s Ratio Perm	0.42		0.46		c0.18		0.08		0.08			
v/c Ratio	0.69	0.91	0.81	0.77	0.93	0.27	0.39	0.22	0.39	0.22	0.39	0.22
Uniform Delay, d1	19.1	22.1	24.9	20.7	51.2	44.1	45.3	43.7	45.3	43.7	45.3	43.7
Progression Factor	1.28	0.64	1.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	2.1	26.9	2.4	39.1	0.4	1.1	0.4	1.1	0.4	1.1	0.4
Delay (s)	27.0	16.3	69.5	17.1	90.3	44.5	46.3	44.1	46.3	44.1	46.3	44.1
Level of Service	C	B	E	B	F	D	D	D	D	D	D	D
Approach Delay (s)	17.1		20.2		70.4		44.9		44.9		44.9	
Approach LOS	B		C		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt		0.850			0.850			0.850			0.850	0.850
Fit Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950		0.950		0.950		0.329		0.290		0.290	
Satd. Flow (perm)	1638	3400	1549	1719	3579	1502	604	5255	1470	523	5105	1550
Right Turn on Red		Yes		Yes		Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		139			146			59				202
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	297.5			222.7			158.6			385.2		
Travel Time (s)	17.9			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75	31	31		75	37	65	65	65	65	65	37
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
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	0	2	0	4
Adj. Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Channel												
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2033 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	29.0		29.0	29.0		29.0	33.0		33.0		33.0	33.0
Pedestrian Calls (#/hr)	13		13	38		38	20		20		20	20
Act Effct Green (s)	14.7	37.6	37.6	26.0	48.9	48.9	50.4	40.0	71.4	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.39	0.31	0.55	0.39	0.31	0.31
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
LOS	F	F	C	F	C	C	E	D	D	E	D	A
Approach Delay	78.3			39.6			45.7			36.0		
Approach LOS	E			D			D			D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 50.6

Intersection Capacity Utilization 113.7%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service H

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2033 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Length 50th (m)	42.9	~148.8	58.6	~96.3	47.7	25.9	43.0	56.2	162.6	36.0	50.2	0.0
Queue Length 95th (m)	#82.5	#190.0	96.0 m	#152.3	m83.6 m	#122.8	#85.3	68.7	#276.1	#71.4	62.1	17.2
Internal Link Dist (m)	273.5		198.7		134.6		361.2					
Turn Bay Length (m)	127.0		123.0	87.1	35.0	72.0	35.0	88.5			47.0	
Base Capacity (vph)	193	983	546	346	1345	655	278	1616	857	249	1570	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	18	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.06	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2033 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.96	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1760	5255	1517	1741	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.33	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	610	5255	1517	531	5105	1550
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)	168	1023	389	359	829	538	248	743	818	212	671	202
RTOR Reduction (vph)	0	0	99	0	91	0	0	29	0	0	0	140
Lane Group Flow (vph)	168	1023	290	359	829	447	248	743	789	212	671	62
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Effective Green, g (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.35	0.31	0.51	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	190	983	448	346	1346	564	255	1616	770	230	1570	476
v/s Ratio Prot	0.10	c0.30		c0.21	0.23		c0.04	0.14	c0.20	0.04	0.13	
v/s Ratio Perm			0.19			0.30	0.30		0.32	0.28		0.04
v/c Ratio	0.88	1.04	0.65	1.04	0.62	0.79	0.97	0.46	1.02	0.92	0.43	0.13
Uniform Delay, d1	56.8	46.2	40.4	52.0	32.9	36.0	40.5	36.3	32.0	39.3	35.9	32.5
Progression Factor	1.00	1.00	1.00	1.28	0.58	0.48	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.0	39.8	7.1	48.8	1.4	7.2	48.4	0.9	38.8	38.4	0.9	0.6
Delay (s)	91.8	86.0	47.5	115.3	20.5	24.6	88.9	37.2	70.8	77.8	36.7	33.0
Level of Service	F	F	D	F	C	C	F	D	E	E	D	C
Approach Delay (s)	77.2			41.5			59.5			44.1		
Approach LOS	E			D			E			D		
Intersection Summary												
HCM 2000 Control Delay	56.3			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.03											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			21.4					
Intersection Capacity Utilization	113.7%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Total>PM
10-18-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3450	1427	0	3539	3618	0
Fit Permitted	0.954					
Satd. Flow (perm)	3450	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	104				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1372	640	0	936	653	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1436	576	0	936	653	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2033 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

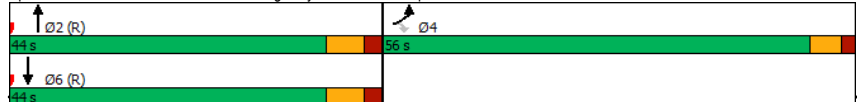


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
v/c Ratio	0.86	0.79		0.67	0.45	
Control Delay	29.2	26.3		28.2	24.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	29.2	26.3		28.2	24.0	
LOS	C	C		C	C	
Approach Delay	28.4			28.2	24.0	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 27.5 Intersection LOS: C
 Intersection Capacity Utilization 76.2% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2033 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1436	576	936	653
v/c Ratio	0.86	0.79	0.67	0.45
Control Delay	29.2	26.3	28.2	24.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.2	26.3	28.2	24.0
Queue Length 50th (m)	117.5	79.5	79.4	49.6
Queue Length 95th (m)	145.4	129.5	102.5	66.3
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1745	760	1405	1436
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.76	0.67	0.45

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2033 Future Total>PM
 10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↑↑	↑↑	
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3453	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3453	1404		3539	3618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1372	640	0	936	653	0
RTOR Reduction (vph)	4	54	0	0	0	0
Lane Group Flow (vph)	1432	522	0	936	653	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	48.1	48.1		39.7	39.7	
Effective Green, g (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1660	675		1404	1436	
v/s Ratio Prot	c0.41			c0.26	0.18	
v/s Ratio Perm		0.37				
v/c Ratio	0.86	0.77		0.67	0.45	
Uniform Delay, d1	23.0	21.4		24.7	22.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	5.5		2.5	1.0	
Delay (s)	27.9	27.0		27.2	23.2	
Level of Service	C	C		C	C	
Approach Delay (s)	27.6			27.2	23.2	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		26.7		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.77				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		76.2%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

APPENDIX

H-3 2038 FUTURE TOTAL CONDITIONS

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Total>AM
10-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.990			0.992			0.854			0.850	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3423	0	1652	3390	0	1745	1537	0	1725	1534	0
Fit Permitted	0.950			0.950			0.736			0.163		
Satd. Flow (perm)	1677	3423	0	1643	3390	0	1337	1537	0	296	1534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			6			287			359	
Link Speed (k/h)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	857	61	111	487	27	241	10	398	15	0	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	918	0	111	514	0	241	408	0	15	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Total>AM
10-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	61.4		13.3	71.1		27.5	27.5		27.5	27.5	
Actuated g/C Ratio	0.06	0.51		0.11	0.59		0.23	0.23		0.23	0.23	
v/c Ratio	0.22	0.52		0.61	0.26		0.79	0.71		0.22	0.05	
Control Delay	70.1	15.4		80.8	8.2		60.9	18.9		42.4	0.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.1	15.4		80.8	8.2		60.9	18.9		42.4	0.1	
LOS	E	B		F	A		E	B		D	A	
Approach Delay		16.7			21.1			34.5			13.6	
Approach LOS		B			C			C			B	

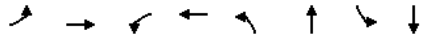
Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 23.0 Intersection LOS: C
 Intersection Capacity Utilization 68.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2038 Future Total>AM
1: Walnut Lane & Kingston Road 10-19-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	918	111	514	241	408	15	32
w/c Ratio	0.22	0.52	0.61	0.26	0.79	0.71	0.22	0.05
Control Delay	70.1	15.4	80.8	8.2	60.9	18.9	42.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.1	15.4	80.8	8.2	60.9	18.9	42.4	0.1
Queue Length 50th (m)	5.4	35.6	27.2	13.0	53.8	25.3	2.9	0.0
Queue Length 95th (m)	m11.7	87.1	46.2	26.6	74.6	54.7	8.6	0.0
Internal Link Dist (m)		105.3	670.6		100.5	155.7		
Turn Bay Length (m)	26.0		37.0		63.2	18.5		
Base Capacity (vph)	104	1756	231	2010	454	712	100	758
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 w/c Ratio	0.21	0.52	0.48	0.26	0.53	0.57	0.15	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <2038 Future Total>AM
1: Walnut Lane & Kingston Road 10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6	3.0	6.6	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.98	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1685	3423	1652	3391	1726	1536	1723	1534	1723	1534	1723	1534
Fit Permitted	0.95	1.00	0.95	1.00	0.74	1.00	0.16	1.00	0.16	1.00	0.16	1.00
Satd. Flow (perm)	1685	3423	1652	3391	1338	1536	296	1534	296	1534	296	1534
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)	22	857	61	111	487	27	241	10	398	15	0	32
RTOR Reduction (vph)	0	3	0	0	3	0	221	0	0	25	0	0
Lane Group Flow (vph)	22	915	0	111	511	0	241	187	0	15	7	0
Confl. Peds. (#/hr)	4	8	8	4	9	2	2	2	2	2	2	9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6			8					4
Permitted Phases					8					4		
Actuated Green, G (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Effective Green, g (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Actuated g/C Ratio	0.04	0.51	0.11	0.58	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	6.6	3.0	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	67	1751	183	1975	306	352	67	351	67	351	67	351
v/s Ratio Prot	0.01	c0.27	c0.07	0.15			0.12			0.00		
v/s Ratio Perm					c0.18				0.05			
w/c Ratio	0.33	0.52	0.61	0.26	0.79	0.53	0.22	0.02	0.22	0.02	0.22	0.02
Uniform Delay, d1	56.0	19.5	50.9	12.3	43.5	40.6	37.6	35.8	37.6	35.8	37.6	35.8
Progression Factor	1.23	0.66	1.35	0.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	1.0	5.2	0.3	12.6	1.5	1.7	0.0	1.7	0.0	1.7	0.0
Delay (s)	71.5	14.0	73.9	7.4	56.1	42.1	39.3	35.8	39.3	35.8	39.3	35.8
Level of Service	E	B	E	A	E	D	D	D	D	D	D	D
Approach Delay (s)		15.3		19.2		47.3		36.9		36.9		36.9
Approach LOS		B		B		D		D		D		D

Intersection Summary

HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2038 Future Total>AM
10-19-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	837	162	0	755	0	34
Future Volume (vph)	837	162	0	755	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3433	1516	0	3400	0	1808
Fit Permitted						
Satd. Flow (perm)	3433	1516	0	3400	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	5%	2%	0%
Adj. Flow (vph)	910	176	0	821	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	910	176	0	821	0	37
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2038 Future Total>AM
10-19-2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	837	162	0	755	0	34
Future Volume (Veh/h)	837	162	0	755	0	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	910	176	0	821	0	37
Pedestrians						4
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.87		0.90	0.87
vC, conflicting volume			914		1324	459
vC1, stage 1 conf vol					914	
vC2, stage 2 conf vol					410	
vCu, unblocked vol			599		813	75
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			842		419	846

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	455	455	176	410	410	37
Volume Left	0	0	0	0	0	0
Volume Right	0	0	176	0	0	37
cSH	1700	1700	1700	1700	1700	846
Volume to Capacity	0.27	0.27	0.10	0.24	0.24	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.5
Lane LOS						A
Approach Delay (s)	0.0			0.0		9.5
Approach LOS						A

Intersection Summary

Average Delay 0.2
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Total>AM
10-19-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖		↖	↖	
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4		48.0			18.0			25.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00	1.00		1.00	1.00		0.99	1.00		0.99	
Frt	0.987		0.980		0.900		0.879					
Flt Protected	0.950		0.950			0.950			0.950			
Satd. Flow (prot)	1564	3320	0	1645	3301	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950		0.950			0.551			0.726			
Satd. Flow (perm)	1554	3320	0	1640	3301	0	1014	1769	0	1393	1759	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		11			17			32			157	
Link Speed (k/h)	60		60		40		60		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	914	88	85	640	96	66	16	32	162	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1002	0	85	736	0	66	48	0	162	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		4.9					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane			Yes									
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

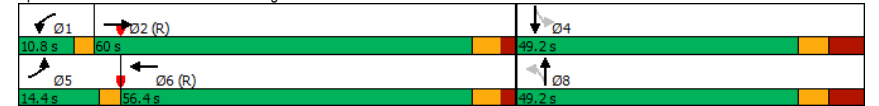
<2038 Future Total>AM
10-19-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases										8		4
Detector Phase	5	2			1	6				8	8	4 4
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0				8.0	8.0	8.0 8.0
Minimum Split (s)	8.0	27.6			8.0	27.6				42.5	42.5	40.8 40.8
Total Split (s)	14.4	60.0			10.8	56.4				49.2	49.2	49.2 49.2
Total Split (%)	12.0%	50.0%			9.0%	47.0%				41.0%	41.0%	41.0% 41.0%
Maximum Green (s)	11.4	53.4			7.8	49.8				39.7	39.7	39.7 39.7
Yellow Time (s)	3.0	4.2			3.0	4.2				4.4	4.4	4.4 4.4
All-Red Time (s)	0.0	2.4			0.0	2.4				5.1	5.1	5.1 5.1
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0 0.0
Total Lost Time (s)	3.0	6.6			3.0	6.6				9.5	9.5	9.5 9.5
Lead/Lag	Lead	Lag			Lead	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0 3.0
Recall Mode	None	C-Max			None	C-Max				None	None	None
Walk Time (s)		7.0				7.0				7.0	7.0	7.0 7.0
Flash Dont Walk (s)		14.0				14.0				23.0	23.0	23.0 23.0
Pedestrian Calls (#/hr)		6				1				7	7	4 4
Act Effect Green (s)	10.3	73.1			7.8	70.6				20.0	20.0	20.0 20.0
Actuated g/C Ratio	0.09	0.61			0.06	0.59				0.17	0.17	0.17 0.17
v/c Ratio	0.65	0.49			0.80	0.38				0.39	0.15	0.70 0.46
Control Delay	75.4	15.0			96.6	11.2				49.2	19.3	62.0 13.7
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0 0.0
Total Delay	75.4	15.0			96.6	11.2				49.2	19.3	62.0 13.7
LOS	E	B			F	B				D	B	E B
Approach Delay		19.8				20.1				36.6		35.6
Approach LOS		B				C				D		D

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 112.8 (94%), 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: 23.1
 Intersection LOS: C
 Intersection Capacity Utilization 73.8%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 3: Dixie Road & Kingston Road

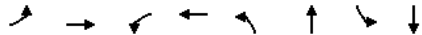


Queues

<2038 Future Total>AM

3: Dixie Road & Kingston Road

10-19-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	1002	85	736	66	48	162	195
w/c Ratio	0.65	0.49	0.80	0.38	0.39	0.15	0.70	0.46
Control Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Length 50th (m)	20.0	63.4	18.8	44.4	14.1	3.2	36.6	7.8
Queue Length 95th (m)	#39.1	99.4	#48.0	50.7	25.3	12.4	53.8	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2026	106	1949	335	606	460	686
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 w/c Ratio	0.59	0.49	0.80	0.38	0.20	0.08	0.35	0.28

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<2038 Future Total>AM

3: Dixie Road & Kingston Road

10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3319		1645	3302		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.55	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3319		1645	3302		1014	1769		1392	1760	
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)	87	914	88	85	640	96	66	16	32	162	38	157
RTOR Reduction (vph)	0	4	0	0	7	0	0	27	0	0	131	0
Lane Group Flow (vph)	87	998	0	85	729	0	66	21	0	162	64	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Effective Green, g (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.09	0.61		0.06	0.59		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2021		106	1942		169	294		232	293	
v/s Ratio Prot	0.06	c0.30		c0.05	0.22			0.01			0.04	
v/s Ratio Perm							0.07			c0.12		
w/c Ratio	0.65	0.49		0.80	0.38		0.39	0.07		0.70	0.22	
Uniform Delay, d1	53.1	13.1		55.3	13.1		44.6	42.2		47.2	43.2	
Progression Factor	1.00	1.00		0.92	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.9		33.0	0.5		1.5	0.1		8.8	0.4	
Delay (s)	63.5	14.0		84.0	10.5		46.1	42.3		56.0	43.6	
Level of Service	E	B		F	B		D	D		E	D	
Approach Delay (s)		17.9			18.1			44.5			49.2	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2038 Future Total>AM

10-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	469	396	167	334	42	115	370	125	76	700	176
Future Volume (vph)	257	469	396	167	334	42	115	370	125	76	700	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8	97.9	170.7		117.0	185.5		52.0	49.0		60.5	
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.246			0.514		
Satd. Flow (perm)	1636	3362	1511	1674	3510	1530	462	3700	1513	1080	3618	1522
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157			137			136			191
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	279	510	430	182	363	46	125	402	136	83	761	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	510	430	182	363	46	125	402	136	83	761	191
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2038 Future Total>AM

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	21.7	36.9	36.9	14.0	29.2	29.2	53.6	43.5	36.9	53.0	41.9	41.9
Actuated g/C Ratio	0.18	0.31	0.31	0.12	0.24	0.24	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.48	0.30	0.24	0.16	0.60	0.29
Control Delay	72.6	32.6	30.3	99.9	40.2	0.4	25.9	28.6	6.2	18.7	34.6	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.3	99.9	40.2	0.4	25.9	28.6	6.2	18.7	34.6	5.0
LOS	E	C	C	F	D	A	C	C	A	B	C	A
Approach Delay		40.9			55.5			23.5			27.9	
Approach LOS		D			E			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 36.3

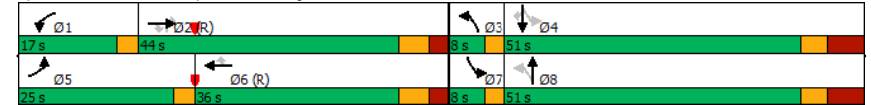
Intersection LOS: D

Intersection Capacity Utilization 97.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues <2038 Future Total>AM
6: Liverpool Road & Kingston Road 10-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	279	510	430	182	363	46	125	402	136	83	761	191
w/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.48	0.30	0.24	0.16	0.60	0.29
Control Delay	72.6	32.6	30.3	99.9	40.2	0.4	25.9	28.6	6.2	18.7	34.6	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.3	99.9	40.2	0.4	25.9	28.6	6.2	18.7	34.6	5.0
Queue Length 50th (m)	66.6	56.3	70.3	43.1	38.3	0.0	16.5	36.1	0.0	10.6	77.2	0.0
Queue Length 95th (m)	#112.0	73.6	101.0	#85.8	52.8	0.0	28.1	49.0	13.9	19.7	97.3	15.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1033	573	197	855	476	261	1340	559	516	1263	655
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced w/c Ratio	0.92	0.49	0.75	0.92	0.42	0.10	0.48	0.30	0.24	0.16	0.60	0.29

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2038 Future Total>AM
6: Liverpool Road & Kingston Road 10-19-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑	↑	↑↑	↑↑	↑	↑	↑↑	↑
Traffic Volume (vph)	257	469	396	167	334	42	115	370	125	76	700	176
Future Volume (vph)	257	469	396	167	334	42	115	370	125	76	700	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Fipb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1790	3700	1513	2011	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.25	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	463	3700	1513	1089	3618	1522
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)	279	510	430	182	363	46	125	402	136	83	761	191
RTOR Reduction (vph)	0	0	110	0	0	35	0	0	95	0	0	123
Lane Group Flow (vph)	279	510	320	182	363	11	125	402	41	83	761	68
Confl. Peds. (#/hr)	15	19	19		15	15		28	28		15	
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2		6		8		2	4		4
Actuated Green, G (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Effective Green, g (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Actuated g/C Ratio	0.18	0.30	0.30	0.12	0.24	0.24	0.40	0.36	0.30	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	1017	457	197	836	364	242	1341	457	452	1281	539
v/s Ratio Prot	c0.17	0.15		0.11	0.10		c0.02	0.11		0.01	c0.21	
v/s Ratio Perm			c0.21			0.01	0.19		0.03	0.06		0.04
w/c Ratio	0.93	0.50	0.70	0.92	0.43	0.03	0.52	0.30	0.09	0.18	0.59	0.13
Uniform Delay, d1	48.4	34.4	37.1	52.5	38.8	35.1	24.6	27.4	30.0	23.5	31.7	26.2
Progression Factor	0.76	0.91	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	31.3	1.5	7.5	42.9	1.6	0.2	1.9	0.6	0.4	0.2	2.0	0.5
Delay (s)	68.0	32.8	42.8	95.4	40.5	35.2	26.5	27.9	30.4	23.7	33.7	26.7
Level of Service	E	C	D	F	D	D	C	C	C	C	C	C
Approach Delay (s)		44.4			57.0			28.2			31.6	
Approach LOS		D			E			C			C	

Intersection Summary
HCM 2000 Control Delay 39.7 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 0.71
Actuated Cycle Length (s) 120.0 Sum of lost time (s) 22.2
Intersection Capacity Utilization 97.4% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-19-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	553	272	146	1090	24
Future Volume (vph)	10	17	36	194	19	59	53	553	272	146	1090	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	1.00		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.205			0.387		
Satd. Flow (perm)	0	3058	0	0	1858	1181	354	5036	1483	678	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	601	296	159	1185	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	601	296	159	1185	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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Lanes, Volumes, Timings

<2038 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	
Detector Phase	3	7		4	8	8	5	2		2	1	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.20	0.23	0.32	0.30	0.42	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	7.4	13.1	4.0	9.0	14.9	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	7.4	13.1	4.0	9.0	14.9	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			9.9			14.0	
Approach LOS		C			D			A			B	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 15.3

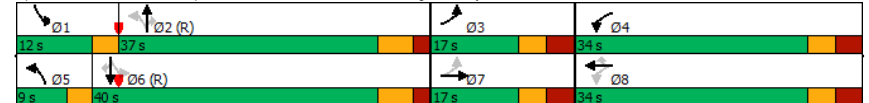
Intersection LOS: B

Intersection Capacity Utilization 55.7%


ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway




Queues <2038 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-19-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	601	296	159	1185	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.20	0.23	0.32	0.30	0.42	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	7.4	13.1	4.0	9.0	14.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	7.4	13.1	4.0	9.0	14.9	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.4	24.0	9.7	11.3	51.0	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.5	37.0	19.8	21.5	67.5	0.0
Internal Link Dist (m)		58.8	304.5			138.3				233.7	
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	294	2621	913	541	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.20	0.23	0.32	0.29	0.42	0.03

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

HCM Signalized Intersection Capacity Analysis <2038 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑↑	↑	↑↑↑	↑↑↑	↑
Traffic Volume (vph)	10	17	36	194	19	59	53	553	272	146	1090	24
Future Volume (vph)	10	17	36	194	19	59	53	553	272	146	1090	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1644	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.20	1.00	1.00	0.39	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	354	5036	1483	680	5029	1458
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)	11	18	39	211	21	64	58	601	296	159	1185	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	0	146	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	601	150	159	1185	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	258	2558	753	502	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.24	
v/s Ratio Perm							0.01	0.11		0.10	0.17	0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.22	0.23	0.20	0.32	0.43	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.4	13.7	13.5	8.1	13.7	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.75	0.89	1.49	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.4	0.2	0.6	0.4	0.5	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.2	12.4	20.6	8.4	14.2	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.7			13.5	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.9 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.43
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-19-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	437	188	69	310	145	535	0	0	900	173
Future Volume (vph)	0	0	437	188	69	310	145	535	0	0	900	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1108	1700	1767	1551	1460	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.147					
Satd. Flow (perm)	0	0	1108	1700	1767	1551	225	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						337						188
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)									4			
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
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	475	204	75	337	158	582	0	0	978	188
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	475	139	140	337	158	582	0	0	978	188
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4				9.4
Detector 2 Size(m)					0.6			0.6				0.6
Detector 2 Type					Cl+Ex			Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2038 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-19-2023

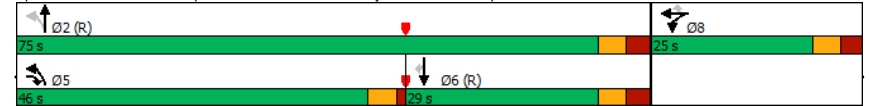


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			46.8	13.7	13.7	13.7	75.8	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.76	0.74			0.23	0.23
v/c Ratio			0.92	0.60	0.58	0.67	0.21	0.16			0.88	0.38
Control Delay			51.3	50.7	49.5	11.3	5.1	4.3			38.0	5.3
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			51.3	50.7	49.5	11.3	5.1	4.3			38.0	5.3
LOS			D	D	D	B	A	A			D	A
Approach Delay			51.3		28.9		4.5				32.7	
Approach LOS			D		C		A				C	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	27.9
Intersection LOS:	C
Intersection Capacity Utilization:	65.5%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2038 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-19-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	475	139	140	337	158	582	978	188
v/c Ratio	0.92	0.60	0.58	0.67	0.21	0.16	0.88	0.38
Control Delay	51.3	50.7	49.5	11.3	5.1	4.3	38.0	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	50.7	49.5	11.3	5.1	4.3	38.0	5.3
Queue Length 50th (m)	82.3	27.1	27.2	0.0	6.7	10.0	69.0	10.2
Queue Length 95th (m)	#158.6	44.3	44.3	23.2	17.5	16.9	#90.4	8.2
Internal Link Dist (m)			202.7		348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	518	323	335	567	749	3651	1107	494
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	0.92	0.43	0.42	0.59	0.21	0.16	0.88	0.38

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<2038 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	437	188	69	310	145	535	0	0	900	173
Future Volume (vph)	0	0	437	188	69	310	145	535	0	0	900	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Ft, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1108	1700	1767	1551	1460	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.15	1.00			1.00	1.00
Satd. Flow (perm)			1108	1700	1767	1551	226	4932			4877	1538
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	0	475	204	75	337	158	582	0	0	978	188
RTOR Reduction (vph)	0	0	0	0	0	291	0	0	0	0	0	145
Lane Group Flow (vph)	0	0	475	139	140	46	158	582	0	0	978	43
Confl. Peds. (#/hr)							7	14	14		7	
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Effective Green, g (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.74	0.74			0.23	0.23
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			518	232	242	212	744	3649			1107	349
v/s Ratio Prot			c0.43	c0.08	0.08		0.10	0.12			c0.20	
v/s Ratio Perm						0.03	0.06					0.03
v/c Ratio			0.92	0.60	0.58	0.22	0.21	0.16			0.88	0.12
Uniform Delay, d1			24.8	40.6	40.4	38.4	5.8	3.8			37.4	30.7
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.74	0.64
Incremental Delay, d2			21.0	4.1	3.3	0.5	0.1	0.1			9.8	0.7
Delay (s)			45.8	44.7	43.8	38.9	6.0	3.9			37.2	20.3
Level of Service			D	D	D	D	A	A			D	C
Approach Delay (s)			45.8			41.3		4.4			34.5	
Approach LOS			D			D		A			C	

Intersection Summary

HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

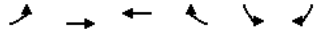
c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Total>AM

10: Kingston Road & Fairport Road

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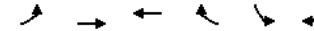
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↔	↕	
Traffic Volume (vph)	96	795	706	99	182	229	
Future Volume (vph)	96	795	706	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Fr			0.981				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3384	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3384	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			15				249
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	864	767	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	864	875	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

<2038 Future Total>AM

10: Kingston Road & Fairport Road

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.37	0.42		0.72	0.52	
Control Delay	74.8	4.3	15.5		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	74.8	4.3	15.5		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		11.8	15.5		34.1		
Approach LOS		B	B		C		

Intersection Summary

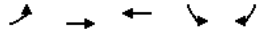
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 52.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

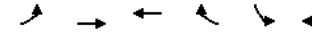
<2038 Future Total>AM
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Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	864	875	198	249
w/c Ratio	0.62	0.37	0.42	0.72	0.52
Control Delay	74.8	4.3	15.5	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	74.8	4.3	15.5	65.5	9.1
Queue Length 50th (m)	17.8	81.0	57.2	49.0	0.0
Queue Length 95th (m)	30.9	2.1	94.8	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2062	476	649
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 w/c Ratio	0.44	0.37	0.42	0.42	0.38
Intersection Summary					

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2038 Future Total>AM
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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↔	↕↕
Traffic Volume (vph)	96	795	706	99	182	229
Future Volume (vph)	96	795	706	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3386		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3386		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	864	767	108	198	249
RTOR Reduction (vph)	0	0	6	0	0	209
Lane Group Flow (vph)	104	864	869	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2057		276	271
v/s Ratio Prot	c0.06	0.26	c0.26		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.38	0.42		0.72	0.15
Uniform Delay, d1	55.7	8.4	13.5		51.9	47.0
Progression Factor	1.11	0.42	1.00		1.00	1.00
Incremental Delay, d2	5.6	0.4	0.6		8.6	0.3
Delay (s)	67.6	3.9	14.1		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	14.1		53.1	
Approach LOS		B	B		D	
Intersection Summary						
HCM 2000 Control Delay		20.3		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.50				
Actuated Cycle Length (s)		130.0		Sum of lost time (s)		16.6
Intersection Capacity Utilization		52.7%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings

<2038 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

10-19-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔		↖	↗↗	↖↖	↗
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	901	13	309	728	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	914	0	309	728	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2038 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

10-19-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effct Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.58		0.85	0.29	0.78	0.20
Control Delay	15.1		56.7	13.0	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	15.1		56.7	13.0	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	15.1			26.0	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.1 Intersection LOS: C
 Intersection Capacity Utilization 67.1% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Total>AM
10-19-2023

	→	↖	←	↙	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	914	309	728	501	71
w/c Ratio	0.58	0.85	0.29	0.78	0.20
Control Delay	15.1	56.7	13.0	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	56.7	13.0	58.6	10.2
Queue Length 50th (m)	83.0	75.7	63.4	63.7	0.0
Queue Length 95th (m)	111.5	104.0	82.6	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.58	0.68	0.29	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Total>AM
10-19-2023

	→	↖	←	↙	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕↔	↕↔	↕↔	↕↔
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	901	13	309	728	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	913	0	209	728	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.26		c0.19	0.21	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.58		0.84	0.29	0.78	0.04
Uniform Delay, d1	26.4		47.8	7.1	50.2	43.2
Progression Factor	0.48		0.79	1.67	1.00	1.00
Incremental Delay, d2	1.3		15.2	0.3	5.8	0.1
Delay (s)	14.0		52.8	12.2	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	14.0			24.3	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2038 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-19-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3381	0	1805	1755	0	1643	1468	0
Flt Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3381	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			8			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1148	40	104	1128	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1188	0	104	1208	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

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12: Plaza Entrance/Delta Blvd & Kingston Road

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0		8.0
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6		37.6
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0		39.0
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%		30.0%
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0		29.0
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8		3.8
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2		6.2
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0		10.0
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0		3.0
Recall Mode	None	C-Max		None	C-Max		None	None		None		None
Walk Time (s)	7.0		7.0		7.0		7.0					
Flash Dont Walk (s)	18.0		18.0		20.0		20.0					
Pedestrian Calls (#/hr)	1		16		0		0				1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9		20.9
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16		0.16
v/c Ratio	0.59	0.62		0.63	0.59		0.76	0.29		0.24		0.43
Control Delay	65.7	17.4		80.2	11.4		74.1	11.5		48.1		12.9
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0		0.0
Total Delay	65.7	17.5		80.2	11.4		74.1	11.5		48.1		12.9
LOS	E	B		F	B		E	B		D		B
Approach Delay	20.6		16.9		48.2		21.2					
Approach LOS	C		B		D		C					

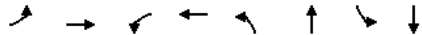
Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 80.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



Queues <2038 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-19-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1188	104	1208	152	107	46	149
w/c Ratio	0.59	0.62	0.63	0.59	0.76	0.29	0.24	0.43
Control Delay	65.7	17.4	80.2	11.4	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.7	17.5	80.2	11.4	74.1	11.5	48.1	12.9
Queue Length 50th (m)	18.6	92.2	22.3	78.7	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.2	121.5	39.2	174.0	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2037	278	469	264	432
Starvation Cap Reductn	0	75	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 w/c Ratio	0.50	0.64	0.51	0.59	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis <2038 Future Total>AM
12: Plaza Entrance/Delta Blvd & Kingston Road 10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3280		1671	3381		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3280		1671	3381		1249	1755		1185	1468	
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)	83	1148	40	104	1128	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	3	0	84	0	0	113	0	0
Lane Group Flow (vph)	83	1186	0	104	1205	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8				4	
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2033		200	282		190	236	
v/s Ratio Prot	0.05	c0.36		c0.06	0.36			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.62		0.63	0.59		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	17.3		56.3	16.0		52.2	46.4		47.6	46.9	
Progression Factor	0.87	0.84		1.15	0.58		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	1.4		7.3	1.2		15.5	0.1		0.7	0.3	
Delay (s)	55.8	15.9		72.0	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.5			15.5			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2038 Future Total>AM
10-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			144		249			191			172	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

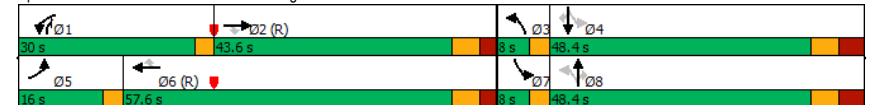
<2038 Future Total>AM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	38.2	38.2	25.4	52.5	52.5	50.4	40.0	70.8	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.39	0.31	0.54	0.39	0.31	0.31
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	37.3		27.2		27.1		33.4					
Approach LOS	D		C		C		C					

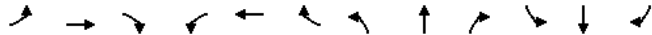
Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	30.8
Intersection Capacity Utilization:	108.2%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	G

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2038 Future Total>AM
13: Whites Road & Kingston Road 10-19-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Length 50th (m)	21.2	40.8	38.6	58.8	58.8	19.2	26.2	30.0	41.6	31.6	67.8	3.2
Queue Length 95th (m)	38.4	55.3	69.7	#121.0	47.2	8.7	#51.5	39.4	68.2	49.1	81.8	20.2
Internal Link Dist (m)		273.5			198.7			134.6			361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	979	561	366	1418	763	208	1556	935	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.38	0.57	0.84	0.43	0.41	0.76	0.27	0.53	0.50	0.56	0.32

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2038 Future Total>AM
13: Whites Road & Kingston Road 10-19-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	0.91	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1528	1741	5057	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1528	906	5057	1574
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)	85	374	320	309	612	315	159	424	492	189	865	190
RTOR Reduction (vph)	0	0	102	0	0	148	0	0	95	0	0	119
Lane Group Flow (vph)	85	374	218	309	612	167	159	424	397	189	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Effective Green, g (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.35	0.31	0.50	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	979	459	345	1417	614	191	1556	768	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.17	0.17		c0.03	0.08	0.10	0.02	0.17	
v/s Ratio Perm			c0.14			0.11	c0.25		0.16	0.17		0.05
v/c Ratio	0.61	0.38	0.48	0.90	0.43	0.27	0.83	0.27	0.52	0.55	0.56	0.15
Uniform Delay, d1	57.4	36.5	37.7	51.0	28.0	25.9	37.0	34.0	21.7	32.3	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.86	0.59	0.50	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.1	3.5	21.2	0.8	0.9	25.5	0.4	0.6	1.8	1.4	0.6
Delay (s)	65.1	37.6	41.2	65.2	17.4	13.9	62.5	34.4	22.3	34.0	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		42.1			28.4			33.0			37.4	
Approach LOS		D			C			C			D	

Intersection Summary
 HCM 2000 Control Delay 34.6 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.72
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
 Intersection Capacity Utilization 108.2% ICU Level of Service G
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings

<2038 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

10-19-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↗		↖↖	↖↖	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.994	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3391	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3391	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	701	291	0	758	484	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	730	262	0	758	484	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2038 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

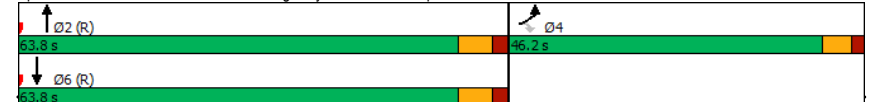
10-19-2023

	↖	↗	↙	↘	↕	↔
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
v/c Ratio	0.79	0.46		0.36	0.23	
Control Delay	43.3	6.2		11.7	10.4	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	43.3	6.2		11.7	10.4	
LOS	D	A		B	B	
Approach Delay	33.5			11.7	10.4	
Approach LOS	C			B	B	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 21.1
 Intersection Capacity Utilization 50.6%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Total>AM
10-19-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	730	262	758	484
w/c Ratio	0.79	0.46	0.36	0.23
Control Delay	43.3	6.2	11.7	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.3	6.2	11.7	10.4
Queue Length 50th (m)	74.5	0.0	39.3	22.6
Queue Length 95th (m)	87.4	18.7	59.8	36.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1257	683	2082	2148
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.38	0.36	0.23
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Total>AM
10-19-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	TTT	T		TTT	TTT	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3392	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3392	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	701	291	0	758	484	0
RTOR Reduction (vph)	3	191	0	0	0	0
Lane Group Flow (vph)	727	71	0	758	484	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	29.9	29.9		67.9	67.9	
Effective Green, g (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	922	380		2082	2148	
v/s Ratio Prot	c0.21			c0.22	0.14	
v/s Ratio Perm		0.05				
v/c Ratio	0.79	0.19		0.36	0.23	
Uniform Delay, d1	37.1	30.7		10.4	9.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.2		0.5	0.2	
Delay (s)	41.7	31.0		10.9	9.6	
Level of Service	D	C		B	A	
Approach Delay (s)	38.8			10.9	9.6	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay			23.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.2
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.97	
Frt		0.980			0.992			0.853			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3460	0	1685	3509	0	1745	1573	0	1725	1583	0
Flt Permitted	0.950			0.950			0.640			0.375		
Satd. Flow (perm)	1677	3460	0	1682	3509	0	1155	1573	0	679	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			6			91				247
Link Speed (k/h)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	5		7	7		5	14		5	5		14
Conf. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	41	1582	245	68	710	39	236	8	414	26	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1827	0	68	749	0	236	422	0	26	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2038 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases										8		4
Detector Phase	5	2			1	6				3	8	4
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0				5.0	8.0	8.0
Minimum Split (s)	8.0	32.6			8.0	32.6				8.0	37.2	37.2
Total Split (s)	8.0	72.0			9.0	73.0				11.8	49.0	37.2
Total Split (%)	6.2%	55.4%			6.9%	56.2%				9.1%	37.7%	28.6%
Maximum Green (s)	5.0	65.4			6.0	66.4				8.8	40.8	29.0
Yellow Time (s)	3.0	4.4			3.0	4.4				3.0	3.3	3.3
All-Red Time (s)	0.0	2.2			0.0	2.2				0.0	4.9	4.9
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Lost Time (s)	3.0	6.6			3.0	6.6				3.0	8.2	8.2
Lead/Lag	Lead	Lag			Lead	Lag				Lead		Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	C-Max			None	C-Max				None	None	None
Walk Time (s)		7.0				7.0				7.0	7.0	7.0
Flash Dont Walk (s)		19.0				19.0				22.0	22.0	22.0
Pedestrian Calls (#/hr)		8				4				2	9	9
Act Effect Green (s)	5.0	72.9			6.0	75.5				38.5	33.3	21.0
Actuated g/C Ratio	0.04	0.56			0.05	0.58				0.30	0.26	0.16
v/c Ratio	0.64	0.94			0.88	0.37				0.59	0.90	0.24
Control Delay	99.7	22.0			133.7	10.9				43.2	58.2	49.2
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	99.7	22.0			133.7	10.9				43.2	58.2	49.2
LOS	F	C			F	B				D	E	D
Approach Delay		23.7				21.1				52.8		23.8
Approach LOS		C				C				D		C

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 28.7

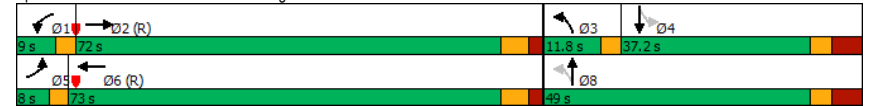
Intersection LOS: C

Intersection Capacity Utilization 89.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2038 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1827	68	749	236	422	26	28
w/c Ratio	0.64	0.94	0.88	0.37	0.59	0.90	0.24	0.06
Control Delay	99.7	22.0	133.7	10.9	43.2	58.2	49.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.7	22.0	133.7	10.9	43.2	58.2	49.2	0.3
Queue Length 50th (m)	10.3	189.0	14.0	72.8	48.6	83.8	5.8	0.0
Queue Length 95th (m)	m#12.9	m#297.4	m#41.9	91.0	67.5	118.4	13.9	0.0
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	1947	77	2039	399	556	151	545
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 w/c Ratio	0.64	0.94	0.88	0.37	0.59	0.76	0.17	0.05

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.

HCM Signalized Intersection Capacity Analysis <2038 Future Total>PM
1: Walnut Lane & Kingston Road 10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00		1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00		0.97
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00		1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.85		1.00		0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1685	3460		1685	3509		1726	1573		1719		1583
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.38		1.00
Satd. Flow (perm)	1685	3460		1685	3509		1163	1573		679		1583
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)	41	1582	245	68	710	39	236	8	414	26	0	28
RTOR Reduction (vph)	0	9	0	0	3	0	0	67	0	0	24	0
Lane Group Flow (vph)	41	1818	0	68	746	0	236	356	0	26	4	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm		NA
Protected Phases	5	2		1	6		3	8				4
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Effective Green, g (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Actuated g/C Ratio	0.03	0.55		0.05	0.56		0.27	0.27		0.15		0.15
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	51	1895		77	1975		367	423		101		236
v/s Ratio Prot	0.02	c0.53		c0.04	0.21		0.06	c0.23				0.00
v/s Ratio Perm							0.11			0.04		
w/c Ratio	0.80	0.96		0.88	0.38		0.64	0.84		0.26		0.02
Uniform Delay, d1	62.6	28.0		61.7	15.8		40.7	44.9		48.9		47.2
Progression Factor	1.28	0.52		1.08	0.66		1.00	1.00		1.00		1.00
Incremental Delay, d2	35.8	8.0		59.5	0.5		3.8	14.0		1.4		0.0
Delay (s)	115.6	22.7		126.2	10.8		44.6	58.8		50.3		47.2
Level of Service	F	C		F	B		D	E		D		D
Approach Delay (s)		24.7			20.4			53.7				48.7
Approach LOS		C			C			D				D

Intersection Summary
 HCM 2000 Control Delay 29.7 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.93
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 20.8
 Intersection Capacity Utilization 89.2% ICU Level of Service E
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2038 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	1647	181	0	1024	0	35
Future Volume (vph)	1647	181	0	1024	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3500	1561	0	3500	0	1808
Fit Permitted						
Satd. Flow (perm)	3500	1561	0	3500	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	2%	2%	2%	0%
Adj. Flow (vph)	1790	197	0	1113	0	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1790	197	0	1113	0	38
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2038 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	1647	181	0	1024	0	35
Future Volume (Veh/h)	1647	181	0	1024	0	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1790	197	0	1113	0	38
Pedestrians						3
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.46		0.51	0.46
vC, conflicting volume			1793		2350	898
vC1, stage 1 conf vol					1793	
vC2, stage 2 conf vol					556	
vCu, unblocked vol			360		734	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			545		295	497

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	895	895	197	556	556	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	197	0	0	38
cSH	1700	1700	1700	1700	1700	497
Volume to Capacity	0.53	0.53	0.12	0.33	0.33	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	12.8
Lane LOS						B
Approach Delay (s)	0.0			0.0		12.8
Approach LOS						B

Intersection Summary	
Average Delay	0.2
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Total>PM
10-18-2023

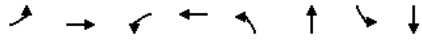
	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖		↖	↖	
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.978		0.978		0.978		0.920		0.885			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3338	0	1597	3421	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.674			0.676		
Satd. Flow (perm)	1578	3338	0	1595	3421	0	1250	1786	0	1290	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			19			42			100	
Link Speed (k/h)	60		60		60		40		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	222	1752	303	43	905	154	166	59	68	161	30	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	2055	0	43	1059	0	166	127	0	161	130	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2038 Future Total>PM
10-18-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2			1	6						4
Permitted Phases										8		4
Detector Phase	5	2			1	6				8	8	4
Switch Phase												
Minimum Initial (s)	5.0	20.0			5.0	20.0				8.0	8.0	8.0
Minimum Split (s)	8.0	27.6			8.0	27.6				40.1	40.1	40.1
Total Split (s)	26.0	81.6			8.0	63.6				40.4	40.4	40.4
Total Split (%)	20.0%	62.8%			6.2%	48.9%				31.1%	31.1%	31.1%
Maximum Green (s)	23.0	75.0			5.0	57.0				30.9	30.9	30.9
Yellow Time (s)	3.0	4.2			3.0	4.2				4.4	4.4	4.4
All-Red Time (s)	0.0	2.4			0.0	2.4				5.1	5.1	5.1
Lost Time Adjust (s)	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Lost Time (s)	3.0	6.6			3.0	6.6				9.5	9.5	9.5
Lead/Lag	Lead	Lag			Lead	Lag						
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0				3.0	3.0	3.0
Recall Mode	None	C-Max			None	C-Max				None	None	None
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.2	85.1			5.0	67.3				22.4	22.4	22.4
Actuated g/C Ratio	0.16	0.65			0.04	0.52				0.17	0.17	0.17
v/c Ratio	0.86	0.94			0.70	0.60				0.77	0.37	0.73
Control Delay	81.3	15.1			115.0	13.8				73.5	32.9	68.5
Queue Delay	0.0	0.0			0.0	0.0				0.0	0.0	0.0
Total Delay	81.3	15.1			115.0	13.8				73.5	32.9	68.5
LOS	F	B			F	B				E	C	E
Approach Delay	21.6		17.7		55.9		44.7					
Approach LOS	C		B		E		D					
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	130											
Offset:	0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green											
Natural Cycle:	140											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.94											
Intersection Signal Delay:	24.7						Intersection LOS: C					
Intersection Capacity Utilization:	91.7%						ICU Level of Service F					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues <2038 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	222	2055	43	1059	166	127	161	130
w/c Ratio	0.86	0.94	0.70	0.60	0.77	0.37	0.73	0.34
Control Delay	81.3	15.1	115.0	13.8	73.5	32.9	68.5	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.3	15.1	115.0	13.8	73.5	32.9	68.5	15.2
Queue Length 50th (m)	51.7	36.8	11.5	56.9	41.0	19.1	39.4	6.6
Queue Length 95th (m)	m62.4	#78.4	m#29.0	76.8	61.4	35.1	59.2	22.2
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2193	61	1779	297	456	306	487
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 w/c Ratio	0.80	0.94	0.70	0.60	0.56	0.28	0.53	0.27

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.

HCM Signalized Intersection Capacity Analysis <2038 Future Total>PM
3: Dixie Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	↑
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3338		1597	3422		1762	1786		1813	1729	
Fit Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3338		1597	3422		1250	1786		1289	1729	
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)	222	1752	303	43	905	154	166	59	68	161	30	100
RTOR Reduction (vph)	0	9	0	0	9	0	35	0	0	83	0	0
Lane Group Flow (vph)	222	2046	0	43	1050	0	166	92	0	161	47	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Effective Green, g (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.16	0.65		0.03	0.52		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	2169		49	1771		215	307		222	297	
v/s Ratio Prot	c0.14	c0.61		0.03	0.31			0.05			0.03	
v/s Ratio Perm							c0.13			0.12		
w/c Ratio	0.86	0.94		0.88	0.59		0.77	0.30		0.73	0.16	
Uniform Delay, d1	53.0	20.6		62.8	21.8		51.4	47.0		50.9	45.8	
Progression Factor	1.24	0.38		1.08	0.53		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.2	5.3		80.5	1.4		15.7	0.6		11.1	0.3	
Delay (s)	79.1	13.1		148.1	13.0		67.1	47.5		62.0	46.0	
Level of Service	E	B		F	B		E	D		E	D	
Approach Delay (s)		19.6			18.3			58.6			54.9	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay				24.7	HCM 2000 Level of Service			C				
HCM 2000 Volume to Capacity ratio	0.91											
Actuated Cycle Length (s)				130.0	Sum of lost time (s)			19.1				
Intersection Capacity Utilization				91.7%	ICU Level of Service			F				
Analysis Period (min)	15											

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2038 Future Total>PM
10-18-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<2038 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1049	546	267	439	72	131	808	241	102	682	171
Future Volume (vph)	313	1049	546	267	439	72	131	808	241	102	682	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.224			0.146		
Satd. Flow (perm)	1650	3461	1479	1689	3579	1485	422	3773	1543	307	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			127			184			171
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
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
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	340	1140	593	290	477	78	142	878	262	111	741	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	1140	593	290	477	78	142	878	262	111	741	186
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2038 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

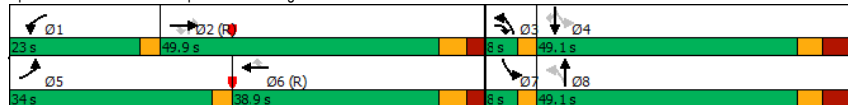


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	29.0	42.8	51.9	22.0	33.8	33.8	51.1	40.0	42.8	51.1	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.40	0.17	0.26	0.26	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.65	0.76	0.42	0.60	0.66	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	41.8	45.6	12.5	38.8	42.5	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	41.8	45.6	12.5	38.8	42.5	7.8
LOS	E	D	D	F	D	A	D	D	B	D	D	A
Approach Delay	49.0			61.8			38.4			35.9		
Approach LOS	D			E			D			D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 135
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.00
 Intersection Signal Delay: 45.9 Intersection LOS: D
 Intersection Capacity Utilization 104.5% ICU Level of Service G
 Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2038 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	340	1140	593	290	477	78	142	878	262	111	741	186
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.65	0.76	0.42	0.60	0.66	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	41.8	45.6	12.5	38.8	42.5	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	41.8	45.6	12.5	38.8	42.5	7.8
Queue Length 50th (m)	76.5	~146.0	126.6	~75.4	56.4	0.0	22.7	106.7	14.1	17.3	86.7	2.7
Queue Length 95th (m)	m90.4	m#182.7	m#155.6	#132.1	73.7	2.4	#37.7	130.8	36.9	29.5	108.0	19.8
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8	97.9	170.7	117.0	185.5		52.0	49.0				60.5
Base Capacity (vph)	402	1139	640	289	931	480	219	1160	631	186	1124	569
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.00	0.93	1.00	0.51	0.16	0.65	0.76	0.42	0.60	0.66	0.33

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.

HCM Signalized Intersection Capacity Analysis

<2038 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	313	1049	546	267	439	72	131	808	241	102	682	171
Future Volume (vph)	313	1049	546	267	439	72	131	808	241	102	682	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	1.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1805	3773	1543	2023	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.22	1.00	1.00	0.15	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	426	3773	1543	310	3654	1466
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)	340	1140	593	290	477	78	142	878	262	111	741	186
RTOR Reduction (vph)	0	0	48	0	0	58	0	0	123	0	0	118
Lane Group Flow (vph)	340	1140	545	290	477	20	142	878	139	111	741	68
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6	8		2	4			4
Actuated Green, G (s)	29.0	42.8	47.8	20.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Effective Green, g (s)	29.0	42.8	47.8	22.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.37	0.17	0.26	0.26	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	376	1139	548	289	930	386	200	1160	508	173	1124	451
v/s Ratio Prot	c0.20	c0.33	c0.04	c0.17	0.13		0.03	c0.23		0.02	0.20	
v/s Ratio Perm			0.33			0.01	0.22		0.09	0.20		0.05
v/c Ratio	0.90	1.00	0.99	1.00	0.51	0.05	0.71	0.76	0.27	0.64	0.66	0.15
Uniform Delay, d1	49.1	43.6	41.0	54.0	41.1	36.1	35.8	40.6	32.1	31.6	39.1	32.7
Progression Factor	1.01	0.71	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.5	18.4	24.7	53.8	2.0	0.3	11.0	4.6	1.3	7.9	3.0	0.7
Delay (s)	63.3	49.3	57.2	107.8	43.1	36.3	46.8	45.2	33.5	39.5	42.1	33.4
Level of Service	E	D	E	F	D	D	D	D	C	D	D	C
Approach Delay (s)		53.8			64.7			43.0			40.3	
Approach LOS		D			E			D			D	
Intersection Summary												
HCM 2000 Control Delay		50.2										D
HCM 2000 Volume to Capacity ratio		0.93										
Actuated Cycle Length (s)		130.0							22.2			
Intersection Capacity Utilization		104.5%							G			
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings

<2038 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	873	401	196	1246	46
Future Volume (vph)	87	69	130	412	58	174	116	873	401	196	1246	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor		0.96		0.98			1.00		0.96	0.99		0.93
Frt		0.902				0.850		0.850				0.850
Flt Protected	0.950			0.950			0.950		0.950			0.950
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000			0.000			0.110		0.230			
Satd. Flow (perm)	0	2959	0	0	1858	1399	190	5085	1502	411	5079	1482
Right Turn on Red			Yes			Yes		Yes			Yes	Yes
Satd. Flow (RTOR)		141				189		436				144
Link Speed (k/h)	30				50			50				50
Link Distance (m)		82.8			328.5			162.3				257.7
Travel Time (s)		9.9			23.7			11.7				18.6
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	95	75	141	448	63	189	126	949	436	213	1354	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	216	0	448	63	189	126	949	436	213	1354	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8				3.8
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

Lanes, Volumes, Timings

<2038 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

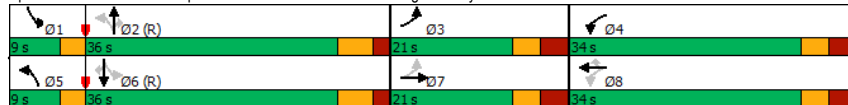


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0
Minimum Split (s)	15.0	15.0		34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	21.0	21.0		34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0
Total Split (%)	21.0%	21.0%		34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4		27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				20	20		28	28		15	15	
Act Effect Green (s)	11.0	11.0		20.9	20.9	20.9	48.9	39.6	39.6	48.9	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.49	0.40	0.40	0.49	0.40	0.40
v/c Ratio	0.51	0.48		0.67	0.16	0.43	0.70	0.47	0.51	0.77	0.67	0.07
Control Delay	51.0	18.9		40.8	31.2	7.5	34.7	20.0	8.4	38.9	28.6	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9		40.8	31.2	7.5	34.7	20.0	8.4	38.9	28.6	0.2
LOS	D	B		D	C	A	C	B	A	D	C	A
Approach Delay	28.7			31.0			17.9			29.1		
Approach LOS	C			C			B			C		

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	15 (15%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	25.3
Intersection Capacity Utilization:	69.3%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	C

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<2038 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	95	216	448	63	189	126	949	436	213	1354	50
v/c Ratio	0.51	0.48	0.67	0.16	0.43	0.70	0.47	0.51	0.77	0.67	0.07
Control Delay	51.0	18.9	40.8	31.2	7.5	34.7	20.0	8.4	38.9	28.6	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9	40.8	31.2	7.5	34.7	20.0	8.4	38.9	28.6	0.2
Queue Length 50th (m)	17.7	7.1	42.3	10.3	0.0	7.0	52.1	32.2	20.8	75.1	0.0
Queue Length 95th (m)	32.2	17.3	52.8	19.3	15.9	m#40.8	74.9	54.9	#62.0	#111.5	0.0
Internal Link Dist (m)	58.8		304.5		138.3		233.7				
Turn Bay Length (m)	57.0		62.1		54.4		75.7		132.5		35.5
Base Capacity (vph)	245	546	877	509	520	180	2012	857	278	2010	673
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.40	0.51	0.12	0.36	0.70	0.47	0.51	0.77	0.67	0.07

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2038 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	873	401	196	1246	46
Future Volume (vph)	87	69	130	412	58	174	116	873	401	196	1246	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2931		3204	1858	1399	1644	5085	1503	1706	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.11	1.00	1.00	0.23	1.00	1.00
Satd. Flow (perm)	0	2931		0	1858	1399	190	5085	1503	412	5079	1485
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)	95	75	141	448	63	189	126	949	436	213	1354	50
RTOR Reduction (vph)	0	125	0	0	0	149	0	0	263	0	0	30
Lane Group Flow (vph)	95	91	0	448	63	40	126	949	173	213	1354	20
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Effective Green, g (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	322		669	388	292	173	2013	595	265	2011	588
v/s Ratio Prot	c0.06	0.03		c0.14	0.03		0.04	0.19		c0.05	0.27	
v/s Ratio Perm						0.03	0.29		0.11	c0.32		0.01
v/c Ratio	0.51	0.28		0.67	0.16	0.14	0.73	0.47	0.29	0.80	0.67	0.03
Uniform Delay, d1	41.9	40.9		36.4	32.4	32.2	18.3	22.4	20.6	19.6	24.9	18.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.82	0.80	2.25	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.5		2.6	0.2	0.2	13.0	0.7	1.1	16.0	1.8	0.1
Delay (s)	44.1	41.3		38.9	32.6	32.4	27.9	18.7	47.4	35.6	26.7	18.6
Level of Service	D	D		D	C	C	C	B	D	D	C	B
Approach Delay (s)		42.2			36.6			27.7			27.6	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		30.3										C
HCM 2000 Volume to Capacity ratio		0.72										
Actuated Cycle Length (s)		100.0							22.5			
Intersection Capacity Utilization		69.3%										C
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2038 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	427	278	487	293	125	1110	0	0	1135	128
Future Volume (vph)	0	0	427	278	487	293	125	1110	0	0	1135	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0	1	1		1	1			0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865			0.850						0.850
Flt Protected				0.950	0.997		0.950					
Satd. Flow (prot)	0	0	1662	1734	1820	1581	1825	5079	0	0	4972	1633
Flt Permitted				0.950	0.997		0.132					
Satd. Flow (perm)	0	0	1662	1734	1820	1581	254	5079	0	0	4972	1509
Right Turn on Red			No		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)					85							139
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4			226.7		372.2				162.3	
Travel Time (s)		27.3			16.3		26.8				11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
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
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	464	302	529	318	136	1207	0	0	1234	139
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	0	464	272	559	318	136	1207	0	0	1234	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7		3.7				3.7	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<2038 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023

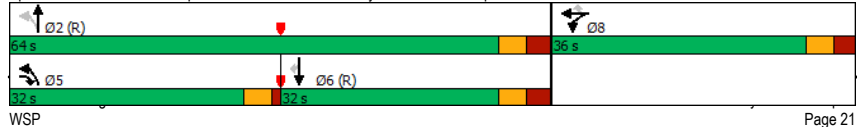


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8			5	2			6
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			32.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)			32.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)			27.5	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		14			7	7
Act Effct Green (s)			27.5	30.0	30.0	30.0	59.5	57.7			25.7	25.7
Actuated g/C Ratio			0.28	0.30	0.30	0.30	0.60	0.58			0.26	0.26
v/c Ratio			1.02	0.52	1.02	0.60	0.23	0.41			0.97	0.28
Control Delay			83.4	33.4	80.6	26.9	10.0	12.3			50.5	13.3
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			83.4	33.4	80.6	26.9	10.0	12.3			50.5	13.3
LOS			F	C	F	C	A	B			D	B
Approach Delay		83.4			54.6			12.0			46.7	
Approach LOS		F			D			B			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 42.0 Intersection LOS: D
 Intersection Capacity Utilization 88.0% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



WSP

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Queues

<2038 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	464	272	559	318	136	1207	1234	139
v/c Ratio	1.02	0.52	1.02	0.60	0.23	0.41	0.97	0.28
Control Delay	83.4	33.4	80.6	26.9	10.0	12.3	50.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	33.4	80.6	26.9	10.0	12.3	50.5	13.3
Queue Length 50th (m)	~92.3	45.8	~122.1	38.1	10.7	44.4	47.9	1.6
Queue Length 95th (m)	#154.3	72.1	#187.8	66.2	18.8	54.1	#111.2	m17.0
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	546	533	583	2930	1277	491
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	1.02	0.52	1.02	0.60	0.23	0.41	0.97	0.28

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.

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 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2038 Future Total>PM
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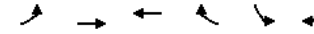


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	427	278	487	293	125	1110	0	0	1135	128
Future Volume (vph)	0	0	427	278	487	293	125	1110	0	0	1135	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.92
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1820	1581	1825	5079			4972	1509
Flt Permitted			1.00	0.95	1.00	1.00	0.13	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1820	1581	254	5079			4972	1509
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	0	464	302	529	318	136	1207	0	0	1234	139
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	0	103
Lane Group Flow (vph)	0	0	464	272	559	259	136	1207	0	0	1234	36
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6	6			7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Effective Green, g (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Actuated g/C Ratio			0.28	0.30	0.30	0.30	0.58	0.58			0.26	0.26
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			457	520	546	474	578	2930			1277	387
v/s Ratio Prot			c0.28	0.16	c0.31		0.06	0.24			c0.25	
v/s Ratio Perm						0.16	0.07					0.02
v/c Ratio			1.02	0.52	1.02	0.55	0.24	0.41			0.97	0.09
Uniform Delay, d1			36.2	29.1	35.0	29.3	12.7	11.7			36.7	28.3
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.92	2.25
Incremental Delay, d2			46.0	1.0	44.7	1.3	0.2	0.4			15.7	0.4
Delay (s)			82.3	30.0	79.7	30.6	12.9	12.2			49.6	64.1
Level of Service			F	C	E	C	B	B			D	E
Approach Delay (s)		82.3			54.3			12.2			51.1	
Approach LOS		F			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2038 Future Total>PM
 10-18-2023



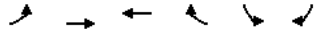
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1872	861	223	271	137	
Future Volume (vph)	205	1872	861	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00			0.99	
Frt			0.969			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3356	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3356	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			34			149	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	223	2035	936	242	295	149	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	223	2035	1178	0	295	149	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2038 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023

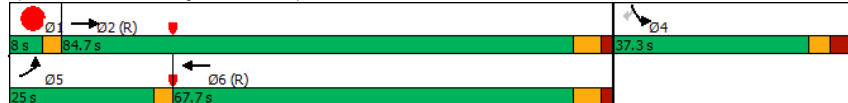


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.6	86.1	67.3		25.5	25.5	
Actuated g/C Ratio	0.16	0.66	0.52		0.20	0.20	
v/c Ratio	0.87	0.89	0.67		0.84	0.32	
Control Delay	79.4	9.0	15.1		70.3	8.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	79.4	9.0	15.1		70.3	8.1	
LOS	E	A	B		E	A	
Approach Delay	16.0		15.1		49.4		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 19.5 Intersection LOS: B
 Intersection Capacity Utilization 78.7% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2038 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	223	2035	1178	295	149
v/c Ratio	0.87	0.89	0.67	0.84	0.32
Control Delay	79.4	9.0	15.1	70.3	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	79.4	9.0	15.1	70.3	8.1
Queue Length 50th (m)	51.0	282.0	126.1	72.7	0.0
Queue Length 95th (m)	m50.3	m272.1	161.4	102.0	16.9
Internal Link Dist (m)	400.0		872.3		256.0
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	273	2274	1754	416	518
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	0.82	0.89	0.67	0.71	0.29

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2038 Future Total>PM
10-18-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↔↔	↔↔		↔	↔
Traffic Volume (vph)	205	1872	861	223	271	137
Future Volume (vph)	205	1872	861	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3357		1805	1751
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3357		1805	1751
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	2035	936	242	295	149
RTOR Reduction (vph)	0	0	16	0	0	120
Lane Group Flow (vph)	223	2035	1162	0	295	29
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.6	84.9	67.3		25.5	25.5
Effective Green, g (s)	20.6	84.9	67.3		25.5	25.5
Actuated g/C Ratio	0.16	0.65	0.52		0.20	0.20
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	256	2242	1737		354	343
v/s Ratio Prot	c0.14	c0.59	0.35		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.87	0.91	0.67		0.83	0.09
Uniform Delay, d1	53.4	19.2	23.1		50.2	42.7
Progression Factor	1.33	0.30	0.56		1.00	1.00
Incremental Delay, d2	7.7	1.7	1.7		15.4	0.1
Delay (s)	78.6	7.5	14.7		65.6	42.8
Level of Service	E	A	B		E	D
Approach Delay (s)		14.5	14.7		57.9	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			78.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Total>PM
10-18-2023

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔		↔	↔↔	↔↔	↔
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					218
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1951	25	200	884	720	303
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1976	0	200	884	720	303
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)			9.4		9.4	
Detector 2 Size(m)			0.6		0.6	
Detector 2 Type			Cl+Ex		Cl+Ex	

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2038 Future Total>PM
10-18-2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↘	↑↑	↘	↗
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1951	25	200	884	720	303
RTOR Reduction (vph)	0	0	0	0	0	168
Lane Group Flow (vph)	1976	0	200	884	720	135
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	67.3		16.0	86.3	29.8	29.8
Effective Green, g (s)	67.3		16.0	86.3	29.8	29.8
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1851		194	2401	812	364
v/s Ratio Prot	c0.55		c0.13	0.24	c0.20	
v/s Ratio Perm						0.08
v/c Ratio	1.07		1.03	0.37	0.89	0.37
Uniform Delay, d1	31.4		57.0	9.7	48.5	42.2
Progression Factor	0.44		0.64	2.64	1.00	1.00
Incremental Delay, d2	36.7		65.5	0.3	11.4	0.6
Delay (s)	50.5		101.8	26.0	59.9	42.8
Level of Service	D		F	C	E	D
Approach Delay (s)	50.5			40.0	54.9	
Approach LOS	D			D	D	

Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2038 Future Total>PM
10-18-2023

	↖	→	↘	↙	←	↖	↗	↘	↙	↖	↗	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↘	↑↑		↘	↑↑		↘	↗		↘	↗		
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143	
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7	
Grade (%)		6%			0%			0%				0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0	
Storage Lanes	1		0	1		0	1		0	1		0	
Taper Length (m)	35.3			2.5			2.5			2.5			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	
Ped Bike Factor		1.00			0.99		1.00					0.99	
Frt		0.997			0.987			0.864				0.862	
Fit Protected	0.950			0.950			0.950			0.950			
Satd. Flow (prot)	1656	3346	0	1705	3403	0	1770	1824	0	1725	1474	0	
Fit Permitted	0.084			0.053			0.630			0.637			
Satd. Flow (perm)	146	3346	0	95	3403	0	1172	1824	0	1157	1474	0	
Right Turn on Red			Yes			Yes			Yes			Yes	
Satd. Flow (RTOR)		3			13			85				129	
Link Speed (k/h)		60			60			30				40	
Link Distance (m)		222.7			268.7			130.9				169.9	
Travel Time (s)		13.4			16.1			15.7				15.3	
Confl. Peds. (#/hr)	16		1	1		16	1					1	
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	
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%	
Adj. Flow (vph)	141	1811	41	97	1383	132	215	16	150	89	14	155	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	141	1852	0	97	1515	0	215	166	0	89	169	0	
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No	
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.5			3.5			3.6				3.6	
Link Offset(m)		0.0			0.0			0.0				0.0	
Crosswalk Width(m)		1.6			1.6			1.6				1.6	
Two way Left Turn Lane					Yes								
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99	
Turning Speed (k/h)	24		14	24		14	24		14	24		14	
Number of Detectors	1	2			2		1	2		1	2		
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru		
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0		
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6		
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		
Detector 1 Channel													
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		
Detector 2 Position(m)		9.4			9.4			9.4			9.4		
Detector 2 Size(m)		0.6			0.6			0.6			0.6		
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex		

Lanes, Volumes, Timings

<2038 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

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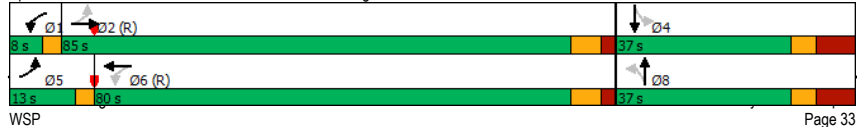


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	91.0	79.3		84.2	75.3		25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.70	0.61		0.65	0.58		0.20	0.20		0.20	0.20	
v/c Ratio	0.68	0.91		0.79	0.77		0.93	0.39		0.39	0.43	
Control Delay	23.0	17.2		67.5	17.6		93.7	24.4		50.3	16.3	
Queue Delay	0.0	24.3		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay	23.0	41.5		67.5	17.7		93.7	24.4		50.3	16.3	
LOS	C	D		E	B		F	C		D	B	
Approach Delay		40.2			20.7			63.5			28.0	
Approach LOS		D			C			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 34.1 Intersection LOS: C
 Intersection Capacity Utilization 99.0% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road



WSP

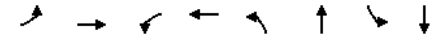
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Queues

<2038 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	1852	97	1515	215	166	89	169
v/c Ratio	0.68	0.91	0.79	0.77	0.93	0.39	0.39	0.43
Control Delay	23.0	17.2	67.5	17.6	93.7	24.4	50.3	16.3
Queue Delay	0.0	24.3	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	23.0	41.5	67.5	17.7	93.7	24.4	50.3	16.3
Queue Length 50th (m)	16.3	132.0	9.5	214.6	54.0	17.4	19.7	8.4
Queue Length 95th (m)	m16.1	m126.5	m#27.1	237.0	#99.2	37.9	36.4	29.0
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	218	2042	123	1975	243	446	240	408
Starvation Cap Reductn	0	47	0	38	0	0	0	0
Spillback Cap Reductn	0	274	0	0	0	6	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.05	0.79	0.78	0.88	0.38	0.37	0.41

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.

1105-1163 Kingston Road
 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2038 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3345	1705	3403	1768	1825	1725	1475	1725	1475	1725	1475
Fit Permitted	0.08	1.00	0.05	1.00	0.63	1.00	0.64	1.00	0.64	1.00	0.64	1.00
Satd. Flow (perm)	147	3345	95	3403	1173	1825	1157	1475	1157	1475	1157	1475
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)	141	1811	41	97	1383	132	215	16	150	89	14	155
RTOR Reduction (vph)	0	1	0	0	5	0	68	0	0	103	0	0
Lane Group Flow (vph)	141	1851	0	97	1510	0	215	98	0	89	66	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Effective Green, g (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Actuated g/C Ratio	0.67	0.61	0.62	0.58	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	2040	120	1971	232	362	229	292	229	292	229	292
v/s Ratio Prot	c0.05	c0.55	c0.03	0.44	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
v/s Ratio Perm	0.42		0.46		c0.18		0.08		0.08			
v/c Ratio	0.69	0.91	0.81	0.77	0.93	0.27	0.39	0.22	0.39	0.22	0.39	0.22
Uniform Delay, d1	19.1	22.1	24.9	20.7	51.2	44.1	45.3	43.7	45.3	43.7	45.3	43.7
Progression Factor	1.28	0.64	1.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	2.1	26.9	2.4	39.1	0.4	1.1	0.4	1.1	0.4	1.1	0.4
Delay (s)	27.0	16.3	69.5	17.1	90.3	44.5	46.3	44.1	46.3	44.1	46.3	44.1
Level of Service	C	B	E	B	F	D	D	D	D	D	D	D
Approach Delay (s)	17.1		20.2		70.4		44.9		44.9		44.9	
Approach LOS	B		C		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2038 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Fit Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950		0.950		0.950		0.329		0.290		0.290	
Satd. Flow (perm)	1638	3400	1549	1719	3579	1502	604	5255	1470	523	5105	1550
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	139		146		146		59		202		202	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2		385.2		385.2	
Travel Time (s)	17.9		13.4		9.5		23.1		23.1		23.1	
Confl. Peds. (#/hr)	75	31	31	75	37	65	65	65	65	65	65	37
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
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	0	0	0	4
Adj. Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24	14	24	14	24	14	24	14	24	14	24	14
Number of Detectors	1	2	1	1	2	1	2	1	2	1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2038 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0	7.0		7.0	7.0		7.0		7.0	7.0
Flash Dont Walk (s)	29.0		29.0	29.0		29.0	33.0		33.0		33.0	33.0
Pedestrian Calls (#/hr)	13		13	38		38	20		20		20	20
Act Effct Green (s)	14.7	37.6	37.6	26.0	48.9	48.9	50.4	40.0	71.4	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.39	0.31	0.55	0.39	0.31	0.31
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
LOS	F	F	C	F	C	C	E	D	D	E	D	A
Approach Delay	78.3			39.6			45.7			36.0		
Approach LOS	E			D			D			D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 50.6

Intersection Capacity Utilization 113.7%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service H

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2038 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Length 50th (m)	42.9	~148.8	58.6	~96.3	47.7	25.9	43.0	56.2	162.6	36.0	50.2	0.0
Queue Length 95th (m)	#82.5	#190.0	96.0 m	#152.3	m83.6 m	#122.8	#85.3	68.7	#276.1	#71.4	62.1	17.2
Internal Link Dist (m)	273.5		198.7		134.6		361.2					
Turn Bay Length (m)	127.0	123.0		87.1	35.0	72.0	35.0	88.5	47.0			
Base Capacity (vph)	193	983	546	346	1345	655	278	1616	857	249	1570	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	18	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.06	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2038 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.96	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1760	5255	1517	1741	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.33	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	610	5255	1517	531	5105	1550
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)	168	1023	389	359	829	538	248	743	818	212	671	202
RTOR Reduction (vph)	0	0	99	0	0	91	0	0	29	0	0	140
Lane Group Flow (vph)	168	1023	290	359	829	447	248	743	789	212	671	62
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Effective Green, g (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.35	0.31	0.51	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	190	983	448	346	1346	564	255	1616	770	230	1570	476
v/s Ratio Prot	0.10	c0.30		c0.21	0.23		c0.04	0.14	c0.20	0.04	0.13	
v/s Ratio Perm			0.19			0.30	0.30		0.32	0.28		0.04
v/c Ratio	0.88	1.04	0.65	1.04	0.62	0.79	0.97	0.46	1.02	0.92	0.43	0.13
Uniform Delay, d1	56.8	46.2	40.4	52.0	32.9	36.0	40.5	36.3	32.0	39.3	35.9	32.5
Progression Factor	1.00	1.00	1.00	1.28	0.58	0.48	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.0	39.8	7.1	48.8	1.4	7.2	48.4	0.9	38.8	38.4	0.9	0.6
Delay (s)	91.8	86.0	47.5	115.3	20.5	24.6	88.9	37.2	70.8	77.8	36.7	33.0
Level of Service	F	F	D	F	C	C	F	D	E	E	D	C
Approach Delay (s)	77.2			41.5			59.5			44.1		
Approach LOS	E			D			E			D		
Intersection Summary												
HCM 2000 Control Delay	56.3		HCM 2000 Level of Service				E					
HCM 2000 Volume to Capacity ratio	1.03											
Actuated Cycle Length (s)	130.0		Sum of lost time (s)				21.4					
Intersection Capacity Utilization	113.7%		ICU Level of Service				H					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
14: Whites Road & Highway 401 EB Off Ramp

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Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3450	1427	0	3539	3618	0
Fit Permitted	0.954					
Satd. Flow (perm)	3450	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	104				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1372	640	0	936	653	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1436	576	0	936	653	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

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14: Whites Road & Highway 401 EB Off Ramp

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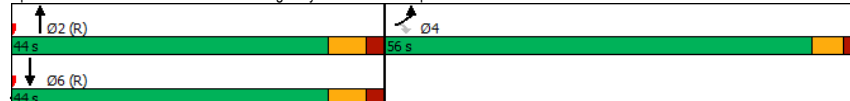


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
v/c Ratio	0.86	0.79		0.67	0.45	
Control Delay	29.2	26.3		28.2	24.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	29.2	26.3		28.2	24.0	
LOS	C	C		C	C	
Approach Delay	28.4			28.2	24.0	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 27.5 Intersection LOS: C
 Intersection Capacity Utilization 76.2% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2038 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

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Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1436	576	936	653
v/c Ratio	0.86	0.79	0.67	0.45
Control Delay	29.2	26.3	28.2	24.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.2	26.3	28.2	24.0
Queue Length 50th (m)	117.5	79.5	79.4	49.6
Queue Length 95th (m)	145.4	129.5	102.5	66.3
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1745	760	1405	1436
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.76	0.67	0.45

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2038 Future Total>PM
 10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↑↑	↑↑	
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3453	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3453	1404		3539	3618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1372	640	0	936	653	0
RTOR Reduction (vph)	4	54	0	0	0	0
Lane Group Flow (vph)	1432	522	0	936	653	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	48.1	48.1		39.7	39.7	
Effective Green, g (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1660	675		1404	1436	
v/s Ratio Prot	c0.41			c0.26	0.18	
v/s Ratio Perm		0.37				
v/c Ratio	0.86	0.77		0.67	0.45	
Uniform Delay, d1	23.0	21.4		24.7	22.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	5.5		2.5	1.0	
Delay (s)	27.9	27.0		27.2	23.2	
Level of Service	C	C		C	C	
Approach Delay (s)	27.6			27.2	23.2	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		26.7		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.77				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		76.2%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

APPENDIX

H-4 2043 FUTURE TOTAL CONDITIONS

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2043 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	1.00		0.99	0.99		1.00	0.98	
Frt		0.990			0.992			0.854			0.850	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3423	0	1652	3390	0	1745	1537	0	1725	1534	0
Fit Permitted	0.950			0.950			0.736			0.163		
Satd. Flow (perm)	1677	3423	0	1643	3390	0	1337	1537	0	296	1534	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			6			287			359	
Link Speed (kh)		60			60			40			40	
Link Distance (m)		129.3			694.6			124.5			179.7	
Travel Time (s)		7.8			41.7			11.2			16.2	
Conf. Peds. (#/hr)	4		8	8		4	9		2	2		9
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
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	22	857	61	111	487	27	241	10	398	15	0	32
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	918	0	111	514	0	241	408	0	15	32	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.1			3.1			3.3			3.3	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			1.6			4.9			4.9	
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

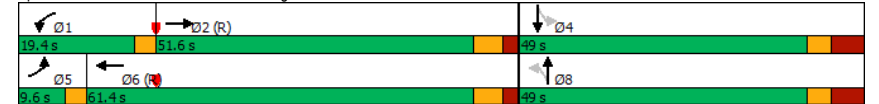
<2043 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	9.5	32.6		9.5	32.6		38.3	38.3		38.3	38.3	
Total Split (s)	9.6	51.6		19.4	61.4		49.0	49.0		49.0	49.0	
Total Split (%)	8.0%	43.0%		16.2%	51.2%		40.8%	40.8%		40.8%	40.8%	
Maximum Green (s)	6.6	45.0		16.4	54.8		40.8	40.8		40.8	40.8	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.3	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		4.9	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		8.2	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		19.0			19.0		22.0	22.0		22.0	22.0	
Pedestrian Calls (#/hr)		7			5		5	5		14	14	
Act Effct Green (s)	7.2	61.4		13.3	71.1		27.5	27.5		27.5	27.5	
Actuated g/C Ratio	0.06	0.51		0.11	0.59		0.23	0.23		0.23	0.23	
v/c Ratio	0.22	0.52		0.61	0.26		0.79	0.71		0.22	0.05	
Control Delay	70.1	15.4		80.7	8.2		60.9	18.9		42.4	0.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	70.1	15.4		80.7	8.2		60.9	18.9		42.4	0.1	
LOS	E	B		F	A		E	B		D	A	
Approach Delay		16.7			21.1			34.5			13.6	
Approach LOS		B			C			C			B	

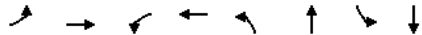
Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 23.0 Intersection LOS: C
 Intersection Capacity Utilization 68.3% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 1: Walnut Lane & Kingston Road



Queues <2043 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	918	111	514	241	408	15	32
w/c Ratio	0.22	0.52	0.61	0.26	0.79	0.71	0.22	0.05
Control Delay	70.1	15.4	80.7	8.2	60.9	18.9	42.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.1	15.4	80.7	8.2	60.9	18.9	42.4	0.1
Queue Length 50th (m)	5.4	35.6	27.2	13.0	53.8	25.3	2.9	0.0
Queue Length 95th (m)	m11.7	87.1	46.1	26.6	74.6	54.7	8.6	0.0
Internal Link Dist (m)		105.3	670.6		100.5		155.7	
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	104	1756	231	2010	454	712	100	758
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 w/c Ratio	0.21	0.52	0.48	0.26	0.53	0.57	0.15	0.04

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis <2043 Future Total>AM
1: Walnut Lane & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Future Volume (vph)	20	788	56	102	448	25	222	9	366	14	0	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6	3.0	6.6	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.98	1.00	0.98	1.00
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99	1.00	1.00	1.00	1.00
Frt	1.00	0.99	1.00	0.99	1.00	0.85	1.00	0.85	1.00	0.85	1.00	0.85
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1685	3423	1652	3391	1726	1536	1723	1534	1723	1534	1723	1534
Fit Permitted	0.95	1.00	0.95	1.00	0.74	1.00	0.16	1.00	0.16	1.00	0.16	1.00
Satd. Flow (perm)	1685	3423	1652	3391	1338	1536	296	1534	296	1534	296	1534
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)	22	857	61	111	487	27	241	10	398	15	0	32
RTOR Reduction (vph)	0	3	0	0	3	0	0	221	0	0	25	0
Lane Group Flow (vph)	22	915	0	111	511	0	241	187	0	15	7	0
Confl. Peds. (#/hr)	4	8	8	4	9	2	2	2	2	2	2	9
Heavy Vehicles (%)	0%	4%	6%	2%	5%	14%	0%	0%	3%	0%	0%	4%
Bus Blockages (#/hr)	0	0	6	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA	Prot	NA	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2	1	6			8					4
Permitted Phases							8					4
Actuated Green, G (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Effective Green, g (s)	4.8	61.4	13.3	69.9	27.5	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Actuated g/C Ratio	0.04	0.51	0.11	0.58	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Clearance Time (s)	3.0	6.6	3.0	6.6	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	67	1751	183	1975	306	352	67	351	67	351	67	351
v/s Ratio Prot	0.01	c0.27	c0.07	0.15			0.12					0.00
v/s Ratio Perm							c0.18			0.05		
w/c Ratio	0.33	0.52	0.61	0.26	0.79	0.53	0.22	0.05	0.22	0.05	0.22	0.02
Uniform Delay, d1	56.0	19.5	50.9	12.3	43.5	40.6	37.6	35.8	37.6	35.8	37.6	35.8
Progression Factor	1.23	0.66	1.35	0.57	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	1.0	5.2	0.3	12.6	1.5	1.7	0.0	1.7	0.0	1.7	0.0
Delay (s)	71.5	14.0	73.8	7.4	56.1	42.1	39.3	35.8	39.3	35.8	39.3	35.8
Level of Service	E	B	E	A	E	D	D	D	D	D	D	D
Approach Delay (s)		15.3		19.2		47.3		36.9		36.9		36.9
Approach LOS		B		B		D		D		D		D

Intersection Summary

HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2043 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	837	162	0	755	0	34
Future Volume (vph)	837	162	0	755	0	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3433	1516	0	3400	0	1808
Fit Permitted						
Satd. Flow (perm)	3433	1516	0	3400	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		4				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	4%	3%	2%	5%	2%	0%
Adj. Flow (vph)	910	176	0	821	0	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	910	176	0	821	0	37
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2043 Future Total>AM
10-18-2023

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	837	162	0	755	0	34
Future Volume (Veh/h)	837	162	0	755	0	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	910	176	0	821	0	37
Pedestrians						4
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.87		0.90	0.87
vC, conflicting volume			914		1324	459
vC1, stage 1 conf vol					914	
vC2, stage 2 conf vol					410	
vCu, unblocked vol			599		813	75
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	96
cM capacity (veh/h)			842		419	846

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	455	455	176	410	410	37
Volume Left	0	0	0	0	0	0
Volume Right	0	0	176	0	0	37
cSH	1700	1700	1700	1700	1700	846
Volume to Capacity	0.27	0.27	0.10	0.24	0.24	0.04
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.5
Lane LOS						A
Approach Delay (s)	0.0			0.0		9.5
Approach LOS						A

Intersection Summary

Average Delay 0.2
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Total>AM
10-18-2023

	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖		↖	↖		↖	↖		↖	↖	
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4		48.0			18.0			25.0			
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00	1.00		1.00	1.00		0.99	1.00		0.99	
Frt	0.987		0.980		0.900		0.879					
Flt Protected	0.950		0.950			0.950			0.950			
Satd. Flow (prot)	1564	3320	0	1645	3301	0	1752	1769	0	1827	1759	0
Flt Permitted	0.950		0.950			0.551			0.726			
Satd. Flow (perm)	1554	3320	0	1640	3301	0	1014	1769	0	1393	1759	0
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)		11			17			32			157	
Link Speed (k/h)	60		60		40		60		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
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
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Adj. Flow (vph)	87	914	88	85	640	96	66	16	32	162	38	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1002	0	85	736	0	66	48	0	162	195	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)	2.8		2.8		3.8		4.9					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane			Yes									
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Total>AM
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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	27.6		8.0	27.6		42.5	42.5		40.8	40.8	
Total Split (s)	14.4	60.0		10.8	56.4		49.2	49.2		49.2	49.2	
Total Split (%)	12.0%	50.0%		9.0%	47.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	11.4	53.4		7.8	49.8		39.7	39.7		39.7	39.7	
Yellow Time (s)	3.0	4.2		3.0	4.2		4.4	4.4		4.4	4.4	
All-Red Time (s)	0.0	2.4		0.0	2.4		5.1	5.1		5.1	5.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		14.0			14.0		23.0	23.0		23.0	23.0	
Pedestrian Calls (#/hr)		6			1		7	7		4	4	
Act Effect Green (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.09	0.61		0.06	0.59		0.17	0.17		0.17	0.17	
v/c Ratio	0.65	0.49		0.80	0.38		0.39	0.15		0.70	0.46	
Control Delay	75.4	15.0		96.6	11.2		49.2	19.3		62.0	13.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	75.4	15.0		96.6	11.2		49.2	19.3		62.0	13.7	
LOS	E	B		F	B		D	B		E	B	
Approach Delay		19.8			20.1			36.6			35.6	
Approach LOS		B			C			D			D	

Intersection Summary

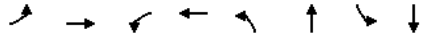
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	112.8 (94%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.80
Intersection Signal Delay:	23.1
Intersection LOS:	C
Intersection Capacity Utilization:	73.8%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 3: Dixie Road & Kingston Road



Queues
3: Dixie Road & Kingston Road

<2043 Future Total>AM
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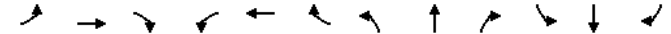
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	1002	85	736	66	48	162	195
w/c Ratio	0.65	0.49	0.80	0.38	0.39	0.15	0.70	0.46
Control Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	15.0	96.6	11.2	49.2	19.3	62.0	13.7
Queue Length 50th (m)	20.0	63.4	18.8	44.4	14.1	3.2	36.6	7.8
Queue Length 95th (m)	#39.1	99.4	#48.0	50.7	25.3	12.4	53.8	25.6
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	148	2026	106	1949	335	606	460	686
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 w/c Ratio	0.59	0.49	0.80	0.38	0.20	0.08	0.35	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2043 Future Total>AM
10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Future Volume (vph)	80	841	81	78	589	88	61	15	29	149	35	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1564	3319		1645	3302		1748	1769		1823	1760	
Flt Permitted	0.95	1.00		0.95	1.00		0.55	1.00		0.73	1.00	
Satd. Flow (perm)	1564	3319		1645	3302		1014	1769		1392	1760	
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)	87	914	88	85	640	96	66	16	32	162	38	157
RTOR Reduction (vph)	0	4	0	0	7	0	0	27	0	0	131	0
Lane Group Flow (vph)	87	998	0	85	729	0	66	21	0	162	64	0
Confl. Peds. (#/hr)	6		4	4		6	3		2	2		3
Heavy Vehicles (%)	2%	4%	2%	0%	6%	2%	3%	0%	0%	1%	0%	0%
Bus Blockages (#/hr)	0	0	6	0	0	6	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8					4
Actuated Green, G (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Effective Green, g (s)	10.3	73.1		7.8	70.6		20.0	20.0		20.0	20.0	
Actuated g/C Ratio	0.09	0.61		0.06	0.59		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	134	2021		106	1942		169	294		232	293	
v/s Ratio Prot	0.06	c0.30		c0.05	0.22			0.01			0.04	
v/s Ratio Perm							0.07			c0.12		
w/c Ratio	0.65	0.49		0.80	0.38		0.39	0.07		0.70	0.22	
Uniform Delay, d1	53.1	13.1		55.3	13.1		44.6	42.2		47.2	43.2	
Progression Factor	1.00	1.00		0.92	0.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	0.9		33.0	0.5		1.5	0.1		8.8	0.4	
Delay (s)	63.5	14.0		84.0	10.5		46.1	42.3		56.0	43.6	
Level of Service	E	B		F	B		D	D		E	D	
Approach Delay (s)		17.9			18.1			44.5			49.2	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

<2043 Future Total>AM

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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Traffic Volume (vph)	257	469	396	167	334	42	115	379	125	76	713	176
Future Volume (vph)	257	469	396	167	334	42	115	379	125	76	713	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.99		0.96	0.99		0.97	1.00		0.95	0.99		0.97
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1655	3362	1568	1694	3510	1579	1791	3700	1588	2026	3618	1561
Fit Permitted	0.950			0.950			0.238			0.506		
Satd. Flow (perm)	1636	3362	1511	1674	3510	1530	447	3700	1513	1064	3618	1522
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)			155			137			136			191
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		694.6			396.4			257.7			348.6	
Travel Time (s)		41.7			23.8			18.6			25.1	
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Adj. Flow (vph)	279	510	430	182	363	46	125	412	136	83	775	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	279	510	430	182	363	46	125	412	136	83	775	191
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7			4.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane		Yes									Yes	
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.88	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

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WSP

Synchro 11 Report
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Lanes, Volumes, Timings

6: Liverpool Road & Kingston Road

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	↖	→	↘	↙	←	↖	↙	↘	↙	↘	↙	↘
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	2	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	35.1	8.0	35.1	35.1	8.0	50.3	35.1	8.0	50.3	50.3
Total Split (s)	25.0	44.0	44.0	17.0	36.0	36.0	8.0	51.0	44.0	8.0	51.0	51.0
Total Split (%)	20.8%	36.7%	36.7%	14.2%	30.0%	30.0%	6.7%	42.5%	36.7%	6.7%	42.5%	42.5%
Maximum Green (s)	22.0	36.9	36.9	14.0	28.9	28.9	5.0	41.9	36.9	5.0	41.9	41.9
Yellow Time (s)	3.0	4.3	4.3	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0	21.0		21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		44	44		31	31		61	44		40	40
Act Effect Green (s)	21.7	36.9	36.9	14.0	29.2	29.2	53.6	43.5	36.9	53.0	41.9	41.9
Actuated g/C Ratio	0.18	0.31	0.31	0.12	0.24	0.24	0.45	0.36	0.31	0.44	0.35	0.35
v/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.49	0.31	0.24	0.16	0.61	0.29
Control Delay	72.6	32.6	30.5	99.9	40.2	0.4	26.4	28.7	6.2	18.7	34.9	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.5	99.9	40.2	0.4	26.4	28.7	6.2	18.7	34.9	5.0
LOS	E	C	C	F	D	A	C	C	A	B	C	A
Approach Delay		41.0			55.5			23.7				28.2
Approach LOS		D			E			C				C

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 80.4 (67%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 115

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 36.3

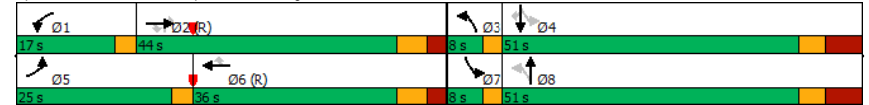
Intersection LOS: D

Intersection Capacity Utilization 97.4%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

6: Liverpool Road & Kingston Road

<2043 Future Total>AM

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	279	510	430	182	363	46	125	412	136	83	775	191
v/c Ratio	0.94	0.49	0.75	0.92	0.42	0.10	0.49	0.31	0.24	0.16	0.61	0.29
Control Delay	72.6	32.6	30.5	99.9	40.2	0.4	26.4	28.7	6.2	18.7	34.9	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.6	32.6	30.5	99.9	40.2	0.4	26.4	28.7	6.2	18.7	34.9	5.0
Queue Length 50th (m)	66.6	56.3	70.5	43.1	38.3	0.0	16.5	37.1	0.0	10.6	79.0	0.0
Queue Length 95th (m)	#112.0	73.6	101.5	#85.8	52.8	0.0	28.1	50.2	13.9	19.7	99.3	15.1
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	303	1033	571	197	855	476	255	1340	559	510	1263	655
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.49	0.75	0.92	0.42	0.10	0.49	0.31	0.24	0.16	0.61	0.29

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

6: Liverpool Road & Kingston Road

<2043 Future Total>AM

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	257	469	396	167	334	42	115	379	125	76	713	176
Future Volume (vph)	257	469	396	167	334	42	115	379	125	76	713	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.97
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1655	3362	1511	1694	3510	1530	1790	3700	1513	2012	3618	1522
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.24	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1655	3362	1511	1694	3510	1530	448	3700	1513	1071	3618	1522
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)	279	510	430	182	363	46	125	412	136	83	775	191
RTOR Reduction (vph)	0	0	108	0	0	35	0	0	95	0	0	123
Lane Group Flow (vph)	279	510	322	182	363	11	125	412	41	83	775	68
Confl. Peds. (#/hr)	15		19	19		15	15		28	28		15
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	3%	5%	3%	3%	4%	0%	3%	3%	12%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	7	0	0	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6		8		2	4	4
Actuated Green, G (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Effective Green, g (s)	21.7	36.3	36.3	14.0	28.6	28.6	48.5	43.5	36.3	46.5	42.5	42.5
Actuated g/C Ratio	0.18	0.30	0.30	0.12	0.24	0.24	0.40	0.36	0.30	0.39	0.35	0.35
Clearance Time (s)	3.0	7.1	7.1	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	299	1017	457	197	836	364	236	1341	457	446	1281	539
v/s Ratio Prot	c0.17	0.15		0.11	0.10		c0.02	0.11		0.01	c0.21	
v/s Ratio Perm			c0.21			0.01	0.19		0.03	0.07		0.04
v/c Ratio	0.93	0.50	0.70	0.92	0.43	0.03	0.53	0.31	0.09	0.19	0.60	0.13
Uniform Delay, d1	48.4	34.4	37.1	52.5	38.8	35.1	24.7	27.4	30.0	23.5	31.9	26.2
Progression Factor	0.76	0.91	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	31.3	1.5	7.6	42.9	1.6	0.2	2.1	0.6	0.4	0.2	2.1	0.5
Delay (s)	68.0	32.8	42.8	95.4	40.5	35.2	26.9	28.0	30.4	23.7	34.0	26.7
Level of Service	E	C	D	F	D	D	C	C	C	C	C	C
Approach Delay (s)		44.4			57.0			28.3			31.8	
Approach LOS		D			E			C			C	

Intersection Summary

HCM 2000 Control Delay	39.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.2
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2043 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	10	17	36	194	19	59	53	566	272	146	1107	24
Future Volume (vph)	10	17	36	194	19	59	53	566	272	146	1107	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	2.5			12.0			29.5			28.9		
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.99					0.98	1.00		0.97	0.99		0.96
Frt		0.897				0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1705	3058	0	3113	1858	1204	1645	5036	1523	1675	5029	1521
Fit Permitted	0.000			0.000			0.199			0.380		
Satd. Flow (perm)	0	3058	0	0	1858	1181	343	5036	1483	666	5029	1458
Right Turn on Red			Yes			Yes			Yes		Yes	
Satd. Flow (RTOR)		39				141			296			144
Link Speed (k/h)		30			50			50			50	
Link Distance (m)		82.8			328.5			162.3			257.7	
Travel Time (s)		9.9			23.7			11.7			18.6	
Conf. Peds. (#/hr)	7					7	10		11	11		10
Conf. Bikes (#/hr)								1				
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
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Adj. Flow (vph)	11	18	39	211	21	64	58	615	296	159	1203	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	57	0	211	21	64	58	615	296	159	1203	26
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		6.0			6.0			3.8			3.8	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.12	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
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Lanes, Volumes, Timings

<2043 Future Total>AM

8: Liverpool Road & Private Access/Pickering Parkway

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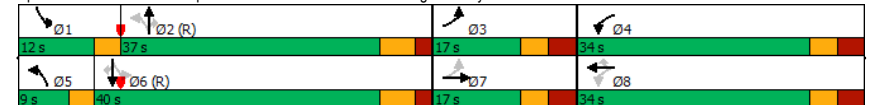


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2		2	6		6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	20.0	20.0
Minimum Split (s)	15.0	15.0		15.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	17.0	17.0		34.0	34.0	34.0	9.0	37.0	37.0	12.0	40.0	40.0
Total Split (%)	17.0%	17.0%		34.0%	34.0%	34.0%	9.0%	37.0%	37.0%	12.0%	40.0%	40.0%
Maximum Green (s)	10.4	10.4		27.4	27.4	27.4	6.0	30.7	30.7	9.0	33.7	33.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				0	0		21	21		21	21	
Act Effect Green (s)	8.0	8.0		12.1	12.1	12.1	61.3	52.1	52.1	66.4	56.1	56.1
Actuated g/C Ratio	0.08	0.08		0.12	0.12	0.12	0.61	0.52	0.52	0.66	0.56	0.56
v/c Ratio	0.08	0.20		0.56	0.09	0.24	0.20	0.23	0.32	0.30	0.43	0.03
Control Delay	44.1	22.1		46.9	38.5	2.1	7.5	13.1	4.0	9.1	15.0	0.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1		46.9	38.5	2.1	7.5	13.1	4.0	9.1	15.0	0.0
LOS	D	C		D	D	A	A	B	A	A	B	A
Approach Delay		25.7			36.6			10.0			14.0	
Approach LOS		C			D			A			B	


Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 34 (34%), Referenced to phase 2:NBL and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 15.3
 Intersection Capacity Utilization 55.7%
 Analysis Period (min) 15
 Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway




Queues <2043 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	57	211	21	64	58	615	296	159	1203	26
v/c Ratio	0.08	0.20	0.56	0.09	0.24	0.20	0.23	0.32	0.30	0.43	0.03
Control Delay	44.1	22.1	46.9	38.5	2.1	7.5	13.1	4.0	9.1	15.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	22.1	46.9	38.5	2.1	7.5	13.1	4.0	9.1	15.0	0.0
Queue Length 50th (m)	2.0	1.7	20.2	3.7	0.0	2.4	24.6	9.8	11.3	52.0	0.0
Queue Length 95th (m)	7.4	7.8	30.3	10.1	0.0	m5.4	37.8	20.3	21.5	68.6	0.0
Internal Link Dist (m)		58.8	304.5				138.3			233.7	
Turn Bay Length (m)			57.0		62.1	54.4		75.7	132.5		35.5
Base Capacity (vph)	177	352	852	509	425	288	2621	913	534	2821	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.16	0.25	0.04	0.15	0.20	0.23	0.32	0.30	0.43	0.03

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

HCM Signalized Intersection Capacity Analysis <2043 Future Total>AM
8: Liverpool Road & Private Access/Pickering Parkway 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑			↑↑↑	↑	↑↑↑	↑↑↑	↑
Traffic Volume (vph)	10	17	36	194	19	59	53	566	272	146	1107	24
Future Volume (vph)	10	17	36	194	19	59	53	566	272	146	1107	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.97	1.00	1.00	0.96
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	3060		3113	1858	1181	1644	5036	1483	1671	5029	1458
Fit Permitted	0.00	1.00		0.00	1.00	1.00	0.20	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	0	3060		0	1858	1181	345	5036	1483	668	5029	1458
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)	11	18	39	211	21	64	58	615	296	159	1203	26
RTOR Reduction (vph)	0	37	0	0	0	56	0	146	0	0	0	12
Lane Group Flow (vph)	11	20	0	211	21	8	58	615	150	159	1203	14
Confl. Peds. (#/hr)	7					7	10		11	11		10
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	0%	0%	5%	0%	23%	0%	3%	4%	3%	2%	5%
Bus Blockages (#/hr)	0	0	0	0	0	10	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2		2	6		6
Actuated Green, G (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Effective Green, g (s)	6.4	6.4		12.1	12.1	12.1	55.6	50.8	50.8	62.0	54.2	54.2
Actuated g/C Ratio	0.06	0.06		0.12	0.12	0.12	0.56	0.51	0.51	0.62	0.54	0.54
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	109	195		376	224	142	254	2558	753	496	2725	790
v/s Ratio Prot	0.01	c0.01		c0.07	0.01		0.01	0.12		c0.03	c0.24	
v/s Ratio Perm							0.01	0.12	0.10	0.17		0.01
v/c Ratio	0.10	0.11		0.56	0.09	0.05	0.23	0.24	0.20	0.32	0.44	0.02
Uniform Delay, d1	44.1	44.1		41.4	39.1	38.9	10.4	13.8	13.5	8.1	13.8	10.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.75	0.89	1.49	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.2		1.9	0.2	0.2	0.4	0.2	0.6	0.4	0.5	0.0
Delay (s)	44.5	44.3		43.4	39.3	39.0	8.2	12.4	20.7	8.4	14.3	10.6
Level of Service	D	D		D	D	D	A	B	C	A	B	B
Approach Delay (s)		44.4			42.1			14.7			13.6	
Approach LOS		D			D			B			B	

Intersection Summary
HCM 2000 Control Delay 17.8 HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio 0.43
Actuated Cycle Length (s) 100.0 Sum of lost time (s) 22.5
Intersection Capacity Utilization 55.7% ICU Level of Service B
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	437	188	69	310	145	548	0	0	915	173
Future Volume (vph)	0	0	437	188	69	310	145	548	0	0	915	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0		125.0	50.0		0.0	0.0		0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5			30.0			2.5		
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor							1.00					0.96
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.977		0.950					
Satd. Flow (prot)	0	0	1108	1700	1767	1551	1460	4932	0	0	4877	1601
Fit Permitted				0.950	0.977		0.147					
Satd. Flow (perm)	0	0	1108	1700	1767	1551	225	4932	0	0	4877	1538
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						336						188
Link Speed (kh)		50			50			50				50
Link Distance (m)		379.4			226.7			372.2				162.3
Travel Time (s)		27.3			16.3			26.8				11.7
Confl. Peds. (#/hr)							7		14	14		7
Confl. Bikes (#/hr)								4				
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
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Adj. Flow (vph)	0	0	475	204	75	337	158	596	0	0	995	188
Shared Lane Traffic (%)				32%								
Lane Group Flow (vph)	0	0	475	139	140	337	158	596	0	0	995	188
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7				3.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)						9.4		9.4				9.4
Detector 2 Size(m)						0.6		0.6				0.6
Detector 2 Type						Cl+Ex		Cl+Ex				Cl+Ex

Lanes, Volumes, Timings

<2043 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

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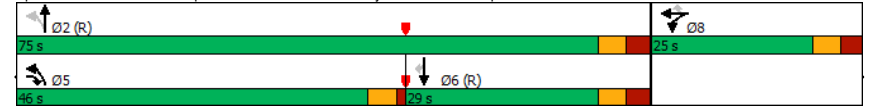


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)						0.0					0.0	0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			46.0	25.0	25.0	25.0	46.0	75.0			29.0	29.0
Total Split (%)			46.0%	25.0%	25.0%	25.0%	46.0%	75.0%			29.0%	29.0%
Maximum Green (s)			41.5	19.0	19.0	19.0	41.5	68.7			22.7	22.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		15			17	17
Act Effct Green (s)			46.8	13.7	13.7	13.7	75.8	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.76	0.74			0.23	0.23
v/c Ratio			0.92	0.60	0.58	0.67	0.21	0.16			0.90	0.38
Control Delay			51.3	50.7	49.5	11.5	5.1	4.3			39.3	5.2
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			51.3	50.7	49.5	11.5	5.1	4.3			39.3	5.2
LOS			D	D	D	B	A	A			D	A
Approach Delay			51.3			28.9		4.5			33.9	
Approach LOS			D			C		A			C	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	38 (38%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle:	100
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.92
Intersection Signal Delay:	28.3
Intersection LOS:	C
Intersection Capacity Utilization:	65.8%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2043 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	475	139	140	337	158	596	995	188
v/c Ratio	0.92	0.60	0.58	0.67	0.21	0.16	0.90	0.38
Control Delay	51.3	50.7	49.5	11.5	5.1	4.3	39.3	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	50.7	49.5	11.5	5.1	4.3	39.3	5.2
Queue Length 50th (m)	82.3	27.1	27.2	0.2	6.7	10.3	70.5	10.1
Queue Length 95th (m)	#158.6	44.3	44.3	23.5	17.5	17.3	#93.2	7.9
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	518	323	335	566	749	3651	1107	494
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	0.92	0.43	0.42	0.60	0.21	0.16	0.90	0.38

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

<2043 Future Total>AM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	437	188	69	310	145	548	0	0	915	173
Future Volume (vph)	0	0	437	188	69	310	145	548	0	0	915	173
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.96
Ftbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1108	1700	1767	1551	1460	4932			4877	1538
Flt Permitted			1.00	0.95	0.98	1.00	0.15	1.00			1.00	1.00
Satd. Flow (perm)			1108	1700	1767	1551	226	4932			4877	1538
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	0	475	204	75	337	158	596	0	0	995	188
RTOR Reduction (vph)	0	0	0	0	0	290	0	0	0	0	0	145
Lane Group Flow (vph)	0	0	475	139	140	47	158	596	0	0	995	43
Confl. Peds. (#/hr)							7	14	14		7	
Confl. Bikes (#/hr)								4				
Heavy Vehicles (%)	0%	2%	50%	2%	0%	3%	25%	4%	4%	2%	4%	2%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Effective Green, g (s)			46.8	13.7	13.7	13.7	74.0	74.0			22.7	22.7
Actuated g/C Ratio			0.47	0.14	0.14	0.14	0.74	0.74			0.23	0.23
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			518	232	242	212	744	3649			1107	349
v/s Ratio Prot			c0.43	c0.08	0.08		0.10	0.12			c0.20	
v/s Ratio Perm						0.03	0.06					0.03
v/c Ratio			0.92	0.60	0.58	0.22	0.21	0.16			0.90	0.12
Uniform Delay, d1			24.8	40.6	40.4	38.4	5.9	3.8			37.5	30.7
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.73	0.63
Incremental Delay, d2			21.0	4.1	3.3	0.5	0.1	0.1			10.9	0.7
Delay (s)			45.8	44.7	43.8	38.9	6.0	3.9			38.5	19.9
Level of Service			D	D	D	D	A	A			D	B
Approach Delay (s)			45.8			41.3		4.4			35.5	
Approach LOS			D			D		A			D	

Intersection Summary

HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

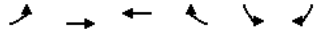
c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Total>AM

10: Kingston Road & Fairport Road

10-18-2023



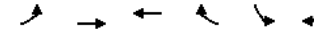
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↔	↕↕	↕↕		↔	↕	
Traffic Volume (vph)	96	795	706	99	182	229	
Future Volume (vph)	96	795	706	99	182	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Frt			0.981				0.850
Fit Protected	0.950				0.950		
Satd. Flow (prot)	1602	3335	3384	0	1736	1708	
Fit Permitted	0.950				0.950		
Satd. Flow (perm)	1602	3335	3384	0	1736	1708	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			15				249
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	104	864	767	108	198	249	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	104	864	875	0	198	249	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				
Detector 2 Type		CI+Ex	CI+Ex				
Detector 2 Channel							

Lanes, Volumes, Timings

<2043 Future Total>AM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Extend (s)		0.0	0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases						4	
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		38.1	38.1	8.0
Total Split (s)	22.0	79.0	65.0		43.0	43.0	8.0
Total Split (%)	16.9%	60.8%	50.0%		33.1%	33.1%	6%
Maximum Green (s)	19.0	72.7	58.7		35.7	35.7	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)		7.0	7.0		7.0	7.0	5.0
Flash Dont Walk (s)		19.0	19.0		23.0	23.0	0.0
Pedestrian Calls (#/hr)		0	1		2	2	20
Act Effect Green (s)	13.7	90.9	79.0		20.7	20.7	
Actuated g/C Ratio	0.11	0.70	0.61		0.16	0.16	
v/c Ratio	0.62	0.37	0.42		0.72	0.52	
Control Delay	74.8	4.3	15.5		65.5	9.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	74.8	4.3	15.5		65.5	9.1	
LOS	E	A	B		E	A	
Approach Delay		11.8	15.5		34.1		
Approach LOS		B	B		C		

Intersection Summary

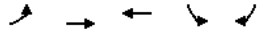
Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 52 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 17.6
 Intersection LOS: B
 Intersection Capacity Utilization 52.7%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues
10: Kingston Road & Fairport Road

<2043 Future Total>AM
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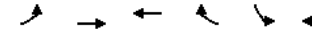


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	104	864	875	198	249
v/c Ratio	0.62	0.37	0.42	0.72	0.52
Control Delay	74.8	4.3	15.5	65.5	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	74.8	4.3	15.5	65.5	9.1
Queue Length 50th (m)	17.8	81.0	57.2	49.0	0.0
Queue Length 95th (m)	30.9	2.1	94.8	68.5	20.6
Internal Link Dist (m)		400.0	872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	234	2331	2062	476	649
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	0.44	0.37	0.42	0.42	0.38

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2043 Future Total>AM
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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↔	↕↕
Traffic Volume (vph)	96	795	706	99	182	229
Future Volume (vph)	96	795	706	99	182	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%			0%
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Fit Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1602	3335	3386		1736	1708
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1602	3335	3386		1736	1708
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	864	767	108	198	249
RTOR Reduction (vph)	0	0	6	0	0	209
Lane Group Flow (vph)	104	864	869	0	198	40
Heavy Vehicles (%)	2%	5%	3%	7%	4%	4%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	89.7	79.0		20.7	20.7
Effective Green, g (s)	13.7	89.7	79.0		20.7	20.7
Actuated g/C Ratio	0.11	0.69	0.61		0.16	0.16
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	168	2301	2057		276	271
v/s Ratio Prot	c0.06	0.26	c0.26		c0.11	
v/s Ratio Perm						0.02
v/c Ratio	0.62	0.38	0.42		0.72	0.15
Uniform Delay, d1	55.7	8.4	13.5		51.9	47.0
Progression Factor	1.11	0.42	1.00		1.00	1.00
Incremental Delay, d2	5.6	0.4	0.6		8.6	0.3
Delay (s)	67.6	3.9	14.1		60.5	47.3
Level of Service	E	A	B		E	D
Approach Delay (s)		10.8	14.1		53.1	
Approach LOS		B	B		D	

Intersection Summary

HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Frt	0.998					0.850
Fit Protected			0.950		0.950	
Satd. Flow (prot)	3479	0	1593	3548	3442	1633
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3479	0	1593	3548	3442	1633
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					71
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Adj. Flow (vph)	901	13	309	728	501	71
Shared Lane Traffic (%)						
Lane Group Flow (vph)	914	0	309	728	501	71
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	CI+Ex			CI+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		

Lanes, Volumes, Timings

<2043 Future Total>AM

11: Hwy 401 WB Ramps & Kingston Road

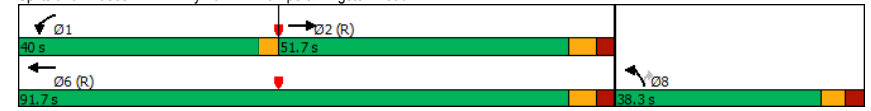
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	38.3	38.3
Total Split (s)	51.7		40.0	91.7	38.3	38.3
Total Split (%)	39.8%		30.8%	70.5%	29.5%	29.5%
Maximum Green (s)	44.5		37.0	84.5	31.6	31.6
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			3	3	3
Act Effct Green (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
v/c Ratio	0.58		0.85	0.29	0.78	0.20
Control Delay	15.1		56.7	13.0	58.6	10.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	15.1		56.7	13.0	58.6	10.2
LOS	B		E	B	E	B
Approach Delay	15.1			26.0	52.6	
Approach LOS	B			C	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 3 (2%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 28.1
 Intersection Capacity Utilization 67.1%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



Queues
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Total>AM
10-18-2023

	→	↖	←	↗	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	914	309	728	501	71
w/c Ratio	0.58	0.85	0.29	0.78	0.20
Control Delay	15.1	56.7	13.0	58.6	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.1	56.7	13.0	58.6	10.2
Queue Length 50th (m)	83.0	75.7	63.4	63.7	0.0
Queue Length 95th (m)	111.5	104.0	82.6	77.4	12.0
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1575	453	2502	836	450
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 w/c Ratio	0.58	0.68	0.29	0.60	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Total>AM
10-18-2023

	→	↖	←	↗	↘	
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↔		↕↔	↕↔	↕↔	↕
Traffic Volume (vph)	829	12	284	670	461	65
Future Volume (vph)	829	12	284	670	461	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Fr't	1.00		1.00	1.00	1.00	0.85
Fit Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3478		1593	3548	3442	1633
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3478		1593	3548	3442	1633
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	901	13	309	728	501	71
RTOR Reduction (vph)	1	0	0	0	0	58
Lane Group Flow (vph)	913	0	209	728	501	13
Heavy Vehicles (%)	5%	0%	2%	4%	4%	0%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	58.8		29.9	91.7	24.4	24.4
Effective Green, g (s)	58.8		29.9	91.7	24.4	24.4
Actuated g/C Ratio	0.45		0.23	0.71	0.19	0.19
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1573		366	2502	646	306
v/s Ratio Prot	c0.26		c0.19	0.21	c0.15	
v/s Ratio Perm						0.01
w/c Ratio	0.58		0.84	0.29	0.78	0.04
Uniform Delay, d1	26.4		47.8	7.1	50.2	43.2
Progression Factor	0.48		0.79	1.67	1.00	1.00
Incremental Delay, d2	1.3		15.2	0.3	5.8	0.1
Delay (s)	14.0		52.8	12.2	56.0	43.3
Level of Service	B		D	B	E	D
Approach Delay (s)	14.0			24.3	54.4	
Approach LOS	B			C	D	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

<2043 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99				1.00		0.99	0.98		1.00		0.98
Frt	0.995		0.990		0.860		0.864					
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1673	3280	0	1671	3381	0	1805	1755	0	1643	1468	0
Fit Permitted	0.950			0.950			0.662			0.688		
Satd. Flow (perm)	1662	3280	0	1671	3381	0	1249	1755	0	1185	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			8			100				135
Link Speed (k/h)	60		60		30		40					
Link Distance (m)	222.7		268.7		130.9		169.9					
Travel Time (s)	13.4		16.1		15.7		15.3					
Confl. Peds. (#/hr)	13				13	6		3	3			6
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
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Adj. Flow (vph)	83	1148	40	104	1128	80	152	7	100	46	14	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1188	0	104	1208	0	152	107	0	46	149	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.6		3.6					
Link Offset(m)	0.0		0.0		0.0		0.0					
Crosswalk Width(m)	1.6		1.6		1.6		1.6					
Two way Left Turn Lane	Yes											
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)	9.4		9.4		9.4		9.4					
Detector 2 Size(m)	0.6		0.6		0.6		0.6					
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex					

Lanes, Volumes, Timings

<2043 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0					
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8			4		4
Permitted Phases							8				4	
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.6	37.6		37.6	37.6	
Total Split (s)	16.0	72.0		19.0	75.0		39.0	39.0		39.0	39.0	
Total Split (%)	12.3%	55.4%		14.6%	57.7%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	13.0	65.1		16.0	68.1		29.0	29.0		29.0	29.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)	7.0		7.0		7.0		7.0					
Flash Dont Walk (s)	18.0		18.0		20.0		20.0					
Pedestrian Calls (#/hr)	1		16		0		0				1	
Act Effct Green (s)	11.0	76.3		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
v/c Ratio	0.59	0.62		0.63	0.59		0.76	0.29		0.24	0.43	
Control Delay	65.7	17.4		80.2	11.4		74.1	11.5		48.1	12.9	
Queue Delay	0.0	0.1		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.7	17.5		80.2	11.4		74.1	11.5		48.1	12.9	
LOS	E	B		F	B		E	B		D	B	
Approach Delay	20.6		16.9		48.2		21.2					
Approach LOS	C		B		D		C					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 95 (73%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 21.4
 Intersection LOS: C
 Intersection Capacity Utilization 80.6%
 ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

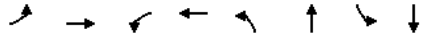


Queues

<2043 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	1188	104	1208	152	107	46	149
w/c Ratio	0.59	0.62	0.63	0.59	0.76	0.29	0.24	0.43
Control Delay	65.7	17.4	80.2	11.4	74.1	11.5	48.1	12.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.7	17.5	80.2	11.4	74.1	11.5	48.1	12.9
Queue Length 50th (m)	18.6	92.2	22.3	78.7	37.6	1.5	10.4	3.1
Queue Length 95th (m)	36.2	121.5	39.2	174.0	57.4	16.2	20.7	20.6
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	167	1927	205	2037	278	469	264	432
Starvation Cap Reductn	0	75	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 w/c Ratio	0.50	0.64	0.51	0.59	0.55	0.23	0.17	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis

<2043 Future Total>AM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	↑
Traffic Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Future Volume (vph)	76	1056	37	96	1038	74	140	6	92	42	13	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1673	3280		1671	3381		1792	1755		1637	1468	
Fit Permitted	0.95	1.00		0.95	1.00		0.66	1.00		0.69	1.00	
Satd. Flow (perm)	1673	3280		1671	3381		1249	1755		1185	1468	
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)	83	1148	40	104	1128	80	152	7	100	46	14	135
RTOR Reduction (vph)	0	2	0	0	3	0	0	84	0	0	113	0
Lane Group Flow (vph)	83	1186	0	104	1205	0	152	23	0	46	36	0
Confl. Peds. (#/hr)	13					13	6		3	3		6
Heavy Vehicles (%)	0%	4%	0%	2%	3%	3%	0%	0%	2%	5%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases							8			4		
Actuated Green, G (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Effective Green, g (s)	11.0	76.4		12.8	78.2		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.08	0.59		0.10	0.60		0.16	0.16		0.16	0.16	
Clearance Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1927		164	2033		200	282		190	236	
v/s Ratio Prot	0.05	c0.36		c0.06	0.36			0.01			0.02	
v/s Ratio Perm							c0.12			0.04		
w/c Ratio	0.59	0.62		0.63	0.59		0.76	0.08		0.24	0.15	
Uniform Delay, d1	57.3	17.3		56.3	16.0		52.2	46.4		47.6	46.9	
Progression Factor	0.87	0.84		1.15	0.58		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	1.4		7.3	1.2		15.5	0.1		0.7	0.3	
Delay (s)	55.8	15.9		72.0	10.6		67.7	46.5		48.3	47.2	
Level of Service	E	B		E	B		E	D		D	D	
Approach Delay (s)		18.5			15.5			58.9			47.5	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2043 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.98		0.97	0.99		0.95	0.99		0.97	0.99		0.97
Frt		0.850			0.850			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1633	3335	1607	1767	3510	1606	1700	5057	1558	1750	5057	1625
Flt Permitted	0.950			0.950			0.230			0.494		
Satd. Flow (perm)	1605	3335	1565	1752	3510	1522	409	5057	1509	900	5057	1574
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)			144		249			191			172	
Link Speed (k/h)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
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
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Adj. Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.95
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

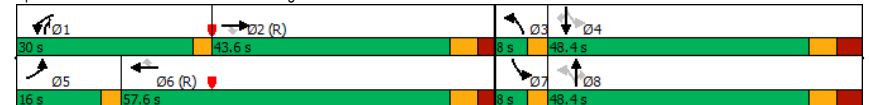
<2043 Future Total>AM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	16.0	43.6	43.6	30.0	57.6	57.6	8.0	48.4	30.0	8.0	48.4	48.4
Total Split (%)	12.3%	33.5%	33.5%	23.1%	44.3%	44.3%	6.2%	37.2%	23.1%	6.2%	37.2%	37.2%
Maximum Green (s)	13.0	36.6	36.6	27.0	50.6	50.6	5.0	40.0	27.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	31		31		75		75		65		37	
Act Effect Green (s)	11.1	38.2	38.2	25.4	52.5	52.5	50.4	40.0	70.8	50.4	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.39	0.31	0.54	0.39	0.31	0.31
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
LOS	E	D	C	E	B	A	D	C	B	C	D	A
Approach Delay	37.3		27.2		27.1		33.4					
Approach LOS	D		C		C		C					

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.90
Intersection Signal Delay:	30.8
Intersection Capacity Utilization:	108.2%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	G

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2043 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	374	320	309	612	315	159	424	492	189	865	190
v/c Ratio	0.61	0.38	0.57	0.90	0.43	0.41	0.76	0.27	0.54	0.50	0.56	0.32
Control Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.8	38.4	25.7	69.0	17.7	4.7	53.8	34.6	12.0	32.7	39.2	7.8
Queue Length 50th (m)	21.2	40.8	38.6	58.8	58.8	19.2	26.2	30.0	41.6	31.6	67.8	3.2
Queue Length 95th (m)	38.4	55.3	69.7	#121.0	47.2	8.7	#51.5	39.4	68.2	49.1	81.8	20.2
Internal Link Dist (m)		273.5			198.7			134.6			361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	163	979	561	366	1418	763	208	1556	935	381	1556	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.38	0.57	0.84	0.43	0.41	0.76	0.27	0.53	0.50	0.56	0.32

Intersection Summary
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis <2043 Future Total>AM
13: Whites Road & Kingston Road 10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Future Volume (vph)	78	344	294	284	563	290	146	390	453	174	796	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1633	3335	1565	1767	3510	1522	1698	5057	1528	1741	5057	1574
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.23	1.00	1.00	0.49	1.00	1.00
Satd. Flow (perm)	1633	3335	1565	1767	3510	1522	411	5057	1528	906	5057	1574
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)	85	374	320	309	612	315	159	424	492	189	865	190
RTOR Reduction (vph)	0	0	102	0	0	148	0	0	95	0	0	119
Lane Group Flow (vph)	85	374	218	309	612	167	159	424	397	189	865	71
Confl. Peds. (#/hr)	38		13	13		38	20		20	20		20
Heavy Vehicles (%)	6%	5%	4%	1%	4%	5%	5%	6%	4%	2%	6%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	2
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Effective Green, g (s)	11.1	38.2	38.2	25.4	52.5	52.5	45.0	40.0	65.4	45.0	40.0	40.0
Actuated g/C Ratio	0.09	0.29	0.29	0.20	0.40	0.40	0.35	0.31	0.50	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	139	979	459	345	1417	614	191	1556	768	345	1556	484
v/s Ratio Prot	0.05	0.11		c0.17	0.17		c0.03	0.08	0.10	0.02	0.17	
v/s Ratio Perm			c0.14			0.11	c0.25		0.16	0.17		0.05
v/c Ratio	0.61	0.38	0.48	0.90	0.43	0.27	0.83	0.27	0.52	0.55	0.56	0.15
Uniform Delay, d1	57.4	36.5	37.7	51.0	28.0	25.9	37.0	34.0	21.7	32.3	37.6	32.6
Progression Factor	1.00	1.00	1.00	0.86	0.59	0.50	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.7	1.1	3.5	21.2	0.8	0.9	25.5	0.4	0.6	1.8	1.4	0.6
Delay (s)	65.1	37.6	41.2	65.2	17.4	13.9	62.5	34.4	22.3	34.0	39.0	33.3
Level of Service	E	D	D	E	B	B	E	C	C	C	D	C
Approach Delay (s)		42.1			28.4			33.0			37.4	
Approach LOS		D			C			C			D	

Intersection Summary
 HCM 2000 Control Delay 34.6 HCM 2000 Level of Service C
 HCM 2000 Volume to Capacity ratio 0.72
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
 Intersection Capacity Utilization 108.2% ICU Level of Service G
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings

<2043 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023

	↖	↘	↙	↑	↓	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖↖	↘		↑↑	↑↑	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0			0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor						
Frt	0.994	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3391	1400	0	3374	3481	0
Fit Permitted	0.954					
Satd. Flow (perm)	3391	1400	0	3374	3481	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4	262				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)			7			7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Adj. Flow (vph)	701	291	0	758	484	0
Shared Lane Traffic (%)		10%				
Lane Group Flow (vph)	730	262	0	758	484	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2043 Future Total>AM

14: Whites Road & Highway 401 EB Off Ramp

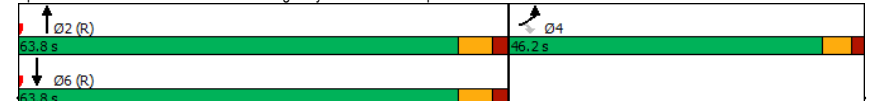
10-18-2023

	↖	↘	↙	↑	↓	↗
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	46.2	46.2		63.8	63.8	
Total Split (%)	42.0%	42.0%		58.0%	58.0%	
Maximum Green (s)	40.7	40.7		57.1	57.1	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	3	3		0	0	
Act Effect Green (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
v/c Ratio	0.79	0.46		0.36	0.23	
Control Delay	43.3	6.2		11.7	10.4	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	43.3	6.2		11.7	10.4	
LOS	D	A		B	B	
Approach Delay	33.5			11.7	10.4	
Approach LOS	C			B	B	

Intersection Summary

Area Type: Other
 Cycle Length: 110
 Actuated Cycle Length: 110
 Offset: 79.2 (72%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 21.1
 Intersection Capacity Utilization 50.6%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service A

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues
14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Total>AM
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Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	730	262	758	484
w/c Ratio	0.79	0.46	0.36	0.23
Control Delay	43.3	6.2	11.7	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	43.3	6.2	11.7	10.4
Queue Length 50th (m)	74.5	0.0	39.3	22.6
Queue Length 95th (m)	87.4	18.7	59.8	36.1
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1257	683	2082	2148
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.38	0.36	0.23
Intersection Summary				

HCM Signalized Intersection Capacity Analysis
14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Total>AM
10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	TTT	T		TT	TT	
Traffic Volume (vph)	645	268	0	697	445	0
Future Volume (vph)	645	268	0	697	445	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3392	1400		3374	3481	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3392	1400		3374	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	701	291	0	758	484	0
RTOR Reduction (vph)	3	191	0	0	0	0
Lane Group Flow (vph)	727	71	0	758	484	0
Confl. Peds. (#/hr)			7			7
Heavy Vehicles (%)	3%	5%	2%	7%	6%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	29.9	29.9		67.9	67.9	
Effective Green, g (s)	29.9	29.9		67.9	67.9	
Actuated g/C Ratio	0.27	0.27		0.62	0.62	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	922	380		2082	2148	
v/s Ratio Prot	c0.21			c0.22	0.14	
v/s Ratio Perm		0.05				
v/c Ratio	0.79	0.19		0.36	0.23	
Uniform Delay, d1	37.1	30.7		10.4	9.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.2		0.5	0.2	
Delay (s)	41.7	31.0		10.9	9.6	
Level of Service	D	C		B	A	
Approach Delay (s)	38.8			10.9	9.6	
Approach LOS	D			B	A	
Intersection Summary						
HCM 2000 Control Delay			23.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.49			
Actuated Cycle Length (s)			110.0		Sum of lost time (s)	12.2
Intersection Capacity Utilization			50.6%		ICU Level of Service	A
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

<2043 Future Total>PM
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Storage Length (m)	26.0		25.8	37.0		0.0	63.2		0.0	18.5		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	24.0			26.0			24.4			18.1		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		0.98	0.98		1.00	0.97	
Frt		0.980			0.992			0.853			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1685	3460	0	1685	3509	0	1745	1573	0	1725	1583	0
Flt Permitted	0.950			0.950			0.640			0.375		
Satd. Flow (perm)	1677	3460	0	1682	3509	0	1155	1573	0	679	1583	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			6			91				247
Link Speed (k/h)		60			60			40				40
Link Distance (m)		129.3			694.6			124.5				179.7
Travel Time (s)		7.8			41.7			11.2				16.2
Conf. Peds. (#/hr)	5		7	7		5	14		5	5		14
Conf. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	41	1582	245	68	710	39	236	8	414	26	0	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1827	0	68	749	0	236	422	0	26	28	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	
Median Width(m)		3.1			3.1			3.3				3.3
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		4.9			1.6			4.9				4.9
Two way Left Turn Lane		Yes			Yes							
Headway Factor	1.09	1.00	1.01	1.09	1.00	0.99	1.04	1.01	0.99	1.06	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	0	0		0	0		1	1		0	0	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		7.5	7.5		0.0	0.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		-1.5	-1.5		0.0	0.0	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		9.0	9.0		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	

Lanes, Volumes, Timings
1: Walnut Lane & Kingston Road

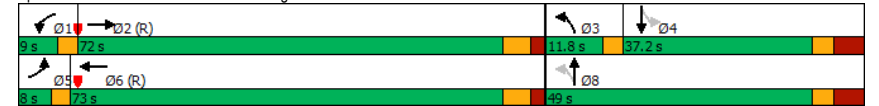
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							8				4	
Detector Phase	5	2		1	6		3	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		5.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	32.6		8.0	32.6		8.0	37.2		37.2	37.2	
Total Split (s)	8.0	72.0		9.0	73.0		11.8	49.0		37.2	37.2	
Total Split (%)	6.2%	55.4%		6.9%	56.2%		9.1%	37.7%		28.6%	28.6%	
Maximum Green (s)	5.0	65.4		6.0	66.4		8.8	40.8		29.0	29.0	
Yellow Time (s)	3.0	4.4		3.0	4.4		3.0	3.3		3.3	3.3	
All-Red Time (s)	0.0	2.2		0.0	2.2		0.0	4.9		4.9	4.9	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2	8.2	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		19.0			19.0			22.0			22.0	
Pedestrian Calls (#/hr)		8			4			2			9	
Act Effect Green (s)	5.0	72.9		6.0	75.5		38.5	33.3		21.0	21.0	
Actuated g/C Ratio	0.04	0.56		0.05	0.58		0.30	0.26		0.16	0.16	
v/c Ratio	0.64	0.94		0.88	0.37		0.59	0.90		0.24	0.06	
Control Delay	99.7	22.0		133.5	10.8		43.2	58.2		49.2	0.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	99.7	22.0		133.5	10.8		43.2	58.2		49.2	0.3	
LOS	F	C		F	B		D	E		D	A	
Approach Delay		23.7			21.0			52.8			23.8	
Approach LOS		C			C			D			C	

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	10 (8%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	120
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	28.7
Intersection LOS:	C
Intersection Capacity Utilization:	89.2%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Walnut Lane & Kingston Road

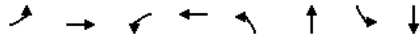


Queues

<2043 Future Total>PM

1: Walnut Lane & Kingston Road

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Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	41	1827	68	749	236	422	26	28
v/c Ratio	0.64	0.94	0.88	0.37	0.59	0.90	0.24	0.06
Control Delay	99.7	22.0	133.5	10.8	43.2	58.2	49.2	0.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	99.7	22.0	133.5	10.8	43.2	58.2	49.2	0.3
Queue Length 50th (m)	10.3	189.0	14.0	72.5	48.6	83.8	5.8	0.0
Queue Length 95th (m)	m#12.9	m#297.4	m#42.0	90.6	67.5	118.4	13.9	0.0
Internal Link Dist (m)		105.3		670.6		100.5		155.7
Turn Bay Length (m)	26.0		37.0		63.2		18.5	
Base Capacity (vph)	64	1947	77	2039	399	556	151	545
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	0.64	0.94	0.88	0.37	0.59	0.76	0.17	0.05

Intersection Summary

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

Queue shown is maximum after two cycles.

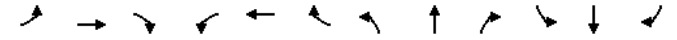
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

<2043 Future Total>PM

1: Walnut Lane & Kingston Road

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Future Volume (vph)	38	1455	225	63	653	36	217	7	381	24	0	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.0	3.6	3.7	3.3	3.5	3.7	3.2	3.7	3.7
Total Lost time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00		1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00		0.97
Fipb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00		1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.85		1.00		0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1685	3460		1685	3509		1726	1573		1719		1583
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.38		1.00
Satd. Flow (perm)	1685	3460		1685	3509		1163	1573		679		1583
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)	41	1582	245	68	710	39	236	8	414	26	0	28
RTOR Reduction (vph)	0	9	0	0	3	0	0	67	0	0	24	0
Lane Group Flow (vph)	41	1818	0	68	746	0	236	356	0	26	4	0
Confl. Peds. (#/hr)	5		7	7		5	14		5	5		14
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	3	0	0	0	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		Perm		NA
Protected Phases	5	2		1	6		3	8				4
Permitted Phases							8			4		
Actuated Green, G (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Effective Green, g (s)	4.0	71.2		6.0	73.2		35.0	35.0		19.4		19.4
Actuated g/C Ratio	0.03	0.55		0.05	0.56		0.27	0.27		0.15		0.15
Clearance Time (s)	3.0	6.6		3.0	6.6		3.0	8.2		8.2		8.2
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	51	1895		77	1975		367	423		101		236
v/s Ratio Prot	0.02	c0.53		c0.04	0.21		0.06	c0.23				0.00
v/s Ratio Perm							0.11			0.04		
v/c Ratio	0.80	0.96		0.88	0.38		0.64	0.84		0.26		0.02
Uniform Delay, d1	62.6	28.0		61.7	15.8		40.7	44.9		48.9		47.2
Progression Factor	1.28	0.52		1.08	0.65		1.00	1.00		1.00		1.00
Incremental Delay, d2	35.8	8.0		59.4	0.5		3.8	14.0		1.4		0.0
Delay (s)	115.6	22.7		126.0	10.7		44.6	58.8		50.3		47.2
Level of Service	F	C		F	B		D	E		D		D
Approach Delay (s)		24.7			20.3			53.7				48.7
Approach LOS		C			C			D				D

Intersection Summary

HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
2: Internal Road & Kingston Road

<2043 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (vph)	1647	181	0	1024	0	35
Future Volume (vph)	1647	181	0	1024	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.3	3.7	3.5	3.7	4.5
Storage Length (m)		45.0	0.0		0.0	0.0
Storage Lanes		1	0		0	1
Taper Length (m)			2.5		2.5	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.865
Fit Protected						
Satd. Flow (prot)	3500	1561	0	3500	0	1808
Fit Permitted						
Satd. Flow (perm)	3500	1561	0	3500	0	1808
Link Speed (k/h)	60			60	30	
Link Distance (m)	191.2			129.3	157.3	
Travel Time (s)	11.5			7.8	18.9	
Confl. Peds. (#/hr)		3	3			
Confl. Bikes (#/hr)		1				
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	2%	2%	2%	0%
Adj. Flow (vph)	1790	197	0	1113	0	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1790	197	0	1113	0	38
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.0			3.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	1.01	1.04	0.99	1.01	0.99	0.88
Turning Speed (k/h)		14	24		24	14
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
2: Internal Road & Kingston Road

<2043 Future Total>PM
10-18-2023

	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Traffic Volume (veh/h)	1647	181	0	1024	0	35
Future Volume (Veh/h)	1647	181	0	1024	0	35
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1790	197	0	1113	0	38
Pedestrians						3
Lane Width (m)						4.5
Walking Speed (m/s)						1.1
Percent Blockage						0
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage (veh)	2			2		
Upstream signal (m)	191			129		
pX, platoon unblocked			0.46		0.51	0.46
vC, conflicting volume			1793		2350	898
vC1, stage 1 conf vol					1793	
vC2, stage 2 conf vol					556	
vCu, unblocked vol			360		734	0
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			545		295	497

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	895	895	197	556	556	38
Volume Left	0	0	0	0	0	0
Volume Right	0	0	197	0	0	38
cSH	1700	1700	1700	1700	1700	497
Volume to Capacity	0.53	0.53	0.12	0.33	0.33	0.08
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	1.9
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	12.8
Lane LOS						B
Approach Delay (s)	0.0			0.0		12.8
Approach LOS						B

Intersection Summary	
Average Delay	0.2
Intersection Capacity Utilization	55.5%
ICU Level of Service	B
Analysis Period (min)	15

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	145.4		64.5	51.0		79.5	13.0		0.0	16.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	66.4			48.0			18.0			25.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	0.99		1.00	1.00		1.00	0.99		0.99	0.99	
Frt	0.978		0.978		0.978		0.920		0.885			
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1579	3338	0	1597	3421	0	1770	1786	0	1827	1730	0
Flt Permitted	0.950			0.950			0.674			0.676		
Satd. Flow (perm)	1578	3338	0	1595	3421	0	1250	1786	0	1290	1730	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			19			42			100	
Link Speed (k/h)	60		60		60		40		60			
Link Distance (m)	896.3		191.2		123.5		236.2					
Travel Time (s)	53.8		11.5		11.1		14.2					
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
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
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Adj. Flow (vph)	222	1752	303	43	905	154	166	59	68	161	30	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	222	2055	0	43	1059	0	166	127	0	161	130	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	2.8		2.8		3.8		3.8					
Link Offset(m)	0.0		0.0		0.0		4.9					
Crosswalk Width(m)	4.9		4.9		4.9		4.9					
Two way Left Turn Lane	Yes											
Headway Factor	1.17	1.04	1.07	1.13	1.01	1.08	1.00	0.94	0.99	0.97	0.92	0.99
Turning Speed (k/h)	24		14		24		14		24		14	
Number of Detectors	0	0		0	0		0	0		1	1	
Detector Template												
Leading Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		7.5	7.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		-1.5	-1.5	
Detector 1 Size(m)	6.1	1.8		6.1	1.8		6.1	1.8		9.0	9.0	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	

Lanes, Volumes, Timings
3: Dixie Road & Kingston Road

<2043 Future Total>PM
10-18-2023

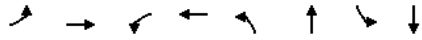
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	5	2		1	6							4
Permitted Phases								8				4
Detector Phase	5	2		1	6			8	8		4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0			8.0	8.0		8.0	8.0
Minimum Split (s)	8.0	27.6		8.0	27.6			40.1	40.1		40.1	40.1
Total Split (s)	26.0	81.6		8.0	63.6			40.4	40.4		40.4	40.4
Total Split (%)	20.0%	62.8%		6.2%	48.9%			31.1%	31.1%		31.1%	31.1%
Maximum Green (s)	23.0	75.0		5.0	57.0			30.9	30.9		30.9	30.9
Yellow Time (s)	3.0	4.2		3.0	4.2			4.4	4.4		4.4	4.4
All-Red Time (s)	0.0	2.4		0.0	2.4			5.1	5.1		5.1	5.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Lost Time (s)	3.0	6.6		3.0	6.6			9.5	9.5		9.5	9.5
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Recall Mode	None	C-Max		None	C-Max			None	None		None	None
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	14.0		14.0		23.0		23.0		23.0		23.0	
Pedestrian Calls (#/hr)	4		6		2		2		3		3	
Act Effct Green (s)	21.2	85.1		5.0	67.3			22.4	22.4		22.4	22.4
Actuated g/C Ratio	0.16	0.65		0.04	0.52			0.17	0.17		0.17	0.17
v/c Ratio	0.86	0.94		0.70	0.60			0.77	0.37		0.73	0.34
Control Delay	81.3	15.1		115.0	13.9			73.5	32.9		68.5	15.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	81.3	15.1		115.0	13.9			73.5	32.9		68.5	15.2
LOS	F	B		F	B			E	C		E	B
Approach Delay	21.6		17.8		55.9		44.7					
Approach LOS	C		B		E		D					
Intersection Summary												
Area Type:	Other											
Cycle Length:	130											
Actuated Cycle Length:	130											
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green												
Natural Cycle:	140											
Control Type:	Actuated-Coordinated											
Maximum v/c Ratio:	0.94											
Intersection Signal Delay:	24.8						Intersection LOS: C					
Intersection Capacity Utilization:	91.7%						ICU Level of Service F					
Analysis Period (min):	15											
Splits and Phases:	3: Dixie Road & Kingston Road											

Queues

3: Dixie Road & Kingston Road

<2043 Future Total>PM

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	222	2055	43	1059	166	127	161	130
w/c Ratio	0.86	0.94	0.70	0.60	0.77	0.37	0.73	0.34
Control Delay	81.3	15.1	115.0	13.9	73.5	32.9	68.5	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.3	15.1	115.0	13.9	73.5	32.9	68.5	15.2
Queue Length 50th (m)	51.7	36.8	11.5	57.3	41.0	19.1	39.4	6.6
Queue Length 95th (m)	m#62.4	#78.4	m#28.9	76.9	61.4	35.1	59.2	22.2
Internal Link Dist (m)		872.3		167.2		99.5		212.2
Turn Bay Length (m)	145.4		51.0		13.0		16.0	
Base Capacity (vph)	279	2193	61	1779	297	456	306	487
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 w/c Ratio	0.80	0.94	0.70	0.60	0.56	0.28	0.53	0.27

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.

HCM Signalized Intersection Capacity Analysis

3: Dixie Road & Kingston Road

<2043 Future Total>PM

10-18-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	↑
Traffic Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Future Volume (vph)	204	1612	279	40	833	142	153	54	63	148	28	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	2.8	3.6	3.4	2.8	3.5	3.1	3.6	4.0	3.7	3.8	4.2	3.7
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.92		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1579	3338		1597	3422		1762	1786		1813	1729	
Fit Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.68	1.00	
Satd. Flow (perm)	1579	3338		1597	3422		1250	1786		1289	1729	
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)	222	1752	303	43	905	154	166	59	68	161	30	100
RTOR Reduction (vph)	0	9	0	0	9	0	35	0	0	83	0	0
Lane Group Flow (vph)	222	2046	0	43	1050	0	166	92	0	161	47	0
Confl. Peds. (#/hr)	1		6	6		1	4		7	7		4
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	2%	3%	2%	0%	2%	0%	2%	1%	0%	3%
Bus Blockages (#/hr)	0	0	5	0	0	5	0	0	0	0	0	0
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases							8			4		
Actuated Green, G (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Effective Green, g (s)	21.2	84.5		4.0	67.3		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.16	0.65		0.03	0.52		0.17	0.17		0.17	0.17	
Clearance Time (s)	3.0	6.6		3.0	6.6		9.5	9.5		9.5	9.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	2169		49	1771		215	307		222	297	
v/s Ratio Prot	c0.14	c0.61		0.03	0.31			0.05			0.03	
v/s Ratio Perm							c0.13			0.12		
w/c Ratio	0.86	0.94		0.88	0.59		0.77	0.30		0.73	0.16	
Uniform Delay, d1	53.0	20.6		62.8	21.8		51.4	47.0		50.9	45.8	
Progression Factor	1.24	0.38		1.08	0.54		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.2	5.3		80.5	1.4		15.7	0.6		11.1	0.3	
Delay (s)	79.1	13.1		148.1	13.1		67.1	47.5		62.0	46.0	
Level of Service	E	B		F	B		E	D		E	D	
Approach Delay (s)		19.6			18.4			58.6			54.9	
Approach LOS		B			B			E			D	

Intersection Summary

HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: Dixie Road & Kingston Road

<2043 Future Total>PM
10-18-2023

c Critical Lane Group

Lanes, Volumes, Timings
6: Liverpool Road & Kingston Road

<2043 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Future Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Flt Permitted	0.950			0.950			0.214			0.134		
Satd. Flow (perm)	1650	3461	1479	1689	3579	1485	403	3773	1543	282	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			127			179			167
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
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
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	340	1140	593	290	477	78	142	900	262	111	758	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	1140	593	290	477	78	142	900	262	111	758	186
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2043 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

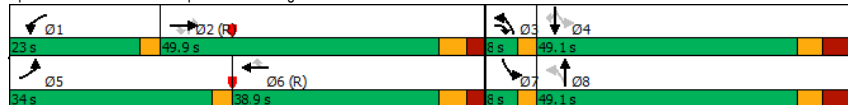


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	21.0		21.0		21.0		33.0		21.0		33.0	
Pedestrian Calls (#/hr)	15		20		20		28		15		15	
Act Effect Green (s)	29.0	42.8	51.9	22.0	33.8	33.8	51.1	40.0	42.8	51.1	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.40	0.17	0.26	0.26	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.67	0.78	0.42	0.63	0.67	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	43.7	46.4	13.0	41.4	42.9	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	43.7	46.4	13.0	41.4	42.9	8.3
LOS	E	D	D	F	D	A	D	D	B	D	D	A
Approach Delay	49.0			61.8			39.4			36.6		
Approach LOS	D			E			D			D		

Intersection Summary

Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	135
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	1.00
Intersection Signal Delay:	46.2
Intersection Capacity Utilization:	104.5%
Analysis Period (min):	15
Intersection LOS:	D
ICU Level of Service:	G

Splits and Phases: 6: Liverpool Road & Kingston Road



Queues

<2043 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	340	1140	593	290	477	78	142	900	262	111	758	186
v/c Ratio	0.90	1.00	0.93	1.00	0.51	0.16	0.67	0.78	0.42	0.63	0.67	0.33
Control Delay	65.4	50.2	37.2	107.5	43.9	1.8	43.7	46.4	13.0	41.4	42.9	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	50.2	37.2	107.5	43.9	1.8	43.7	46.4	13.0	41.4	42.9	8.3
Queue Length 50th (m)	76.5	~146.0	126.6	~75.4	56.4	0.0	22.7	110.2	15.1	17.3	89.3	3.4
Queue Length 95th (m)	m90.4	m#182.7	m#155.6	#132.1	73.7	2.4	#39.6	134.7	38.1	#30.6	110.8	20.7
Internal Link Dist (m)	670.6			372.4			233.7			324.6		
Turn Bay Length (m)	188.8	97.9	170.7	117.0	185.5		52.0	49.0				60.5
Base Capacity (vph)	402	1139	640	289	931	480	212	1160	628	177	1124	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	1.00	0.93	1.00	0.51	0.16	0.67	0.78	0.42	0.63	0.67	0.33

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.

HCM Signalized Intersection Capacity Analysis

<2043 Future Total>PM

6: Liverpool Road & Kingston Road

10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Future Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	1.0	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1806	3773	1543	2023	3654	1466
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.21	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	406	3773	1543	286	3654	1466
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)	340	1140	593	290	477	78	142	900	262	111	758	186
RTOR Reduction (vph)	0	0	48	0	0	58	0	0	120	0	0	116
Lane Group Flow (vph)	340	1140	545	290	477	20	142	900	142	111	758	70
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6	8		2	4			4
Actuated Green, G (s)	29.0	42.8	47.8	20.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Effective Green, g (s)	29.0	42.8	47.8	22.0	33.8	33.8	45.0	40.0	42.8	45.0	40.0	40.0
Actuated g/C Ratio	0.22	0.33	0.37	0.17	0.26	0.26	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	376	1139	548	289	930	386	194	1160	508	165	1124	451
v/s Ratio Prot	c0.20	c0.33	c0.04	c0.17	0.13		0.03	c0.24		0.03	0.21	
v/s Ratio Perm			0.33			0.01	0.22		0.09	0.21		0.05
v/c Ratio	0.90	1.00	0.99	1.00	0.51	0.05	0.73	0.78	0.28	0.67	0.67	0.16
Uniform Delay, d1	49.1	43.6	41.0	54.0	41.1	36.1	36.2	40.9	32.2	31.8	39.3	32.7
Progression Factor	1.01	0.71	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.5	18.4	24.7	53.8	2.0	0.3	13.3	5.1	1.4	10.3	3.2	0.7
Delay (s)	63.3	49.3	57.2	107.8	43.1	36.3	49.5	46.0	33.6	42.2	42.6	33.5
Level of Service	E	D	E	F	D	D	D	D	C	D	D	C
Approach Delay (s)	53.8			64.7			43.9			40.9		
Approach LOS	D			E			D			D		
Intersection Summary												
HCM 2000 Control Delay	50.5			HCM 2000 Level of Service			D					
HCM 2000 Volume to Capacity ratio	0.93											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			22.2					
Intersection Capacity Utilization	104.5%			ICU Level of Service			G					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings

<2043 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	69	130	412	58	174	116	894	401	196	1267	46
Future Volume (vph)	87	69	130	412	58	174	116	894	401	196	1267	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Storage Length (m)	0.0	0.0	57.0		62.1	54.4		75.7	132.5		35.5	
Storage Lanes	1		0	1		1		1	1		1	1
Taper Length (m)	2.5			12.0		29.5		28.9				
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.96		0.98		1.00		0.96		0.99		0.93	
Frt	0.902				0.850		0.850				0.850	
Flt Protected	0.950		0.950		0.850		0.950		0.950		0.950	
Satd. Flow (prot)	1705	2959	0	3204	1858	1399	1645	5085	1569	1708	5079	1597
Flt Permitted	0.000		0.000		0.104		0.221				0.221	
Satd. Flow (perm)	0	2959	0	0	1858	1399	179	5085	1502	395	5079	1482
Right Turn on Red			Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	141				189		436				144	
Link Speed (k/h)	30				50		50				50	
Link Distance (m)	82.8				328.5		162.3				257.7	
Travel Time (s)	9.9				23.7		11.7				18.6	
Confl. Peds. (#/hr)			21		21		21		21		21	
Confl. Bikes (#/hr)			2				5				6	
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
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Adj. Flow (vph)	95	75	141	448	63	189	126	972	436	213	1377	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	216	0	448	63	189	126	972	436	213	1377	50
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	6.0				6.0		3.8				3.8	
Link Offset(m)	0.0				0.0		0.0				0.0	
Crosswalk Width(m)	1.6				1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	1.08	1.08	0.99	1.09	1.03	1.13	1.13	1.00	1.03	1.06	1.01	1.01
Turning Speed (k/h)	24	24	14	24	14	24	14	24	14	24	14	14
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4				9.4		9.4				9.4	
Detector 2 Size(m)	0.6				0.6		0.6				0.6	

Lanes, Volumes, Timings

<2043 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023

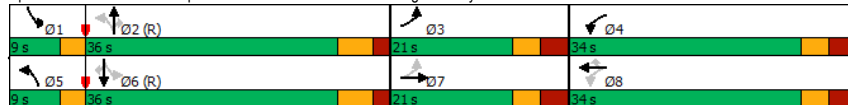


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8		8	2			2	6	6
Detector Phase	3	7		4	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	5.0	20.0	20.0	5.0	8.0	8.0
Minimum Split (s)	15.0	15.0		34.0	34.0	34.0	8.0	30.0	30.0	8.0	30.0	30.0
Total Split (s)	21.0	21.0		34.0	34.0	34.0	9.0	36.0	36.0	9.0	36.0	36.0
Total Split (%)	21.0%	21.0%		34.0%	34.0%	34.0%	9.0%	36.0%	36.0%	9.0%	36.0%	36.0%
Maximum Green (s)	14.4	14.4		27.4	27.4	27.4	6.0	29.7	29.7	6.0	29.7	29.7
Yellow Time (s)	3.3	3.3		3.3	3.3	3.3	3.0	4.2	4.2	3.0	4.2	4.2
All-Red Time (s)	3.3	3.3		3.3	3.3	3.3	0.0	2.1	2.1	0.0	2.1	2.1
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lead/Lag							Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)				19.0	19.0		17.0	17.0		17.0	17.0	
Flash Dont Walk (s)				8.0	8.0		6.0	6.0		6.0	6.0	
Pedestrian Calls (#/hr)				20	20		28	28		15	15	
Act Effect Green (s)	11.0	11.0		20.9	20.9	20.9	48.9	39.6	39.6	48.9	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.49	0.40	0.40	0.49	0.40	0.40
v/c Ratio	0.51	0.48		0.67	0.16	0.43	0.72	0.48	0.51	0.78	0.69	0.07
Control Delay	51.0	18.9		40.8	31.2	7.5	36.7	20.0	8.4	41.2	28.9	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	18.9		40.8	31.2	7.5	36.7	20.0	8.4	41.2	28.9	0.2
LOS	D	B		D	C	A	D	B	A	D	C	A
Approach Delay	28.7			31.0			18.1			29.6		
Approach LOS	C			C			B			C		

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 15 (15%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.78
 Intersection Signal Delay: 25.5 Intersection LOS: C
 Intersection Capacity Utilization 69.7% ICU Level of Service C
 Analysis Period (min) 15

Splits and Phases: 8: Liverpool Road & Private Access/Pickering Parkway



Queues

<2043 Future Total>PM

8: Liverpool Road & Private Access/Pickering Parkway

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Group Flow (vph)	95	216	448	63	189	126	972	436	213	1377	50	
v/c Ratio	0.51	0.48	0.67	0.16	0.43	0.72	0.48	0.51	0.78	0.69	0.07	
Control Delay	51.0	18.9	40.8	31.2	7.5	36.7	20.0	8.4	41.2	28.9	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	51.0	18.9	40.8	31.2	7.5	36.7	20.0	8.4	41.2	28.9	0.2	
Queue Length 50th (m)	17.7	7.1	42.3	10.3	0.0	6.9	53.6	32.4	20.8	76.8	0.0	
Queue Length 95th (m)	32.2	17.3	52.8	19.3	15.9	m#42.0	76.8	55.3	#63.3	#119.5	0.0	
Internal Link Dist (m)	58.8		304.5			138.3			233.7			
Turn Bay Length (m)			57.0		62.1		54.4		75.7		132.5	35.5
Base Capacity (vph)	245	546	877	509	520	175	2012	857	272	2010	673	
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	0.40	0.51	0.12	0.36	0.72	0.48	0.51	0.78	0.69	0.07	

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.

HCM Signalized Intersection Capacity Analysis
8: Liverpool Road & Private Access/Pickering Parkway

<2043 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	87	69	130	412	58	174	116	894	401	196	1267	46
Future Volume (vph)	87	69	130	412	58	174	116	894	401	196	1267	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.1	3.7	3.0	3.4	3.2	2.8	3.6	3.5	3.2	3.5	3.5
Total Lost time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Lane Util. Factor	1.00	0.95		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00	0.93
Fipb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1705	2931		3204	1858	1399	1644	5085	1503	1706	5079	1485
Flt Permitted	0.00	1.00		0.00	1.00	1.00	0.10	1.00	1.00	0.22	1.00	1.00
Satd. Flow (perm)	0	2931		0	1858	1399	181	5085	1503	397	5079	1485
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)	95	75	141	448	63	189	126	972	436	213	1377	50
RTOR Reduction (vph)	0	125	0	0	0	149	0	0	263	0	0	30
Lane Group Flow (vph)	95	91	0	448	63	40	126	972	173	213	1377	20
Confl. Peds. (#/hr)			21	21			21		21	21		21
Confl. Bikes (#/hr)			2				5					6
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	2%	1%	1%	1%	0%
Bus Blockages (#/hr)	0	0	0	0	0	12	0	0	2	0	0	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	3	7		4	8		5	2		1	6	
Permitted Phases	7			8			2			2	6	
Actuated Green, G (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Effective Green, g (s)	11.0	11.0		20.9	20.9	20.9	45.6	39.6	39.6	45.6	39.6	39.6
Actuated g/C Ratio	0.11	0.11		0.21	0.21	0.21	0.46	0.40	0.40	0.46	0.40	0.40
Clearance Time (s)	6.6	6.6		6.6	6.6	6.6	3.0	6.3	6.3	3.0	6.3	6.3
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	322		669	388	292	170	2013	595	259	2011	588
v/s Ratio Prot	c0.06	0.03		c0.14	0.03		0.04	0.19		c0.05	0.27	
v/s Ratio Perm						0.03	0.29		0.11	c0.32		0.01
v/c Ratio	0.51	0.28		0.67	0.16	0.14	0.74	0.48	0.29	0.82	0.68	0.03
Uniform Delay, d1	41.9	40.9		36.4	32.4	32.2	18.5	22.6	20.6	19.8	25.0	18.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	0.81	0.79	2.24	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.5		2.6	0.2	0.2	14.5	0.8	1.1	18.6	1.9	0.1
Delay (s)	44.1	41.3		38.9	32.6	32.4	29.4	18.7	47.3	38.4	26.9	18.6
Level of Service	D	D		D	C	C	C	B	D	D	C	B
Approach Delay (s)		42.2			36.6			27.7			28.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay		30.4										C
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		100.0						22.5				
Intersection Capacity Utilization		69.7%										C
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2043 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Future Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.7	3.4
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865			0.850						0.850
Flt Protected				0.950	0.997		0.950					
Satd. Flow (prot)	0	0	1662	1734	1820	1581	1825	5079	0	0	4972	1633
Flt Permitted				0.950	0.997		0.132					
Satd. Flow (perm)	0	0	1662	1734	1820	1581	254	5079	0	0	4972	1509
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						85						139
Link Speed (k/h)		50			50		50				50	
Link Distance (m)		379.4			226.7		372.2				162.3	
Travel Time (s)		27.3			16.3		26.8				11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)							6					7
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
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	464	302	529	318	136	1236	0	0	1258	139
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	0	464	272	559	318	136	1236	0	0	1258	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7		3.7				3.7	
Link Offset(m)		0.0			0.0		0.0				0.0	
Crosswalk Width(m)		1.6			1.6		1.6				1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4		9.4				9.4	
Detector 2 Size(m)					0.6		0.6				0.6	
Detector 2 Type					Cl+Ex		Cl+Ex				Cl+Ex	

Lanes, Volumes, Timings

<2043 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023

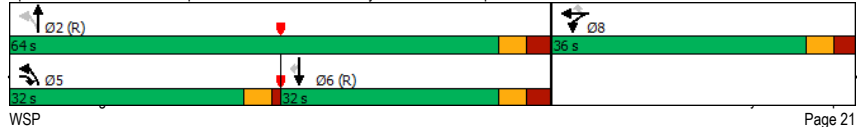


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0			0.0	
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8			5	2		6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			32.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)			32.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)			27.5	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		14			7	7
Act Effct Green (s)			27.5	30.0	30.0	30.0	59.5	57.7			25.7	25.7
Actuated g/C Ratio			0.28	0.30	0.30	0.30	0.60	0.58			0.26	0.26
v/c Ratio			1.02	0.52	1.02	0.60	0.23	0.42			0.99	0.28
Control Delay			83.4	33.4	80.6	26.9	10.0	12.4			54.1	13.3
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			83.4	33.4	80.6	26.9	10.0	12.4			54.1	13.3
LOS			F	C	F	C	A	B			D	B
Approach Delay			83.4			54.6		12.1			50.0	
Approach LOS			F			D		B			D	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 42.9 Intersection LOS: D
 Intersection Capacity Utilization 88.4% ICU Level of Service E
 Analysis Period (min) 15

Splits and Phases: 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp



Queues

<2043 Future Total>PM

9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

10-18-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	464	272	559	318	136	1236	1258	139
v/c Ratio	1.02	0.52	1.02	0.60	0.23	0.42	0.99	0.28
Control Delay	83.4	33.4	80.6	26.9	10.0	12.4	54.1	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.4	33.4	80.6	26.9	10.0	12.4	54.1	13.3
Queue Length 50th (m)	~92.3	45.8	~122.1	38.1	10.7	45.9	49.3	1.6
Queue Length 95th (m)	#154.3	72.1	#187.8	66.2	18.8	55.6	#114.7	m16.4
Internal Link Dist (m)			202.7			348.2	138.3	
Turn Bay Length (m)				125.0	50.0			
Base Capacity (vph)	457	520	546	533	583	2930	1277	491
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	1.02	0.52	1.02	0.60	0.23	0.42	0.99	0.28

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.

HCM Signalized Intersection Capacity Analysis
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp

<2043 Future Total>PM
 10-18-2023

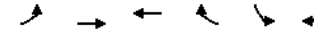


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
Traffic Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Future Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.92
Fpb, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1820	1581	1825	5079			4972	1509
Flt Permitted			1.00	0.95	1.00	1.00	0.13	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1820	1581	254	5079			4972	1509
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	0	464	302	529	318	136	1236	0	0	1258	139
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	0	103
Lane Group Flow (vph)	0	0	464	272	559	259	136	1236	0	0	1258	36
Confl. Peds. (#/hr)							17	15	15			17
Confl. Bikes (#/hr)							6	6	6			7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Effective Green, g (s)			27.5	30.0	30.0	30.0	57.7	57.7			25.7	25.7
Actuated g/C Ratio			0.28	0.30	0.30	0.30	0.58	0.58			0.26	0.26
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			457	520	546	474	578	2930			1277	387
v/s Ratio Prot			c0.28	0.16	c0.31		0.06	0.24			c0.25	
v/s Ratio Perm						0.16	0.07					0.02
v/c Ratio			1.02	0.52	1.02	0.55	0.24	0.42			0.99	0.09
Uniform Delay, d1			36.2	29.1	35.0	29.3	12.9	11.8			37.0	28.3
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.93	2.27
Incremental Delay, d2			46.0	1.0	44.7	1.3	0.2	0.4			19.0	0.4
Delay (s)			82.3	30.0	79.7	30.6	13.1	12.3			53.2	64.4
Level of Service			F	C	E	C	B	B			D	E
Approach Delay (s)		82.3			54.3			12.4			54.3	
Approach LOS		F			D			B			D	

Intersection Summary			
HCM 2000 Control Delay	44.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

Lanes, Volumes, Timings
 10: Kingston Road & Fairport Road

<2043 Future Total>PM
 10-18-2023



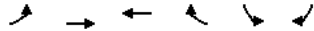
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Lane Configurations	↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	205	1872	861	223	271	137	
Future Volume (vph)	205	1872	861	223	271	137	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (m)	3.0	3.6	3.5	3.7	3.6	4.5	
Grade (%)		6%	0%			0%	
Storage Length (m)	75.0			18.5	15.5	0.0	
Storage Lanes	1			0	1	1	
Taper Length (m)	2.5				31.3		
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00	
Ped Bike Factor	1.00		1.00			0.99	
Frt			0.969			0.850	
Flt Protected	0.950				0.950		
Satd. Flow (prot)	1618	3433	3356	0	1805	1777	
Flt Permitted	0.950				0.950		
Satd. Flow (perm)	1617	3433	3356	0	1805	1751	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)			34			149	
Link Speed (k/h)		60	60		40		
Link Distance (m)		424.0	896.3		280.0		
Travel Time (s)		25.4	53.8		25.2		
Confl. Peds. (#/hr)	1			1		2	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%	
Bus Blockages (#/hr)	0	0	0	9	0	0	
Adj. Flow (vph)	223	2035	936	242	295	149	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	223	2035	1178	0	295	149	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Left	Left	Right	Left	Right	
Median Width(m)		3.0	3.0		3.6		
Link Offset(m)		0.0	0.0		0.0		
Crosswalk Width(m)		1.6	1.6		1.6		
Two way Left Turn Lane		Yes					
Headway Factor	1.14	1.04	1.01	0.99	1.00	0.88	
Turning Speed (k/h)	24			14	24	14	
Number of Detectors	1	2	2		1	1	
Detector Template	Left	Thru	Thru		Left	Right	
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0	
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel							
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4	9.4				
Detector 2 Size(m)		0.6	0.6				

Lanes, Volumes, Timings

<2043 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø1
Detector 2 Type	CI+Ex		CI+Ex				
Detector 2 Channel							
Detector 2 Extend (s)	0.0		0.0				
Turn Type	Prot	NA	NA		Prot	Perm	
Protected Phases	5	2	6		4		1
Permitted Phases				4			
Detector Phase	5	2	6		4	4	
Switch Phase							
Minimum Initial (s)	5.0	20.0	20.0		8.0	8.0	5.0
Minimum Split (s)	8.0	32.3	32.3		37.3	37.3	8.0
Total Split (s)	25.0	84.7	67.7		37.3	37.3	8.0
Total Split (%)	19.2%	65.2%	52.1%		28.7%	28.7%	6%
Maximum Green (s)	22.0	78.4	61.4		30.0	30.0	5.0
Yellow Time (s)	3.0	4.3	4.3		3.3	3.3	3.0
All-Red Time (s)	0.0	2.0	2.0		4.0	4.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.3	6.3		7.3	7.3	
Lead/Lag	Lead	Lag	Lag				Lead
Lead-Lag Optimize?							
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max		None	None	None
Walk Time (s)	7.0		7.0		7.0		5.0
Flash Dont Walk (s)	19.0		19.0		23.0		0.0
Pedestrian Calls (#/hr)	0		0		0		20
Act Effect Green (s)	20.6	86.1	67.3		25.5	25.5	
Actuated g/C Ratio	0.16	0.66	0.52		0.20	0.20	
v/c Ratio	0.87	0.89	0.67		0.84	0.32	
Control Delay	79.4	9.0	15.2		70.3	8.1	
Queue Delay	0.0	0.0	0.0		0.0	0.0	
Total Delay	79.4	9.0	15.2		70.3	8.1	
LOS	E	A	B		E	A	
Approach Delay	16.0		15.2		49.4		
Approach LOS	B		B		D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 72 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 19.5

Intersection LOS: B

Intersection Capacity Utilization 78.7%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 10: Kingston Road & Fairport Road



Queues

<2043 Future Total>PM

10: Kingston Road & Fairport Road

10-18-2023



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	223	2035	1178	295	149
v/c Ratio	0.87	0.89	0.67	0.84	0.32
Control Delay	79.4	9.0	15.2	70.3	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	79.4	9.0	15.2	70.3	8.1
Queue Length 50th (m)	51.0	282.0	126.2	72.7	0.0
Queue Length 95th (m)	m50.3	m272.1	161.4	102.0	16.9
Internal Link Dist (m)	400.0		872.3	256.0	
Turn Bay Length (m)	75.0		15.5		
Base Capacity (vph)	273	2274	1754	416	518
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	0.82	0.89	0.67	0.71	0.29

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Kingston Road & Fairport Road

<2043 Future Total>PM
10-18-2023

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↕
Traffic Volume (vph)	205	1872	861	223	271	137
Future Volume (vph)	205	1872	861	223	271	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.0	3.6	3.5	3.7	3.6	4.5
Grade (%)		6%	0%		0%	
Total Lost time (s)	3.0	6.3	6.3		7.3	7.3
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1618	3433	3357		1805	1751
Fit Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1618	3433	3357		1805	1751
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	2035	936	242	295	149
RTOR Reduction (vph)	0	0	16	0	0	120
Lane Group Flow (vph)	223	2035	1162	0	295	29
Confl. Peds. (#/hr)	1			1		2
Heavy Vehicles (%)	1%	2%	3%	1%	0%	0%
Bus Blockages (#/hr)	0	0	0	9	0	0
Turn Type	Prot	NA	NA		Prot	Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.6	84.9	67.3		25.5	25.5
Effective Green, g (s)	20.6	84.9	67.3		25.5	25.5
Actuated g/C Ratio	0.16	0.65	0.52		0.20	0.20
Clearance Time (s)	3.0	6.3	6.3		7.3	7.3
Vehicle Extension (s)	3.0	0.2	0.2		3.0	3.0
Lane Grp Cap (vph)	256	2242	1737		354	343
v/s Ratio Prot	c0.14	c0.59	0.35		c0.16	
v/s Ratio Perm						0.02
v/c Ratio	0.87	0.91	0.67		0.83	0.09
Uniform Delay, d1	53.4	19.2	23.1		50.2	42.7
Progression Factor	1.33	0.30	0.56		1.00	1.00
Incremental Delay, d2	7.7	1.7	1.7		15.4	0.1
Delay (s)	78.6	7.5	14.8		65.6	42.8
Level of Service	E	A	B		E	D
Approach Delay (s)		14.5	14.8		57.9	
Approach LOS		B	B		E	
Intersection Summary						
HCM 2000 Control Delay			19.5		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	16.6
Intersection Capacity Utilization			78.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Lanes, Volumes, Timings
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Total>PM
10-18-2023

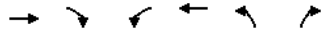
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕	↕	↕	↕	↕	↕
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Fit Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					218
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1951	25	200	884	720	303
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1976	0	200	884	720	303
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings

<2043 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	67.3		16.0	86.3	29.8	29.8
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
v/c Ratio	1.07		1.03	0.37	0.89	0.57
Control Delay	53.5		103.8	26.8	62.0	17.1
Queue Delay	0.9		0.0	0.0	0.0	0.0
Total Delay	54.5		103.8	26.8	62.0	17.1
LOS	D		F	C	E	B
Approach Delay	54.5			41.0	48.7	
Approach LOS	D			D	D	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 145
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.07
 Intersection Signal Delay: 49.4
 Intersection LOS: D
 Intersection Capacity Utilization 95.0%
 ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



WSP

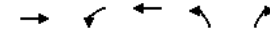
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Queues

<2043 Future Total>PM

11: Hwy 401 WB Ramps & Kingston Road

10-18-2023



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1976	200	884	720	303
v/c Ratio	1.07	1.03	0.37	0.89	0.57
Control Delay	53.5	103.8	26.8	62.0	17.1
Queue Delay	0.9	0.0	0.0	0.0	0.0
Total Delay	54.5	103.8	26.8	62.0	17.1
Queue Length 50th (m)	-296.0	-54.4	117.9	91.1	17.6
Queue Length 95th (m)	#338.5	#104.2	136.0	#114.7	46.7
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1851	194	2401	853	548
Starvation Cap Reductn	4	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.07	1.03	0.37	0.84	0.55

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.

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 WSP

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis
11: Hwy 401 WB Ramps & Kingston Road

<2043 Future Total>PM
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	→	↖	↗	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↗
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%		0%	0%		
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frbp, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Fit Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1951	25	200	884	720	303
RTOR Reduction (vph)	0	0	0	0	0	168
Lane Group Flow (vph)	1976	0	200	884	720	135
Confl. Peds. (#/hr)				1	3	
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	67.3		16.0	86.3	29.8	29.8
Effective Green, g (s)	67.3		16.0	86.3	29.8	29.8
Actuated g/C Ratio	0.52		0.12	0.66	0.23	0.23
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1851		194	2401	812	364
v/s Ratio Prot	c0.55		c0.13	0.24	c0.20	
v/s Ratio Perm						0.08
v/c Ratio	1.07		1.03	0.37	0.89	0.37
Uniform Delay, d1	31.4		57.0	9.7	48.5	42.2
Progression Factor	0.44		0.64	2.64	1.00	1.00
Incremental Delay, d2	36.7		65.5	0.3	11.4	0.6
Delay (s)	50.5		101.8	26.0	59.9	42.8
Level of Service	D		F	C	E	D
Approach Delay (s)	50.5			40.0	54.9	
Approach LOS	D			D	D	

Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Plaza Entrance/Delta Blvd & Kingston Road

<2043 Future Total>PM
10-18-2023

	↖	→	↗	←	↖	↗	↑	↖	↗	↓	↖	↗
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑		↖	↑↑		↖	↗	↗	↖	↗	
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)		6%			0%			0%				0%
Storage Length (m)	51.8		148.5	100.0		18.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	35.3			2.5			2.5			2.5		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		1.00			0.99		1.00					0.99
Frt		0.997			0.987			0.864				0.862
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1656	3346	0	1705	3403	0	1770	1824	0	1725	1474	0
Fit Permitted	0.084			0.053			0.630			0.637		
Satd. Flow (perm)	146	3346	0	95	3403	0	1172	1824	0	1157	1474	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			13			85				129
Link Speed (k/h)		60			60			30				40
Link Distance (m)		222.7			268.7			130.9				169.9
Travel Time (s)		13.4			16.1			15.7				15.3
Confl. Peds. (#/hr)	16		1	1		16	1					1
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
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Adj. Flow (vph)	141	1811	41	97	1383	132	215	16	150	89	14	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	141	1852	0	97	1515	0	215	166	0	89	169	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.6				3.6
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane					Yes							
Headway Factor	1.10	1.07	1.06	1.08	1.03	1.03	1.00	0.87	0.99	1.06	1.13	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2			2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	

Lanes, Volumes, Timings

<2043 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023

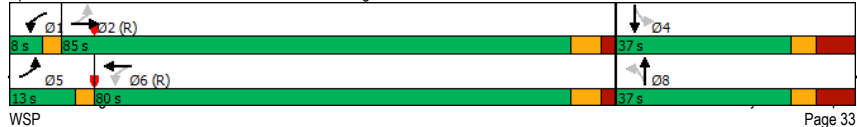


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	20.0		5.0	20.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	8.0	31.9		8.0	31.9		37.0	37.0		37.0	37.0	
Total Split (s)	13.0	85.0		8.0	80.0		37.0	37.0		37.0	37.0	
Total Split (%)	10.0%	65.4%		6.2%	61.5%		28.5%	28.5%		28.5%	28.5%	
Maximum Green (s)	10.0	78.1		5.0	73.1		27.0	27.0		27.0	27.0	
Yellow Time (s)	3.0	4.7		3.0	4.7		3.8	3.8		3.8	3.8	
All-Red Time (s)	0.0	2.2		0.0	2.2		6.2	6.2		6.2	6.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.9		3.0	6.9		10.0	10.0		10.0	10.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2		3.0	0.2		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		18.0			18.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)		0			13		3	3		6	6	
Act Effct Green (s)	91.0	79.3		84.2	75.3		25.8	25.8		25.8	25.8	
Actuated g/C Ratio	0.70	0.61		0.65	0.58		0.20	0.20		0.20	0.20	
v/c Ratio	0.68	0.91		0.79	0.77		0.93	0.39		0.39	0.43	
Control Delay	23.0	17.2		67.5	17.6		93.7	24.4		50.3	16.3	
Queue Delay	0.0	24.3		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay	23.0	41.5		67.5	17.7		93.7	24.4		50.3	16.3	
LOS	C	D		E	B		F	C		D	B	
Approach Delay		40.2			20.7			63.5			28.0	
Approach LOS		D			C			E			C	

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 34.1 Intersection LOS: C
 Intersection Capacity Utilization 99.0% ICU Level of Service F
 Analysis Period (min) 15

Splits and Phases: 12: Plaza Entrance/Delta Blvd & Kingston Road

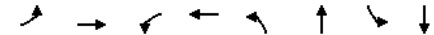


Queues

<2043 Future Total>PM

12: Plaza Entrance/Delta Blvd & Kingston Road

10-18-2023



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	1852	97	1515	215	166	89	169
v/c Ratio	0.68	0.91	0.79	0.77	0.93	0.39	0.39	0.43
Control Delay	23.0	17.2	67.5	17.6	93.7	24.4	50.3	16.3
Queue Delay	0.0	24.3	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	23.0	41.5	67.5	17.7	93.7	24.4	50.3	16.3
Queue Length 50th (m)	16.3	132.0	9.5	214.6	54.0	17.4	19.7	8.4
Queue Length 95th (m)	m16.1	m126.5	m#27.1	237.0	#99.2	37.9	36.4	29.0
Internal Link Dist (m)		198.7		244.7		106.9		145.9
Turn Bay Length (m)	51.8		100.0					
Base Capacity (vph)	218	2042	123	1975	243	446	240	408
Starvation Cap Reductn	0	47	0	38	0	0	0	0
Spillback Cap Reductn	0	274	0	0	0	6	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	1.05	0.79	0.78	0.88	0.38	0.37	0.41

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.

HCM Signalized Intersection Capacity Analysis
12: Plaza Entrance/Delta Blvd & Kingston Road

<2043 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Future Volume (vph)	130	1666	38	89	1272	121	198	15	138	82	13	143
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.2	3.4	3.5	3.1	3.4	3.4	3.6	4.6	3.7	3.2	2.8	3.7
Grade (%)	6%		0%		0%		0%		0%		0%	
Total Lost time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Lane Util. Factor	1.00	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.99	1.00	0.86	1.00	0.86	1.00	0.86	1.00	0.86
Fit Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1656	3345	1705	3403	1768	1825	1725	1475	1725	1475	1725	1475
Fit Permitted	0.08	1.00	0.05	1.00	0.63	1.00	0.64	1.00	0.64	1.00	0.64	1.00
Satd. Flow (perm)	147	3345	95	3403	1173	1825	1157	1475	1157	1475	1157	1475
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)	141	1811	41	97	1383	132	215	16	150	89	14	155
RTOR Reduction (vph)	0	1	0	0	5	0	68	0	0	103	0	0
Lane Group Flow (vph)	141	1851	0	97	1510	0	215	98	0	89	66	0
Confl. Peds. (#/hr)	16	1	1	1	16	1	1	1	1	1	1	1
Heavy Vehicles (%)	1%	2%	0%	0%	2%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA	NA	NA
Protected Phases	5	2	1	6	8	8	8	8	8	8	8	8
Permitted Phases	2		6		8		4		4			
Actuated Green, G (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Effective Green, g (s)	87.3	79.3	80.3	75.3	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8
Actuated g/C Ratio	0.67	0.61	0.62	0.58	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	3.0	6.9	3.0	6.9	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Vehicle Extension (s)	3.0	0.2	3.0	0.2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	2040	120	1971	232	362	229	292	229	292	229	292
v/s Ratio Prot	c0.05	c0.55	c0.03	0.44	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
v/s Ratio Perm	0.42		0.46		c0.18		0.08		0.08			
v/c Ratio	0.69	0.91	0.81	0.77	0.93	0.27	0.39	0.22	0.39	0.22	0.39	0.22
Uniform Delay, d1	19.1	22.1	24.9	20.7	51.2	44.1	45.3	43.7	45.3	43.7	45.3	43.7
Progression Factor	1.28	0.64	1.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	2.1	26.9	2.4	39.1	0.4	1.1	0.4	1.1	0.4	1.1	0.4
Delay (s)	27.0	16.3	69.5	17.1	90.3	44.5	46.3	44.1	46.3	44.1	46.3	44.1
Level of Service	C	B	E	B	F	D	D	D	D	D	D	D
Approach Delay (s)	17.1		20.2		70.4		44.9		44.9		44.9	
Approach LOS	B		C		E		D		D		D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.9
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2043 Future Total>PM
10-18-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	64.0			39.6			66.8			32.6		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96	0.99		0.91	0.99		0.93	0.98		0.95
Frt		0.850			0.850			0.850			0.850	0.850
Fit Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Fit Permitted	0.950		0.950		0.950		0.329		0.290		0.290	
Satd. Flow (perm)	1638	3400	1549	1719	3579	1502	604	5255	1470	523	5105	1550
Right Turn on Red		Yes		Yes		Yes		Yes		Yes		Yes
Satd. Flow (RTOR)		139			146			59				202
Link Speed (k/h)	60			60			60			60		
Link Distance (m)	297.5			222.7			158.6			385.2		
Travel Time (s)	17.9			13.4			9.5			23.1		
Confl. Peds. (#/hr)	75	31	31		75	37	65	65	65	65	65	37
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
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	0	2	0	4
Adj. Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	2	1	2	1	1	2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Channel												
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

Lanes, Volumes, Timings

<2043 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	CI+Ex			CI+Ex			CI+Ex			CI+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		33.0		33.0		33.0	
Pedestrian Calls (#/hr)	13		13		38		38		20		20	
Act Effct Green (s)	14.7	37.6	37.6	26.0	48.9	48.9	50.4	40.0	71.4	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.39	0.31	0.55	0.39	0.31	0.31
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
LOS	F	F	C	F	C	C	E	D	D	E	D	A
Approach Delay	78.3			39.6			45.7			36.0		
Approach LOS	E			D			D			D		

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 50.6

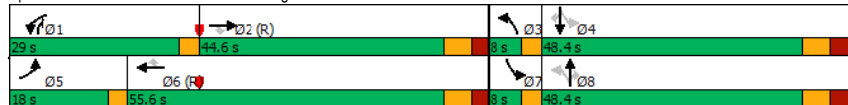
Intersection Capacity Utilization 113.7%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service H

Splits and Phases: 13: Whites Road & Kingston Road



Queues

<2043 Future Total>PM

13: Whites Road & Kingston Road

10-18-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	168	1023	389	359	829	538	248	743	818	212	671	202
v/c Ratio	0.89	1.04	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33
Control Delay	98.3	84.7	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Delay	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	98.3	91.8	34.2	111.2	20.7	20.9	66.6	37.4	46.8	62.0	36.9	5.8
Queue Length 50th (m)	42.9	~148.8	58.6	~96.3	47.7	25.9	43.0	56.2	162.6	36.0	50.2	0.0
Queue Length 95th (m)	#82.5	#190.0	96.0 m	#152.3	m83.6 m	#122.8	#85.3	68.7	#276.1	#71.4	62.1	17.2
Internal Link Dist (m)	273.5		198.7		134.6		361.2					
Turn Bay Length (m)	127.0		123.0	87.1	35.0	72.0	35.0	88.5			47.0	
Base Capacity (vph)	193	983	546	346	1345	655	278	1616	857	249	1570	616
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	18	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.87	1.06	0.71	1.04	0.62	0.82	0.89	0.46	0.95	0.85	0.43	0.33

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.

HCM Signalized Intersection Capacity Analysis
13: Whites Road & Kingston Road

<2043 Future Total>PM
10-18-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%			0%			0%			0%		
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.96	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1760	5255	1517	1741	5105	1550
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.33	1.00	1.00	0.29	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	610	5255	1517	531	5105	1550
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)	168	1023	389	359	829	538	248	743	818	212	671	202
RTOR Reduction (vph)	0	0	99	0	0	91	0	0	29	0	0	140
Lane Group Flow (vph)	168	1023	290	359	829	447	248	743	789	212	671	62
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	65	65	37	37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6		8		4		4
Actuated Green, G (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Effective Green, g (s)	14.7	37.6	37.6	26.0	48.9	48.9	45.0	40.0	66.0	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.35	0.31	0.51	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	190	983	448	346	1346	564	255	1616	770	230	1570	476
v/s Ratio Prot	0.10	c0.30		c0.21	0.23		c0.04	0.14	c0.20	0.04	0.13	
v/s Ratio Perm			0.19			0.30	0.30		0.32	0.28		0.04
v/c Ratio	0.88	1.04	0.65	1.04	0.62	0.79	0.97	0.46	1.02	0.92	0.43	0.13
Uniform Delay, d1	56.8	46.2	40.4	52.0	32.9	36.0	40.5	36.3	32.0	39.3	35.9	32.5
Progression Factor	1.00	1.00	1.00	1.28	0.58	0.48	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.0	39.8	7.1	48.8	1.4	7.2	48.4	0.9	38.8	38.4	0.9	0.6
Delay (s)	91.8	86.0	47.5	115.3	20.5	24.6	88.9	37.2	70.8	77.8	36.7	33.0
Level of Service	F	F	D	F	C	C	F	D	E	E	D	C
Approach Delay (s)	77.2			41.5			59.5			44.1		
Approach LOS	E			D			E			D		
Intersection Summary												
HCM 2000 Control Delay	56.3			HCM 2000 Level of Service			E					
HCM 2000 Volume to Capacity ratio	1.03											
Actuated Cycle Length (s)	130.0			Sum of lost time (s)			21.4					
Intersection Capacity Utilization	113.7%			ICU Level of Service			H					
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Total>PM
10-18-2023

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.7	3.6	3.8	3.7
Storage Length (m)	0.0	225.0	0.0	0.0	0.0	0.0
Storage Lanes	2	1	0			0
Taper Length (m)	2.5		2.5			
Lane Util. Factor	0.97	0.91	1.00	0.95	0.95	1.00
Ped Bike Factor	1.00	0.98				
Frt	0.993	0.850				
Fit Protected	0.954					
Satd. Flow (prot)	3450	1427	0	3539	3618	0
Fit Permitted	0.954					
Satd. Flow (perm)	3450	1404	0	3539	3618	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7	104				
Link Speed (k/h)	50			60	60	
Link Distance (m)	295.9			185.9	316.9	
Travel Time (s)	21.3			11.2	19.0	
Confl. Peds. (#/hr)		3	4			4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Adj. Flow (vph)	1372	640	0	936	653	0
Shared Lane Traffic (%)	10%					
Lane Group Flow (vph)	1436	576	0	936	653	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	7.2			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	0.99	1.00	0.97	0.99
Turning Speed (k/h)	24	14	24			14
Number of Detectors	1	1		2	2	
Detector Template	Left	Right		Thru	Thru	
Leading Detector (m)	2.0	2.0		10.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	2.0		0.6	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				CI+Ex	CI+Ex	
Detector 2 Channel						

Lanes, Volumes, Timings

<2043 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

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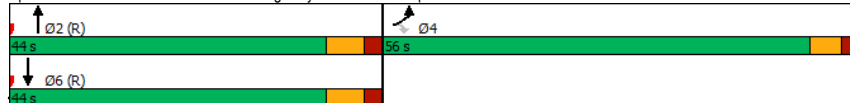


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Detector Phase	4	4		2	6	
Switch Phase						
Minimum Initial (s)	8.0	8.0		20.0	20.0	
Minimum Split (s)	28.5	28.5		27.7	27.7	
Total Split (s)	56.0	56.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		44.0%	44.0%	
Maximum Green (s)	50.5	50.5		37.3	37.3	
Yellow Time (s)	3.7	3.7		4.5	4.5	
All-Red Time (s)	1.8	1.8		2.2	2.2	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.5	5.5		6.7	6.7	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Recall Mode	None	None		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	16.0	16.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effect Green (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
v/c Ratio	0.86	0.79		0.67	0.45	
Control Delay	29.2	26.3		28.2	24.0	
Queue Delay	0.0	0.0		0.0	0.0	
Total Delay	29.2	26.3		28.2	24.0	
LOS	C	C		C	C	
Approach Delay	28.4			28.2	24.0	
Approach LOS	C			C	C	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 8 (8%), Referenced to phase 2:NBT and 6:SBT, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 27.5 Intersection LOS: C
 Intersection Capacity Utilization 76.2% ICU Level of Service D
 Analysis Period (min) 15

Splits and Phases: 14: Whites Road & Highway 401 EB Off Ramp



Queues

<2043 Future Total>PM

14: Whites Road & Highway 401 EB Off Ramp

10-18-2023



Lane Group	EBL	EBR	NBT	SBT
Lane Group Flow (vph)	1436	576	936	653
v/c Ratio	0.86	0.79	0.67	0.45
Control Delay	29.2	26.3	28.2	24.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.2	26.3	28.2	24.0
Queue Length 50th (m)	117.5	79.5	79.4	49.6
Queue Length 95th (m)	145.4	129.5	102.5	66.3
Internal Link Dist (m)	271.9		161.9	292.9
Turn Bay Length (m)		225.0		
Base Capacity (vph)	1745	760	1405	1436
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.82	0.76	0.67	0.45

Intersection Summary

HCM Signalized Intersection Capacity Analysis
 14: Whites Road & Highway 401 EB Off Ramp

<2043 Future Total>PM
 10-18-2023



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↑↑	↑↑	
Traffic Volume (vph)	1262	589	0	861	601	0
Future Volume (vph)	1262	589	0	861	601	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.7	3.6	3.8	3.7
Total Lost time (s)	5.5	5.5		6.7	6.7	
Lane Util. Factor	0.97	0.91		0.95	0.95	
Frbp, ped/bikes	1.00	0.98		1.00	1.00	
Fipb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	0.99	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3453	1404		3539	3618	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	3453	1404		3539	3618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1372	640	0	936	653	0
RTOR Reduction (vph)	4	54	0	0	0	0
Lane Group Flow (vph)	1432	522	0	936	653	0
Confl. Peds. (#/hr)		3	4			4
Heavy Vehicles (%)	1%	3%	2%	2%	2%	2%
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	48.1	48.1		39.7	39.7	
Effective Green, g (s)	48.1	48.1		39.7	39.7	
Actuated g/C Ratio	0.48	0.48		0.40	0.40	
Clearance Time (s)	5.5	5.5		6.7	6.7	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	1660	675		1404	1436	
v/s Ratio Prot	c0.41			c0.26	0.18	
v/s Ratio Perm		0.37				
v/c Ratio	0.86	0.77		0.67	0.45	
Uniform Delay, d1	23.0	21.4		24.7	22.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	5.5		2.5	1.0	
Delay (s)	27.9	27.0		27.2	23.2	
Level of Service	C	C		C	C	
Approach Delay (s)	27.6			27.2	23.2	
Approach LOS	C			C	C	
Intersection Summary						
HCM 2000 Control Delay		26.7		HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio		0.77				
Actuated Cycle Length (s)		100.0		Sum of lost time (s)		12.2
Intersection Capacity Utilization		76.2%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						

Lanes, Volumes, Timings

<2043 Future Total optimized PHF scenario>PM

6: Liverpool Road & Kingston Road

10-30-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Future Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Storage Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Storage Lanes	1		1	1		1	1		1	1		1
Taper Length (m)	31.6			22.7			20.8			25.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	0.98		0.93	0.99		0.94	0.99		0.90	0.99		0.95
Frt			0.850			0.850			0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1688	3461	1599	1711	3579	1579	1809	3773	1715	2026	3654	1546
Fit Permitted	0.950			0.950			0.252			0.173		
Satd. Flow (perm)	1648	3461	1479	1686	3579	1485	474	3773	1543	364	3654	1466
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			127			179			167
Link Speed (k/h)		60			60			50				50
Link Distance (m)		694.6			396.4			257.7				348.6
Travel Time (s)		41.7			23.8			18.6				25.1
Confl. Peds. (#/hr)	31		44	44		31	40		61	61		40
Confl. Bikes (#/hr)			5			6			9			2
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	4	0	0	0
Adj. Flow (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)		3.3			3.3			4.7				4.7
Link Offset(m)		0.0			0.0			0.0				0.0
Crosswalk Width(m)		1.6			1.6			1.6				1.6
Two way Left Turn Lane		Yes										Yes
Headway Factor	1.08	1.03	1.00	1.04	0.99	1.03	0.97	0.93	0.87	0.86	0.97	1.04
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6

Lanes, Volumes, Timings

<2043 Future Total optimized PHF scenario>PM

6: Liverpool Road & Kingston Road

10-30-2023

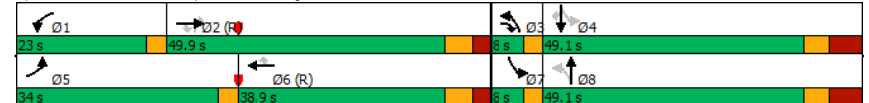


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex		
Detector 2 Channel												
Detector 2 Extend (s)	0.0			0.0			0.0			0.0		
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2			6	8		2	4		4
Detector Phase	5	2	3	1	6	6	3	8	2	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	5.0	5.0	20.0	20.0	5.0	8.0	20.0	5.0	8.0	8.0
Minimum Split (s)	8.0	35.1	8.0	8.0	35.1	35.1	8.0	49.1	35.1	8.0	49.1	49.1
Total Split (s)	34.0	49.9	8.0	23.0	38.9	38.9	8.0	49.1	49.9	8.0	49.1	49.1
Total Split (%)	26.2%	38.4%	6.2%	17.7%	29.9%	29.9%	6.2%	37.8%	38.4%	6.2%	37.8%	37.8%
Maximum Green (s)	31.0	42.8	5.0	20.0	31.8	31.8	5.0	40.0	42.8	5.0	40.0	40.0
Yellow Time (s)	3.0	4.3	3.0	3.0	4.3	4.3	3.0	3.8	4.3	3.0	3.8	3.8
All-Red Time (s)	0.0	2.8	0.0	0.0	2.8	2.8	0.0	5.3	2.8	0.0	5.3	5.3
Lost Time Adjust (s)	0.0	0.0	0.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	None	C-Max	C-Max	None	Max	C-Max	None	Max	Max
Walk Time (s)		7.0			7.0	7.0		7.0	7.0		7.0	7.0
Flash Dont Walk (s)		21.0			21.0	21.0		33.0	21.0		33.0	33.0
Pedestrian Calls (#/hr)		15			20	20		28	15		15	15
Act Effect Green (s)	27.7	42.8	51.9	22.0	35.1	35.1	51.1	40.0	42.8	51.1	40.0	40.0
Actuated g/C Ratio	0.21	0.33	0.40	0.17	0.27	0.27	0.39	0.31	0.33	0.39	0.31	0.31
v/c Ratio	0.87	0.92	0.85	0.92	0.45	0.15	0.55	0.71	0.38	0.49	0.62	0.30
Control Delay	62.7	36.2	29.0	89.9	42.1	0.8	35.4	44.0	11.2	32.6	41.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	36.2	29.0	89.9	42.1	0.8	35.4	44.0	11.2	32.6	41.4	6.6
LOS	E	D	C	F	D	A	D	D	B	C	D	A
Approach Delay		38.5			54.7			36.5				34.3
Approach LOS		D			D			D				C


Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 82 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 125
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.92
 Intersection Signal Delay: 39.8
 Intersection Capacity Utilization 104.5%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service G

Splits and Phases: 6: Liverpool Road & Kingston Road



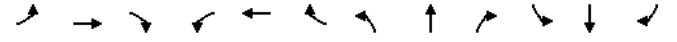
Queues <2043 Future Total optimized PHF scenario>PM
6: Liverpool Road & Kingston Road 10-30-2023



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
v/c Ratio	0.87	0.92	0.85	0.92	0.45	0.15	0.55	0.71	0.38	0.49	0.62	0.30
Control Delay	62.7	36.2	29.0	89.9	42.1	0.8	35.4	44.0	11.2	32.6	41.4	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.7	36.2	29.0	89.9	42.1	0.8	35.4	44.0	11.2	32.6	41.4	6.6
Queue Length 50th (m)	69.9	123.1	103.4	68.1	50.5	0.0	20.8	99.0	11.1	15.9	80.4	0.7
Queue Length 95th (m)	m78.8	m138.7	m115.2	#118.3	67.7	0.8	34.5	121.7	32.0	27.4	100.7	16.8
Internal Link Dist (m)		670.6			372.4			233.7			324.6	
Turn Bay Length (m)	188.8		97.9	170.7		117.0	185.5		52.0	49.0		60.5
Base Capacity (vph)	402	1139	640	289	965	493	237	1160	628	207	1124	566
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.92	0.85	0.92	0.45	0.15	0.55	0.71	0.38	0.49	0.62	0.30

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.

HCM Signalized Intersection Capacity Analysis<2043 Future Total optimized PHF scenario>PM
6: Liverpool Road & Kingston Road 10-30-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑	↑		↑↑	↑		↑↑	↑
Traffic Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Future Volume (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.1	3.4	3.6	3.3	3.7	3.4	3.8	4.1	4.8	4.7	3.8	3.3
Total Lost time (s)	3.0	7.1	3.0	1.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94	1.00	1.00	0.90	1.00	1.00	0.95
Fipb, ped/bikes	1.00	1.00	1.00	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	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Fit Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1688	3461	1492	1711	3579	1486	1804	3773	1543	2022	3654	1466
Fit Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.25	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)	1688	3461	1492	1711	3579	1486	478	3773	1543	368	3654	1466
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	313	1049	546	267	439	72	131	828	241	102	697	171
RTOR Reduction (vph)	0	0	48	0	53	0	0	120	0	0	0	116
Lane Group Flow (vph)	313	1049	498	267	439	19	131	828	121	102	697	55
Confl. Peds. (#/hr)	31	44	44		31	40		61	61		40	
Confl. Bikes (#/hr)			5			6			9			2
Heavy Vehicles (%)	1%	2%	1%	2%	2%	0%	2%	1%	5%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	0	0
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	pm+pt	NA	custom	pm+pt	NA	Perm
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2		6		8		2	4		4
Actuated Green, G (s)	27.7	42.8	47.8	20.0	35.1	35.1	45.0	40.0	42.8	45.0	40.0	40.0
Effective Green, g (s)	27.7	42.8	47.8	22.0	35.1	35.1	45.0	40.0	42.8	45.0	40.0	40.0
Actuated g/C Ratio	0.21	0.33	0.37	0.17	0.27	0.27	0.35	0.31	0.33	0.35	0.31	0.31
Clearance Time (s)	3.0	7.1	3.0	3.0	7.1	7.1	3.0	9.1	7.1	3.0	9.1	9.1
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	359	1139	548	289	966	401	216	1160	508	191	1124	451
v/s Ratio Prot	c0.19	c0.30	c0.03	c0.16	0.12		0.02	c0.22		0.02	0.19	
v/s Ratio Perm			0.30			0.01	0.19		0.08	0.16		0.04
v/c Ratio	0.87	0.92	0.91	0.92	0.45	0.05	0.61	0.71	0.24	0.53	0.62	0.12
Uniform Delay, d1	49.4	42.0	39.0	53.2	39.5	35.1	33.9	39.9	31.7	31.0	38.5	32.4
Progression Factor	1.03	0.69	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.9	6.7	9.6	33.4	1.5	0.2	4.8	3.8	1.1	2.9	2.6	0.6
Delay (s)	60.9	35.6	39.4	86.6	41.0	35.3	38.6	43.7	32.8	33.8	41.1	32.9
Level of Service	E	D	D	F	D	D	D	D	C	C	D	C
Approach Delay (s)		40.8			56.1			41.0			38.9	
Approach LOS		D			E			D			D	

Intersection Summary
 HCM 2000 Control Delay 42.9 HCM 2000 Level of Service D
 HCM 2000 Volume to Capacity ratio 0.86
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 22.2
 Intersection Capacity Utilization 104.5% ICU Level of Service G
 Analysis Period (min) 15
 c Critical Lane Group

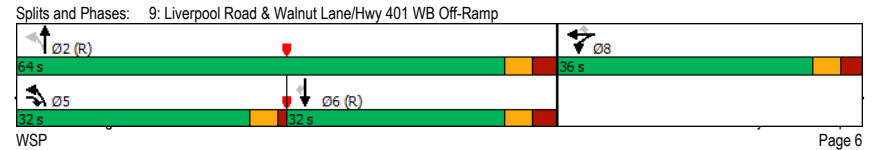
Lanes, Volumes, Timings <2043 Future Total optimized PHF scenario>PM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-30-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Future Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Storage Length (m)	0.0	0.0	0.0	0.0	125.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage Lanes	0		1	1		1	1		0	0		1
Taper Length (m)	2.5			2.5		30.0			2.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	1.00	0.91	1.00
Ped Bike Factor												0.92
Frt			0.865			0.850						0.850
Fit Protected				0.950	0.997		0.950					
Satd. Flow (prot)	0	0	1662	1734	1820	1581	1825	5079	0	0	4972	1633
Fit Permitted				0.950	0.997		0.129					
Satd. Flow (perm)	0	0	1662	1734	1820	1581	248	5079	0	0	4972	1509
Right Turn on Red			No			Yes			Yes			Yes
Satd. Flow (RTOR)						85						128
Link Speed (kh)		50			50			50			50	
Link Distance (m)		379.4			226.7			372.2			162.3	
Travel Time (s)		27.3			16.3			26.8			11.7	
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)								6				7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Adj. Flow (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	0	427	250	515	293	125	1137	0	0	1157	128
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	1.01	0.99	1.01	0.99	0.99	1.03	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors			1	1	2	1	1	2			2	1
Detector Template			Right	Left	Thru	Right	Left	Thru			Thru	Right
Leading Detector (m)			2.0	2.0	10.0	2.0	2.0	10.0			10.0	2.0
Trailing Detector (m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Position(m)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Size(m)			2.0	2.0	0.6	2.0	2.0	0.6			0.6	2.0
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Detector 2 Position(m)					9.4			9.4			9.4	
Detector 2 Size(m)					0.6			0.6			0.6	
Detector 2 Type					Cl+Ex			Cl+Ex			Cl+Ex	


Lanes, Volumes, Timings <2043 Future Total optimized PHF scenario>PM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-30-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Channel												
Detector 2 Extend (s)					0.0			0.0				0.0
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Detector Phase			5	8	8	8	5	2			6	6
Switch Phase												
Minimum Initial (s)			5.0	8.0	8.0	8.0	5.0	15.0			15.0	15.0
Minimum Split (s)			9.5	25.0	25.0	25.0	9.5	24.3			24.3	24.3
Total Split (s)			32.0	36.0	36.0	36.0	32.0	64.0			32.0	32.0
Total Split (%)			32.0%	36.0%	36.0%	36.0%	32.0%	64.0%			32.0%	32.0%
Maximum Green (s)			27.5	30.0	30.0	30.0	27.5	57.7			25.7	25.7
Yellow Time (s)			3.5	3.3	3.3	3.3	3.5	3.3			3.3	3.3
All-Red Time (s)			1.0	2.7	2.7	2.7	1.0	3.0			3.0	3.0
Lost Time Adjust (s)			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lead/Lag			Lead				Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode			None	None	None	None	None	C-Max			C-Max	C-Max
Walk Time (s)				14.0	14.0	14.0		13.0			13.0	13.0
Flash Dont Walk (s)				5.0	5.0	5.0		5.0			5.0	5.0
Pedestrian Calls (#/hr)				0	0	0		14			7	7
Act Effct Green (s)			27.0	29.6	29.6	29.6	59.9	58.1			26.6	26.6
Actuated g/C Ratio			0.27	0.30	0.30	0.30	0.60	0.58			0.27	0.27
v/c Ratio			0.95	0.49	0.96	0.56	0.22	0.39			0.88	0.26
Control Delay			68.8	32.7	65.2	25.2	9.8	11.8			40.4	13.5
Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0
Total Delay			68.8	32.7	65.2	25.2	9.8	11.8			40.4	13.5
LOS			E	C	E	C	A	B			D	B
Approach Delay			68.8			46.5		11.6			37.7	
Approach LOS			E			D		B			D	

Intersection Summary	
Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	8 (8%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	35.1
Intersection LOS:	D
Intersection Capacity Utilization:	88.4%
ICU Level of Service:	E
Analysis Period (min):	15




Queues <2043 Future Total optimized PHF scenario>PM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-30-2023



Lane Group	EBR	WBL	WBT	WBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	427	250	515	293	125	1137	1157	128
w/c Ratio	0.95	0.49	0.96	0.56	0.22	0.39	0.88	0.26
Control Delay	68.8	32.7	65.2	25.2	9.8	11.8	40.4	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.8	32.7	65.2	25.2	9.8	11.8	40.4	13.5
Queue Length 50th (m)	80.7	41.5	102.3	33.2	9.8	41.2	45.2	1.4
Queue Length 95th (m)	#137.7	65.7	#167.3	59.3	17.5	50.1	#99.3	m15.0
Internal Link Dist (m)	202.7				348.2	138.3		
Turn Bay Length (m)			125.0	50.0				
Base Capacity (vph)	457	520	546	533	582	2951	1321	494
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 w/c Ratio	0.93	0.48	0.94	0.55	0.21	0.39	0.88	0.26

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.

HCM Signalized Intersection Capacity Analysis<2043 Future Total optimized PHF scenario>PM
 9: Liverpool Road & Walnut Lane/Hwy 401 WB Off-Ramp 10-30-2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↑	↑	↑	↑	↑↑↑	↑↑↑			↑↑↑	↑
Traffic Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Future Volume (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.7	3.7	3.7	3.7	3.7	3.5	3.7	3.5	3.7	3.7	3.4	3.7
Total Lost time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Lane Util. Factor			1.00	0.95	0.95	1.00	1.00	0.91			0.91	1.00
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	0.92
Frbp, ped/bikes			1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt			0.86	1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected			1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)			1662	1734	1820	1581	1825	5079			4972	1510
Flt Permitted			1.00	0.95	1.00	1.00	0.13	1.00			1.00	1.00
Satd. Flow (perm)			1662	1734	1820	1581	247	5079			4972	1510
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	427	278	487	293	125	1137	0	0	1157	128
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	0	94
Lane Group Flow (vph)	0	0	427	250	515	233	125	1137	0	0	1157	34
Confl. Peds. (#/hr)							17		15	15		17
Confl. Bikes (#/hr)								6				7
Heavy Vehicles (%)	0%	2%	0%	0%	0%	1%	0%	1%	6%	2%	2%	0%
Turn Type			Over	Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases			5	8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)			27.0	29.6	29.6	29.6	58.1	58.1			26.6	26.6
Effective Green, g (s)			27.0	29.6	29.6	29.6	58.1	58.1			26.6	26.6
Actuated g/C Ratio			0.27	0.30	0.30	0.30	0.58	0.58			0.27	0.27
Clearance Time (s)			4.5	6.0	6.0	6.0	4.5	6.3			6.3	6.3
Vehicle Extension (s)			3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)			448	513	538	467	569	2950			1322	401
v/s Ratio Prot			c0.26	0.14	c0.28		0.06	0.22			c0.23	
v/s Ratio Perm						0.15	0.07					0.02
w/c Ratio			0.95	0.49	0.96	0.50	0.22	0.39			0.88	0.08
Uniform Delay, d1			35.9	29.0	34.6	29.1	12.0	11.3			35.1	27.6
Progression Factor			1.00	1.00	1.00	1.00	1.00	1.00			0.94	2.23
Incremental Delay, d2			30.6	0.7	28.0	0.8	0.2	0.4			6.7	0.3
Delay (s)			66.5	29.7	62.6	29.9	12.2	11.7			39.5	61.9
Level of Service			E	C	E	C	B	B			D	E
Approach Delay (s)			66.5		45.8		11.7				41.7	
Approach LOS			E		D		B				D	

Intersection Summary
 HCM 2000 Control Delay 36.0 HCM 2000 Level of Service D
 HCM 2000 Volume to Capacity ratio 0.93
 Actuated Cycle Length (s) 100.0 Sum of lost time (s) 16.8
 Intersection Capacity Utilization 88.4% ICU Level of Service E
 Analysis Period (min) 15
 c Critical Lane Group

Lanes, Volumes, Timings <2043 Future Total optimized PHF scenario>PM
11: Hwy 401 WB Ramps & Kingston Road 10-30-2023

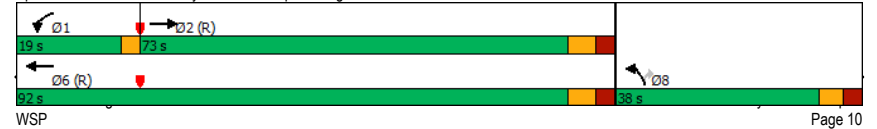
	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕↕		↕	↕↕	↕↕	↕
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Storage Length (m)		0.0	47.5		0.0	52.0
Storage Lanes		0	1		2	1
Taper Length (m)			22.3		2.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	0.97	1.00
Ped Bike Factor					1.00	0.98
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3577	0	1577	3618	3544	1617
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3577	0	1577	3618	3537	1591
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					220
Link Speed (k/h)	60			60	50	
Link Distance (m)	268.7			424.0	216.6	
Travel Time (s)	16.1			25.4	15.6	
Confl. Peds. (#/hr)					1	3
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Adj. Flow (vph)	1795	23	184	813	662	279
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1818	0	184	813	662	279
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.1			3.1	7.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	1.6			1.6	1.6	
Two way Left Turn Lane	Yes			Yes		
Headway Factor	0.98	1.03	1.14	0.97	0.97	0.99
Turning Speed (k/h)		14	24		24	14
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (m)	10.0		2.0	10.0	2.0	2.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0		0.0	0.0	0.0	0.0
Detector 1 Size(m)	0.6		2.0	0.6	2.0	2.0
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4			9.4		
Detector 2 Size(m)	0.6			0.6		
Detector 2 Type	Cl+Ex			Cl+Ex		

Lanes, Volumes, Timings <2043 Future Total optimized PHF scenario>PM
11: Hwy 401 WB Ramps & Kingston Road 10-30-2023


	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Detector Phase	2		1	6	8	8
Switch Phase						
Minimum Initial (s)	20.0		5.0	20.0	8.0	8.0
Minimum Split (s)	49.2		8.0	49.2	37.7	37.7
Total Split (s)	73.0		19.0	92.0	38.0	38.0
Total Split (%)	56.2%		14.6%	70.8%	29.2%	29.2%
Maximum Green (s)	65.8		16.0	84.8	31.3	31.3
Yellow Time (s)	4.2		3.0	4.2	3.7	3.7
All-Red Time (s)	3.0		0.0	3.0	3.0	3.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.2		3.0	7.2	6.7	6.7
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?						
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Recall Mode	C-Max		None	C-Max	None	None
Walk Time (s)	7.0			7.0	7.0	7.0
Flash Dont Walk (s)	35.0			35.0	24.0	24.0
Pedestrian Calls (#/hr)	0			0	14	14
Act Effct Green (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
v/c Ratio	0.97		0.95	0.33	0.85	0.53
Control Delay	23.1		84.2	25.1	59.4	14.3
Queue Delay	0.7		0.0	0.0	0.0	0.0
Total Delay	23.7		84.2	25.1	59.4	14.3
LOS	C		F	C	E	B
Approach Delay	23.7			36.0	46.0	
Approach LOS	C			D	D	

Intersection Summary	
Area Type:	Other
Cycle Length:	130
Actuated Cycle Length:	130
Offset:	28 (22%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle:	125
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.97
Intersection Signal Delay:	32.6
Intersection Capacity Utilization:	95.0%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	F

Splits and Phases: 11: Hwy 401 WB Ramps & Kingston Road



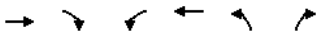
Queues <2043 Future Total optimized PHF scenario>PM
11: Hwy 401 WB Ramps & Kingston Road 10-30-2023



Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Group Flow (vph)	1818	184	813	662	279
w/c Ratio	0.97	0.95	0.33	0.85	0.53
Control Delay	23.1	84.2	25.1	59.4	14.3
Queue Delay	0.7	0.0	0.0	0.0	0.0
Total Delay	23.7	84.2	25.1	59.4	14.3
Queue Length 50th (m)	156.8	47.0	107.7	83.1	12.2
Queue Length 95th (m)	#294.4	#94.0	124.2	103.7	38.1
Internal Link Dist (m)	244.7		400.0	192.6	
Turn Bay Length (m)		47.5			52.0
Base Capacity (vph)	1882	194	2432	853	550
Starvation Cap Reductn	11	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced w/c Ratio	0.97	0.95	0.33	0.78	0.51

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis<2043 Future Total optimized PHF scenario>PM
11: Hwy 401 WB Ramps & Kingston Road 10-30-2023



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↑	↑↑	↑↑	↑
Traffic Volume (vph)	1795	23	184	813	662	279
Future Volume (vph)	1795	23	184	813	662	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	4.0	3.7	2.7	3.8	3.8	3.7
Grade (%)	6%			0%	0%	
Total Lost time (s)	7.2		3.0	7.2	6.7	6.7
Lane Util. Factor	0.95		1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3577		1577	3618	3544	1591
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	3577		1577	3618	3544	1591
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1795	23	184	813	662	279
RTOR Reduction (vph)	0	0	0	0	0	171
Lane Group Flow (vph)	1818	0	184	813	662	108
Confl. Peds. (#/hr)					1	3
Heavy Vehicles (%)	2%	5%	3%	2%	1%	1%
Turn Type	NA		Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases						8
Actuated Green, G (s)	68.4		16.0	87.4	28.7	28.7
Effective Green, g (s)	68.4		16.0	87.4	28.7	28.7
Actuated g/C Ratio	0.53		0.12	0.67	0.22	0.22
Clearance Time (s)	7.2		3.0	7.2	6.7	6.7
Vehicle Extension (s)	0.2		3.0	0.2	3.0	3.0
Lane Grp Cap (vph)	1882		194	2432	782	351
v/s Ratio Prot	c0.51		c0.12	0.22	c0.19	
v/s Ratio Perm						0.07
v/c Ratio	0.97		0.95	0.33	0.85	0.31
Uniform Delay, d1	29.7		56.6	9.0	48.5	42.3
Progression Factor	0.42		0.64	2.65	1.00	1.00
Incremental Delay, d2	8.7		42.7	0.3	8.4	0.5
Delay (s)	21.2		79.0	24.2	57.0	42.8
Level of Service	C		E	C	E	D
Approach Delay (s)	21.2			34.3	52.8	
Approach LOS	C			C	D	

Intersection Summary
HCM 2000 Control Delay 32.6 HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.93
Actuated Cycle Length (s) 130.0 Sum of lost time (s) 16.9
Intersection Capacity Utilization 95.0% ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

<2043 Future Total optimized PHF scenario>PM
10-30-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)	6%		0%		0%		0%		0%		0%	
Storage Length (m)	127.0		123.0		87.1		35.0		72.0		47.0	
Storage Lanes	1		1		1		1		1		1	
Taper Length (m)	64.0		39.6		66.8		32.6					
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Ped Bike Factor	0.97		0.96		0.99		0.91		0.99		0.95	
Frt	0.850		0.850		0.850		0.850		0.850		0.850	
Flt Protected	0.950		0.950		0.950		0.950		0.950		0.950	
Satd. Flow (prot)	1681	3400	1622	1733	3579	1654	1767	5255	1588	1750	5105	1627
Flt Permitted	0.950		0.950		0.361		0.322					
Satd. Flow (perm)	1634	3400	1549	1717	3579	1502	662	5255	1470	580	5105	1550
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	153		158		59		186					
Link Speed (kh)	60		60		60		60		60		60	
Link Distance (m)	297.5		222.7		158.6		385.2					
Travel Time (s)	17.9		13.4		9.5		23.1					
Confl. Peds. (#/hr)	75	31	31	31	75	37	65	65	37	37	37	37
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	2	0	0	0	4
Adj. Flow (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Shared Lane Traffic (%)												
Lane Group Flow (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Left	Left	Right	Left	Left	Right	Right
Median Width(m)	3.5		3.5		3.5		3.5		3.5		3.5	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	1.6		1.6		1.6		1.6		1.6		1.6	
Two way Left Turn Lane												
Headway Factor	1.06	1.04	0.96	1.01	0.99	0.94	1.01	0.96	1.00	1.01	0.96	0.96
Turning Speed (k/h)	24	14	24	24	14	24	14	24	14	24	14	24
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	

1105-1163 Kingston Road
WSP

Synchro 11 Report
Page 13

Lanes, Volumes, Timings
13: Whites Road & Kingston Road

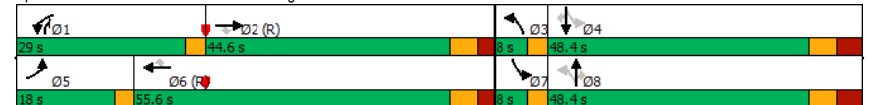
<2043 Future Total optimized PHF scenario>PM
10-30-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 2 Type	Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex		Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2			6	8		8	4		4
Detector Phase	5	2	2	1	6	6	3	8	1	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	5.0	20.0	20.0	5.0	8.0	5.0	5.0	8.0	8.0
Minimum Split (s)	8.0	43.0	43.0	8.0	43.0	43.0	8.0	48.4	8.0	8.0	48.4	48.4
Total Split (s)	18.0	44.6	44.6	29.0	55.6	55.6	8.0	48.4	29.0	8.0	48.4	48.4
Total Split (%)	13.8%	34.3%	34.3%	22.3%	42.8%	42.8%	6.2%	37.2%	22.3%	6.2%	37.2%	37.2%
Maximum Green (s)	15.0	37.6	37.6	26.0	48.6	48.6	5.0	40.0	26.0	5.0	40.0	40.0
Yellow Time (s)	3.0	4.2	4.2	3.0	4.2	4.2	3.0	4.3	3.0	3.0	4.3	4.3
All-Red Time (s)	0.0	2.8	2.8	0.0	2.8	2.8	0.0	4.1	0.0	0.0	4.1	4.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	Max	None	None	Max	Max
Walk Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Flash Dont Walk (s)	29.0		29.0		29.0		29.0		33.0		33.0	
Pedestrian Calls (#/hr)	13		13		38		38		20		20	
Act Effect Green (s)	14.4	37.7	37.7	25.9	49.2	49.2	50.4	40.0	71.3	50.4	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.39	0.31	0.55	0.39	0.31	0.31
v/c Ratio	0.84	0.95	0.64	0.96	0.56	0.74	0.76	0.42	0.88	0.72	0.39	0.31
Control Delay	90.9	64.9	28.4	94.6	20.0	16.1	48.9	36.8	35.7	46.6	36.3	5.9
Queue Delay	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.9	68.0	28.4	94.6	20.0	16.1	48.9	36.8	35.7	46.6	36.3	5.9
LOS	F	E	C	F	B	B	D	D	D	D	D	A
Approach Delay	60.7		34.3		38.0		32.7					
Approach LOS	E		C		D		C					

Intersection Summary

Area Type: Other
 Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 32 (25%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.96
 Intersection Signal Delay: 41.8
 Intersection Capacity Utilization 113.7%
 Analysis Period (min) 15
 Intersection LOS: D
 ICU Level of Service H

Splits and Phases: 13: Whites Road & Kingston Road



Queues <2043 Future Total optimized PHF scenario>PM
13: Whites Road & Kingston Road 10-30-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	155	941	358	330	763	495	228	684	753	195	617	186
v/c Ratio	0.84	0.95	0.64	0.96	0.56	0.74	0.76	0.42	0.88	0.72	0.39	0.31
Control Delay	90.9	64.9	28.4	94.6	20.0	16.1	48.9	36.8	35.7	46.6	36.3	5.9
Queue Delay	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	90.9	68.0	28.4	94.6	20.0	16.1	48.9	36.8	35.7	46.6	36.3	5.9
Queue Length 50th (m)	39.3	124.8	46.2	77.8	41.4	18.4	39.0	51.0	137.0	32.8	45.6	0.0
Queue Length 95th (m)	#74.5	#166.4	80.3 m	#132.7	m74.0	m85.4	#66.3	63.0	#219.2	#54.8	57.0	16.6
Internal Link Dist (m)		273.5			198.7			134.6			361.2	
Turn Bay Length (m)	127.0		123.0	87.1		35.0	72.0		35.0	88.5		47.0
Base Capacity (vph)	193	987	558	346	1354	666	299	1616	857	269	1570	605
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	23	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.98	0.64	0.95	0.56	0.74	0.76	0.42	0.88	0.72	0.39	0.31

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.

HCM Signalized Intersection Capacity Analysis <2043 Future Total optimized PHF scenario>PM
13: Whites Road & Kingston Road 10-30-2023

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑	↑	↑	↑↑↑	↑	↑	↑↑↑	↑
Traffic Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Future Volume (vph)	155	941	358	330	763	495	228	684	753	195	617	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.6	4.2	3.5	3.7	4.0	3.5	3.9	3.7	3.5	3.9	4.0
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00	1.00	0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.91	1.00	1.00	0.96	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1681	3400	1549	1733	3579	1502	1759	5255	1517	1739	5105	1550
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.36	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)	1681	3400	1549	1733	3579	1502	669	5255	1517	589	5105	1550
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	941	358	330	763	495	228	684	753	195	617	186
RTOR Reduction (vph)	0	0	109	0	0	98	0	29	0	0	0	129
Lane Group Flow (vph)	155	941	249	330	763	397	228	684	724	195	617	57
Confl. Peds. (#/hr)	75		31	31		75	37		65	65		37
Heavy Vehicles (%)	3%	3%	3%	3%	2%	2%	1%	2%	2%	2%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	4
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	pm+ov	pm+pt	NA	Perm
Protected Phases	5	2		1	6		3	8	1	7	4	
Permitted Phases			2		6		8		8	4		4
Actuated Green, G (s)	14.4	37.7	37.7	25.9	49.2	49.2	45.0	40.0	65.9	45.0	40.0	40.0
Effective Green, g (s)	14.4	37.7	37.7	25.9	49.2	49.2	45.0	40.0	65.9	45.0	40.0	40.0
Actuated g/C Ratio	0.11	0.29	0.29	0.20	0.38	0.38	0.35	0.31	0.51	0.35	0.31	0.31
Clearance Time (s)	3.0	7.0	7.0	3.0	7.0	7.0	3.0	8.4	3.0	3.0	8.4	8.4
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2	3.0	0.2	3.0	3.0	0.2	0.2
Lane Grp Cap (vph)	186	986	449	345	1354	568	273	1616	769	248	1570	476
v/s Ratio Prot	0.09	c0.28		c0.19	0.21		c0.03	0.13	c0.19	0.03	0.12	
v/s Ratio Perm			0.16			0.26	0.26		0.29	0.24		0.04
v/c Ratio	0.83	0.95	0.56	0.96	0.56	0.70	0.84	0.42	0.94	0.79	0.39	0.12
Uniform Delay, d1	56.6	45.3	39.1	51.5	31.9	34.1	37.5	35.8	30.2	36.6	35.4	32.4
Progression Factor	1.00	1.00	1.00	1.28	0.58	0.47	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.1	19.6	4.9	27.9	1.1	4.6	19.3	0.8	19.5	15.1	0.7	0.5
Delay (s)	82.7	64.9	43.9	93.9	19.7	20.7	56.8	36.6	49.8	51.6	36.2	32.9
Level of Service	F	E	D	F	B	C	E	D	D	D	D	C
Approach Delay (s)		61.6			35.4		45.3				38.6	
Approach LOS		E			D		D				D	

Intersection Summary
 HCM 2000 Control Delay 45.5 HCM 2000 Level of Service D
 HCM 2000 Volume to Capacity ratio 0.94
 Actuated Cycle Length (s) 130.0 Sum of lost time (s) 21.4
 Intersection Capacity Utilization 113.7% ICU Level of Service H
 Analysis Period (min) 15
 c Critical Lane Group