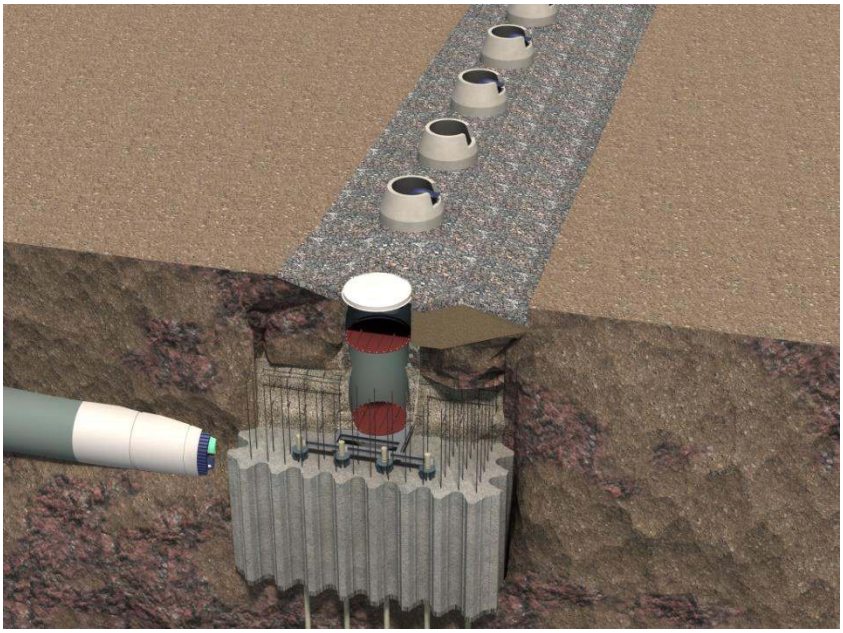
APPENDIX E
TRAFFIC STUDIES

E.1: Traffic Impact Study

Annacis Island WWTP New Outfall System

Vancouver Fraser Port Authority
Project and Environmental Review Application



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Traffic Impact Study

Annacis Island WWTP
New Outfall System

CDM Smith Canada ULC

Prepared for:

metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

October 24, 2017

CDM Smith

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Section 1
Project Information

1.1 Introduction

A traffic impact study (TIS) was conducted for the Annacis Island Sewage Treatment Outfall construction project to be located at the Annacis Island Wastewater Treatment Plant (AIWWTP) along the Fraser River in the Corporation of Delta, British Columbia (BC).

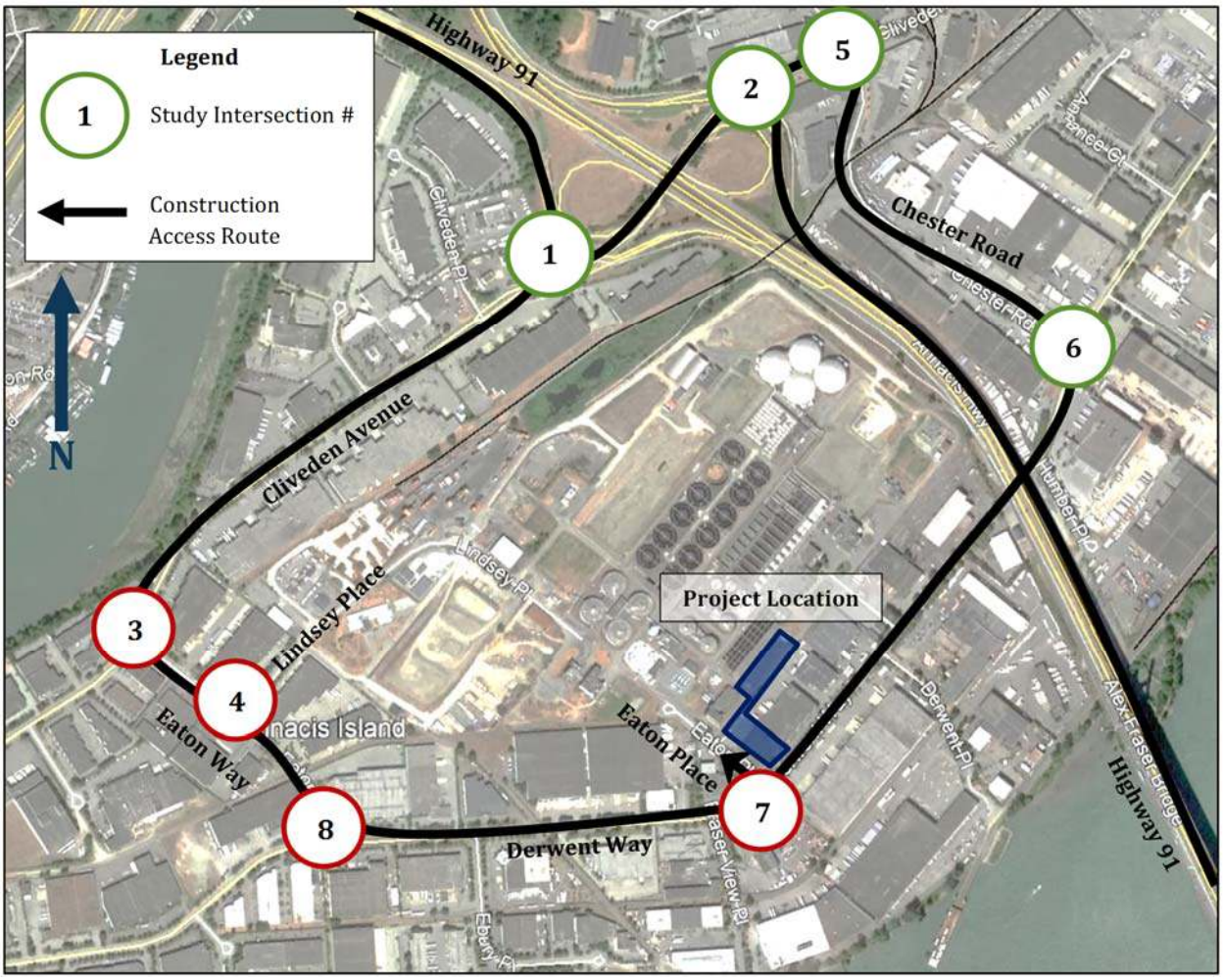
This study was assessed as part of the Vancouver Fraser Port Authority's (hereafter referred to as "the port authority") Project and Environmental Review's required studies and reports to be produced as part of the documentation process for potential effects of the proposed project. The port authority's transportation guidelines were then used as the basis for the traffic analysis and impact study that this report documents, to determine how proposed projects could affect transportation access and mobility in the surrounding area.

For purposes of this study, the construction phase of the Sewage Treatment Outfall project is anticipated to be the scenario during which overall traffic inclusive of project vehicles would be at its peak. Existing AM and PM peak hour conditions were assessed and then compared with the additive hour-by-hour traffic anticipated to be generated from construction.

This report summarizes the project information, existing transportation network, analysis methodology, and findings and conclusions of the study.

Figure 1 below shows the study area, project location, and numbered study intersections.

Figure 1 Project Location, Construction Access Routes, and Study Intersections



Source: Google Maps

1.2 Proposed Project

The proposed project area is located just downstream of the Alex Fraser Bridge in the Corporation of Delta, on Annacis Island. The existing AIWWTP is being equipped with a new outfall system in order to support anticipated additional discharge associated with the plant Stage V upgrades and future plant flows.

Construction is anticipated to take place over a 3-year period. During this period, many activities will be occurring at and around the project site, including preparations for launching a tunnel boring machine, excavation shaft construction, tunneling work, and tie-in to the AIWWTP, among other activities.

Proposed Construction Routes

Construction travel routes have been identified for construction workers and equipment/ vehicles going to and from the project site. Namely, construction traffic is anticipated to mostly arrive and depart Annacis Island via the Alex Fraser Bridge and the interchange at Cliveden Avenue. Vehicles coming from Highway 91 would use either westbound Cliveden Avenue towards Eaton Way and then

east on Derwent Way, or head east on Cliveden Avenue, south on Chester Road, and west on Derwent Way, to access the project site, depending on which direction on Highway 91 people are coming from. **Figure 1** also highlights the expected construction travel routes, with Highway 91 serving as the regional travel route to the island.

Site Access and Egress Locations

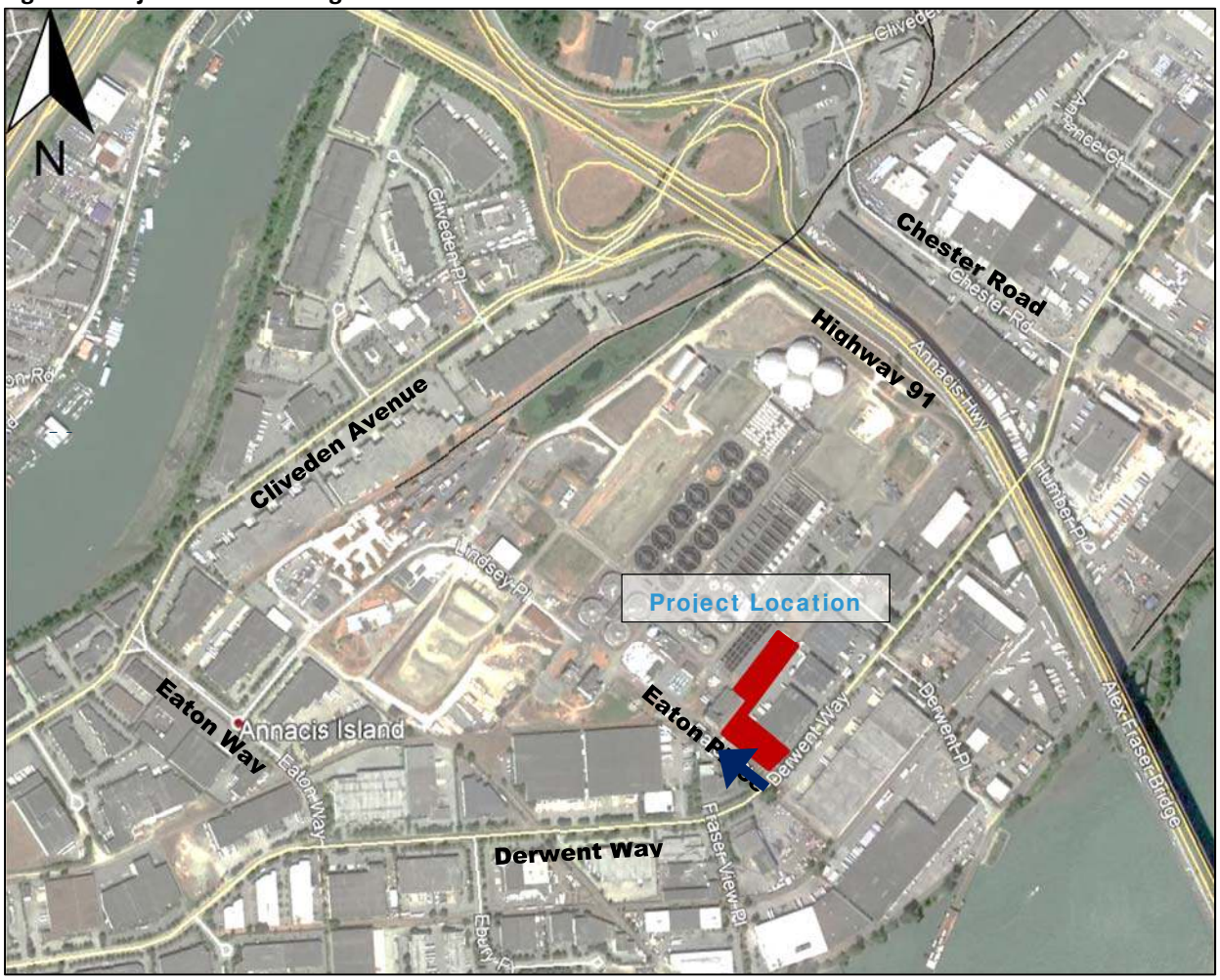
The project applicant has identified one primary driveway location where construction site access for vehicles would originate or terminate their trip to the project site. It is located along Eaton Place, which intersects Derwent Way to the south. Construction vehicles would use the previously identified construction travel routes to get to the project site, as Eaton Way connects Cliveden Avenue and Derwent Way, the two primary roadways near the project site. Vehicles would then turn from Derwent Way onto the Eaton Place cul-de-sac to reach the project location. The project contractor will then determine the specific access location along Eaton Place during construction setup.

Figure 2 below shows the anticipated access locations in relation to the nearby roadways. The main location for construction site access is shown with a blue arrow.

Parking Information and Location

At the time of publication of this report, the project applicant has not yet identified the expected location of the facilities that will serve as parking supply for workers at the project site. It is anticipated that the acquired parking supply will be sufficient to support the parking demand for the construction vehicles at the project site. The contractor is expected to determine the location of the parking facility prior to commencement of the project.

Figure 2 Project Access and Egress Location



Source: Google Maps

Section 2
Existing Transportation Network

The following section describes the study area operations under existing conditions.

2.1 Study Area and Scope

The following eight intersections located in the vicinity of the project site were analyzed during the weekday AM peak hour (the highest hour between 6 AM and 9 AM) and the weekday PM peak hour (the highest hour between 2 PM and 6 PM):

1. Cliveden Avenue/Highway 91 Southbound Ramps
2. Cliveden Avenue/Highway 91 Northbound Ramps
3. Cliveden Avenue/Eaton Way
4. Eaton Way/Lindsey Place
5. Cliveden Avenue/Chester Road
6. Chester Road/Derwent Way
7. Derwent Way/Eaton Place
8. Eaton Way/Derwent Way

The study intersections' locations on the island and in relation to the project site are numbered and shown in **Figure 1** above.

BC Highway 91 is a six-lane (three in each direction) limited-access highway that provides regional travelers access to Annacis Island, in the vicinity of the project, Highway 91 crosses the Fraser River via the Alex Fraser Bridge; pedestrians and bicycles can also use Highway 91 on the bridge via sidewalks on each side. Highway 91 is designated by the Corporation of Delta as a truck route.

Cliveden Avenue is a two- to four-lane (one or two in each direction) arterial street that generally runs east-west through the project area. West of Eaton Way, Cliveden Avenue has two lanes and on-street parking, while east of Eaton Way to Highway 91 it has two lanes in each direction and no parking. Sidewalks are provided along both side of the street.

Derwent Way is a two-lane (one in each direction) collector street that traverses the majority of Annacis Island, providing direct access to the project area. There are no sidewalks provided along Derwent Way.

Chester Road, **Eaton Way**, **Eaton Place** and **Lindsey Place** are local streets on Annacis Island that provide local, low-speed access and connections in and around the project area. In particular, Eaton Place has been identified as the location for where access and egress to the project site would occur.

Due to the industrial nature of Annacis Island, all streets on Annacis Island are designated by the Corporation of Delta as truck routes.

2.2 Methodology

The operating characteristics of intersections are described by the concept of level of service (LOS), which is a qualitative description of the performance of an intersection based on the average delay per vehicle. Intersection LOS values range from LOS A, which indicates free flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays. The study intersections were evaluated using the Highway Capacity Manual 2010 (HCM 2010) methodology. This methodology calculates LOS value based on the average delay in seconds at the intersection. For signalized and all-way stop-controlled intersections, the LOS value is based on the combined weighted average delay of the whole intersection. For two-way stop-controlled intersections, LOS value is calculated for each controlled movement, as opposed to the intersection as a whole. For this study, LOS and delay values for the worst-operating approach are reported at a two-way stop-controlled intersection. LOS definitions for signalized and unsignalized intersections based on the HCM 2010 methodology are provided in **Table 1**.

Table 1 Level of Service Criteria – HCM 2010 Methodology

Level of Service	Average Control Delay (seconds per vehicle)	
	Signalized Intersection	Unsignalized Intersection
A	≤ 10.0	≤ 10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.1 – 80.0	35.1 – 50.0
F	≥ 80.1	≥ 50.1

According to the Vancouver Fraser Port Authority, the following standards are required to be met to satisfy their traffic performance criteria:

- **Signalized Intersections** – A project needs to maintain the following minimum criteria:
  - Operation at LOS D or better overall;
  - Volume-to-capacity (v/c) ratio < 0.90 per individual intersection movement; and
  - Sufficient turning bay storage and driveway spacing to accommodate 95th percentile queues during the peak hour.
- **Unsignalized Intersections** – A project would need to maintain the following criteria:

- Operation at LOS D or better per individual intersection movement; and
- Sufficient turning bay storage and driveway spacing to accommodate 95th percentile queues during the peak hour.

The Corporation of Delta does not have specific traffic performance metrics or criteria in any of its guidelines or documentation. For purposes of this memorandum, the port authority guidelines were used.

Traffic Analysis Tool

Traffic analysis was performed using the Synchro version 9 traffic analysis package. Synchro is a macroscopic traffic analysis tool that implements HCM methodology to determine intersection operations.

2.3 Intersection Operations

The analysis covers the operations of existing traffic at the identified intersections. Of the eight study intersections, four are signalized and four are unsignalized. The four signalized intersections are both Cliveden Avenue/Highway 91 ramp intersections, Cliveden Avenue/Chester Road, and Chester Road/Derwent Way. The remaining four intersections are one- or two-way stop-controlled intersections.

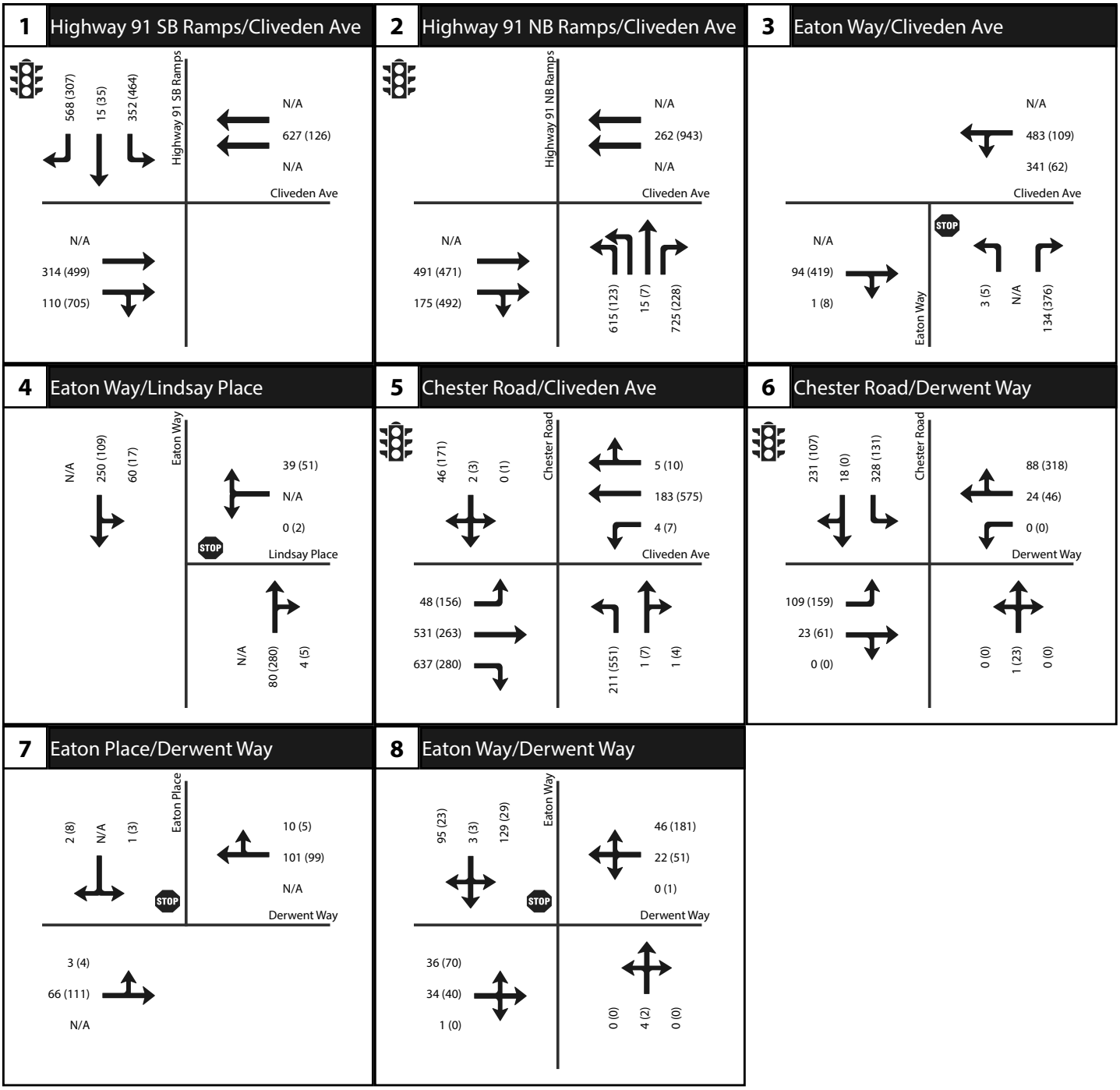
Traffic volumes at the study intersections were collected on a typical weekday (Thursday, August 3, 2017) during the AM peak period (from 6 AM to 9 AM) and mid-afternoon to PM peak period (from 2 PM to 6 PM). PM data was collected more extensively since Annacis Island has many industrial and commercial land uses which attempt to depart the island prior to the typical PM peak period. Traffic counts collected at the study intersections are included in **Appendix A**, while the existing intersection volumes are presented in **Figure 3** on the following page.

A summary of the study intersection operations under existing conditions is provided in **Table 2**. During the weekday AM peak hour, all study intersections operate at LOS D or better. During the weekday PM peak hour, all intersections operate at LOS D or better with the exception of the Cliveden Avenue/Chester Road intersection, which operates at LOS E. Detailed LOS calculation sheets for the study intersections are included in **Appendix B**.

Table 2 Existing Intersection Operations – AM/PM Peak Hours

#	Study Intersection	Traffic Control	AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
1	Cliveden Avenue/Highway 91 Southbound Ramps	Signal	22.1	C	15.4	B
2	Cliveden Avenue/Highway 91 Northbound Ramps	Signal	23.5	C	11.7	B
3	Cliveden Avenue/Eaton Way	OWSC	10.0 (NB)	B	33.2 (NB)	D
4	Eaton Way/Lindsey Place	OWSC	10.0 (WB)	B	12.0 (WB)	B
5	Cliveden Avenue/Chester Road	Signal	48.3	D	**61.2**	**E**
6	Chester Road/Derwent Way	Signal	10.2	B	11.6	B
7	Derwent Way/Eaton Place	OWSC	10.7 (SB)	B	9.7 (SB)	A
8	Eaton Way/Derwent Way	TWSC	11.2 (SB)	B	12.8 (SB)	B

Notes:
Intersections 1 and 2 were evaluated using HCM 2000 due to phasing issues not allowing HCM 2010 outputs
OWSC – One-way Stop-Controlled, TWSC – Two-way Stop-Controlled
NB – Northbound, WB – Westbound, SB – Southbound
Delay is presented in seconds per vehicle.
For unsignalized intersections, delay and LOS values are presented for the worst-operating approach.
Bold represents LOS E or F.



Signalized Intersection

STOP Unsignalized Intersection

(#) Right Turn
(#) Through
(#) Left Turn

AM Volume (PM Volume)
N/A = Movement Not Allowed

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Figure 3 - Annacis Island Turning Movement Volumes

2.4 Roadway Segment Queuing

This section describes current queuing conditions at areas around the project site on Annacis Island. In particular, queuing was observed on August 3, 2017 from 6 AM to 10 AM and 2 PM to 6 PM, at the intersections of Chester Road/Cliveden Avenue (intersection 5, more specifically the northbound Chester Road queues) and Cliveden Avenue/Eaton Way (intersection 3, more specifically the eastbound Cliveden Avenue queues). The major queuing that is typically observed primarily occurs during the afternoon and early evening peak traffic period, due to capacity constraints and high volumes at the Highway 91/Cliveden Avenue ramps.

At the Chester Road/Cliveden Avenue intersection, vehicles were observed to begin queuing as early as 2:30 PM, with queues typically exceeding 500 metres from the intersection in the northbound direction; there were occasional observations of the queue reaching back to the Chester Road/Derwent Way intersection, which is around 660 metres south of the observation point. Northbound Chester Road queues remain high (exceeding 300 metres) until around 5 PM. Queues are lengthy in this area likely due to the spillback and presence of the Cliveden Avenue ramps to Highway 91 near the intersection in addition to the delays from the intersection itself.

For the Cliveden Avenue/Eaton Way intersection, queues were more sporadic since the intersection is around one kilometer away from the interchange. However, occasional queues ranging from 75 to 300 metres were observed, likely due to the amount of traffic added onto the eastbound Cliveden Avenue approach with the number of quick-service retail and restaurant land uses in the vicinity of the interchange, along with island truck traffic itself.

Section 3

Volume Development (Construction Traffic Conditions)

This section discusses the estimated number of vehicle trips that would be generated by project construction and the project's parking demand during construction.

3.1 Trip Generation

To determine the number of vehicle trips that would be generated by project construction, the project applicant provided tables for anticipated weekly worker and equipment trips based on the scheduled construction activity and number of laborers expected to work on the assigned activity. After summing up the weekly combined worker and equipment trips, the peak construction week during the three-year construction period was then identified. Based on information provided by the project applicant, the busiest construction weeks were identified to occur for approximately 11 weeks of the three-year construction period.

Using the number of trips identified to occur during the peak construction period, trips were then assigned on an hourly basis based on activity type, in order to create an hour-by-hour trip table for the traffic generated during this peak time. Assumptions provided by the applicant included worker shift start and end times, shift changes, and when equipment would be able to haul and transport materials to and from the site.

The following was assumed for the purposes of trip generation:

- Typical 8 hour workdays with 1 hour lunch break, beginning at 7 AM and concluding at 4 PM, 5 days a week;
- Specific to the tunnel boring work, 24 hour a day work, with shift changes at 6 AM, 2 PM, and 10 PM; two of the three shifts (6 AM and 2 PM) are construction-related and are expected to require more workers than the third overnight shift (10 PM), which is maintenance-related; and
- Major equipment hauling and spoils trips would occur equally throughout the TBM daytime shifts (16 hours) every workday, while trips related to non-TBM activities would occur equally throughout the daily shift.
    - Equipment trips could be comprised of larger capacity vehicles including dump trucks.

Based on the construction period trip table and incorporation of activity assumptions, an hourly maximum of 43 project construction-generated trips was identified, during the 6 AM to 7 AM hour. **Table 3** shows the hourly trips generated by the project, organized by activity.

Table 3 Peak Week Trip Generation – Hourly Trips

Scheduled Activity	Time of Day – Number of Trips									
	12 AM-5 AM	5 AM-6 AM	6 AM-7 AM	7 AM-1 PM	1 PM-3 PM	4 PM-5 PM	5 PM-9 PM	9 PM-10 PM	10 PM-11 PM	11 PM-12 AM
Passenger Vehicles										
General Conditions - Duration of Project	-	-	21	-	-	21	-	-	-	-
Night Shift Operations - Tunnel Drives[1]	-	3	1	-	3	-	-	1	3	-
Tunnel - Launch Shaft to River Riser[1]	-	15	6	-	15	-	-	6	15	-
Construct Final Lining / LCS Piles and Structure	-	-	15	-	-	15	-	-	-	-
Equipment Truck Traffic										
Dump Truck (spoils transport)[1]	-	-	-	1	1	1	1	1	-	-
Flat-bed truck (concrete tunnel lining delivery)[1]	-	-	-	1	1	1	1	1	-	-
Flat-bed truck (steel tunnel lining delivery)[1]	-	-	-	1	1	1	1	1	-	-
Flat-bed truck (rebar delivery)	-	-	-	1	1	-	-	-	-	-
Concrete Truck (assume ready mix)	-	-	-	1	1	-	-	-	-	-
TOTAL	**0**	**18**	**43**	**5**	**23**	**39**	**3**	**10**	**18**	**0**

Notes:
[1]Activities related to 24-hour Tunnel Boring Machine work.

TIS Statement – Additional Impact Analysis Unwarranted

The port authority guidelines state that a full traffic impact study is to be completed when a proposed project generates or creates "100 new vehicle movements per hour during peak hour, a permanent physical modification to an existing roadway, additional rail car traffic, a new driveway access in proximity to an existing or proposed rail line, new vehicular traffic that will affect rail crossings on an existing or proposed rail line, a physical modification that will affect a rail line, temporary disruptions (such as lane closure or access modification) to vehicle traffic related to works and activities, or works which may have broader transportation impacts for the area".

The proposed project is anticipated to have traffic primarily occur during the 3-year construction schedule, with a calculated maximum of 43 new trips during the peak hour of the busiest construction period, which is below the 100-movement threshold defined by the port authority. The project also does not expect to modify or change existing transportation access to the area or site. Per the port authority's transportation guidelines, **the project would therefore not meet the thresholds that warrant a full traffic impact study**.

In order to satisfy the port authority's Project and Environmental Review Application Submission requirements for traffic and transportation, this document describes the project's expected

construction routes to and from the site, access/egress locations, and construction parking demand and requirements.

3.2 Trip Distribution

Primary Access and Egress Routes

Based on a review of existing traffic patterns as well as understanding the location of Annacis Island within Greater Metro Vancouver, it was assumed that 50 percent of workers and equipment would arrive from the north (New Westminster, Richmond, Burnaby, etc.), while the remaining 50 percent would arrive from the south (Delta, Langley, etc.). All vehicles would use the Alex Fraser Bridge and the Cliveden Avenue interchange to access the project site. Southbound vehicles would use the west side Cliveden Avenue off-ramps, while northbound vehicles would use the east side Cliveden Avenue off-ramps.

To access the project location, vehicles would proceed from the Cliveden Avenue off-ramps in both the westbound and eastbound directions. In the westbound direction, travelers would use Cliveden Avenue to Eaton Way to Derwent Way eastbound towards the Eaton Place entrance. In the eastbound direction, vehicles would turn onto Chester Road to Derwent Way to the driveway location off of the Eaton Place cul-de-sac. The project contractor will be responsible for determining the specific access location along Eaton Place during construction setup.

3.3 Mode of Transportation

The project applicant anticipates that due to the nature of the construction work, shift schedule, and limited alternative transportation modes, most to all workers will use personal vehicles to arrive and depart from the construction site. For purposes of the trip generation and understanding construction traffic, it was conservatively assumed that every worker would arrive and depart the project site independently (i.e. an auto occupancy of 1.0 person/vehicle).

3.4 Parking Demand Analysis

Using the trip generation calculations for construction workers and the schedule anticipated by the project applicant, a maximum of 54 parking spaces of demand is needed during the day during the peak trafficked weeks of the project construction; this is expected to occur for approximately 11 weeks of the three-year construction period, which coincides with the previously identified peak trip generation.

Table 4 shows the expected hourly parking demand generated by the project, organized by activity, during the peak construction weeks of the three-year construction period. As equipment trucks are used primarily on the project site, are based on construction needs, and are not scheduled consistently throughout the day, parking demand from these vehicles cannot be determined directly and therefore excluded from the demand calculations.

Table 4 Peak Week Parking Demand – Hourly

Scheduled Activity	Time of Day – Number of Trips				
	12 AM-6 AM	6 AM-7 AM	7 AM-4 PM	4 PM-10 PM	10 PM-12 AM
General Conditions - Duration of Project	-	-	21	-	-
Night Shift Operations - Tunnel Drives[1]	1	3	3	3	1
Tunnel - Launch Shaft to River Riser[1]	6	15	15	15	6
Construct Final Lining / LCS Piles and Structure	-	-	15	-	-
TOTAL	**7**	**18**	**54**	**18**	**7**

Notes:
[1]Activities related to 24-hour Tunnel Boring Machine work.

Comparison with Available Parking Supply

The project applicant and contractor have not identified the lot or facility on Annacis Island at or near the project site that will be used for construction parking. However, it is expected that the contractor will be able to establish a parking lease agreement to use an available parking lot for construction worker use with sufficient parking capacity to supply the expected demand. Should the facility be further than walking distance from the project site, the contractor will provide a shuttle or alternative method of access to the site. This memorandum assumes that parking demand will be sufficiently handled by the available parking supply, while the traffic management guidelines memorandum would outline how the contractor would provide parking and manage access to and from the parking location.

Section 4

Other Qualitative Assessments

4.1 Site Access and Truck Staging

Access will be provided off the Eaton Place cul-de-sac to the AIWTTP. The site is anticipated to generate 43 trips during the peak hour of traffic during construction, from 6 AM to 7 AM.

Assuming a constant flow of traffic, 43 trips during the peak hour would be one vehicle every one to two minutes. However, since these trips are expected to occur mostly to construction workers arriving or departing from their shift, arrivals and departures would likely be close together and not constant throughout the hour. Based on these traffic volumes and the amount of existing traffic in the vicinity of the project site, there would be little to no effect from project traffic on surrounding roadways. The project would not directly generate many queues, but vehicles egressing the project site would likely have difficulty departing Annacis Island during times when queues are already very high, such as the afternoon peak period.

Project-related vehicles and equipment will be used at the construction site, and travel to and from activities will occur on-site. Trucks are assumed to only be used for loading and unloading activities within internal project site areas, and would not occur along any of the nearby roadways.

4.2 Non-Motorized Access and Transportation

Annacis Island is served by one local transit route from Translink, the regional transit agency for Greater Vancouver. Route 104 (22nd Street Station/Annacis Island) provides daily transit service at 20- to 30-minute frequencies from approximately 6 AM to 12 AM; the route travels in the south/westbound directions via Cliveden Avenue and terminates at the intersection of Cliveden Avenue and Derwent Way. The north/eastbound route uses Derwent Way before proceeding via local routes to Richmond and points north. Other bus routes use the Alex Fraser Bridge on Highway 91 but do not stop at Annacis Island.

Due to the nature of the anticipated construction work, the scheduled shifts, and limited transit service to the island, it is expected that all transportation access to the project site will be done via private vehicle or project equipment. Therefore, there would be no impact to transit ridership or service currently provided at or near the project site. Additionally, as site access would be provided along existing roadways and driveways, transit service would be maintained along the nearby affected roadways with no anticipated effects.

Bicycle and pedestrian activity and access near the project site is limited and not anticipated to be affected by project construction. Therefore, there would be no impact to bicycle and pedestrian operations as a result of the project.

Section 5
Recommendations

Annacis Island has been identified by the Corporation of Delta as an industrial land use area, with trucks allowed to use any roadway and route on the island for access and egress from the area. However, the existing transportation analysis indicate that queuing and the LOS for certain areas on the island approach or exceed traffic operating conditions thresholds that the port authority typically deems to satisfy their traffic performance criteria.

Based on the anticipated number of trips and spaces of parking demand generated by the construction of the proposed project, there is not expected to be any significant impacts that would occur as a direct result of the project construction, even during the peak weeks of the three-year construction period. The proposed project is conservatively anticipated to generate 43 peak hour trips and 54 spaces of parking demand during construction.

While the proposed project will not cause direct impacts to traffic performance in the nearby vicinity of the site, there will be additional trips occurring as a result of the project construction on a temporary basis. Additionally, the Highway 91/Cliveden Avenue ramp interchange serves as the primary access point for vehicular traffic; this limits the available routes for traffic to enter and leave Annacis Island. The following suggestions are proposed below in order to minimize any potential additional traffic/parking concerns or effects as a result of the project construction:

- If possible, the project contractor shall attempt to identify access and egress routes to and from the project site that will minimize additional queuing and/or time delays as a result of vehicles leaving or entering the study area (which includes routes approaching the Highway 91 ramps), particularly during the peak travel periods of the typical weekday;
- The project contractor shall attempt to schedule and arrange for worker and construction trips to and from the project site to occur during non-peak periods of traffic, in order to limit the amount of additive traffic during peak travel periods of the typical weekday. This could include midday trips during the primary work shift or trips during off-peak hours that are permitted by noise bylaws for large equipment installation or hauling and spoils removal;
- Parking facilities to be determined by the project contractor shall be:
    - Arranged such that sufficient parking supply to meet or exceed the calculated maximum parking demand of 54 parking spaces will be provided for the project construction period; and
    - Located as proximate as possible to the project site to allow contractor workers to walk from the parking facility to the project site. Should such a site with enough supply only be available beyond walking distance from the site, the contractor shall arrange for alternate transportation, such as a shuttle, to transport workers to and from the parking facility.

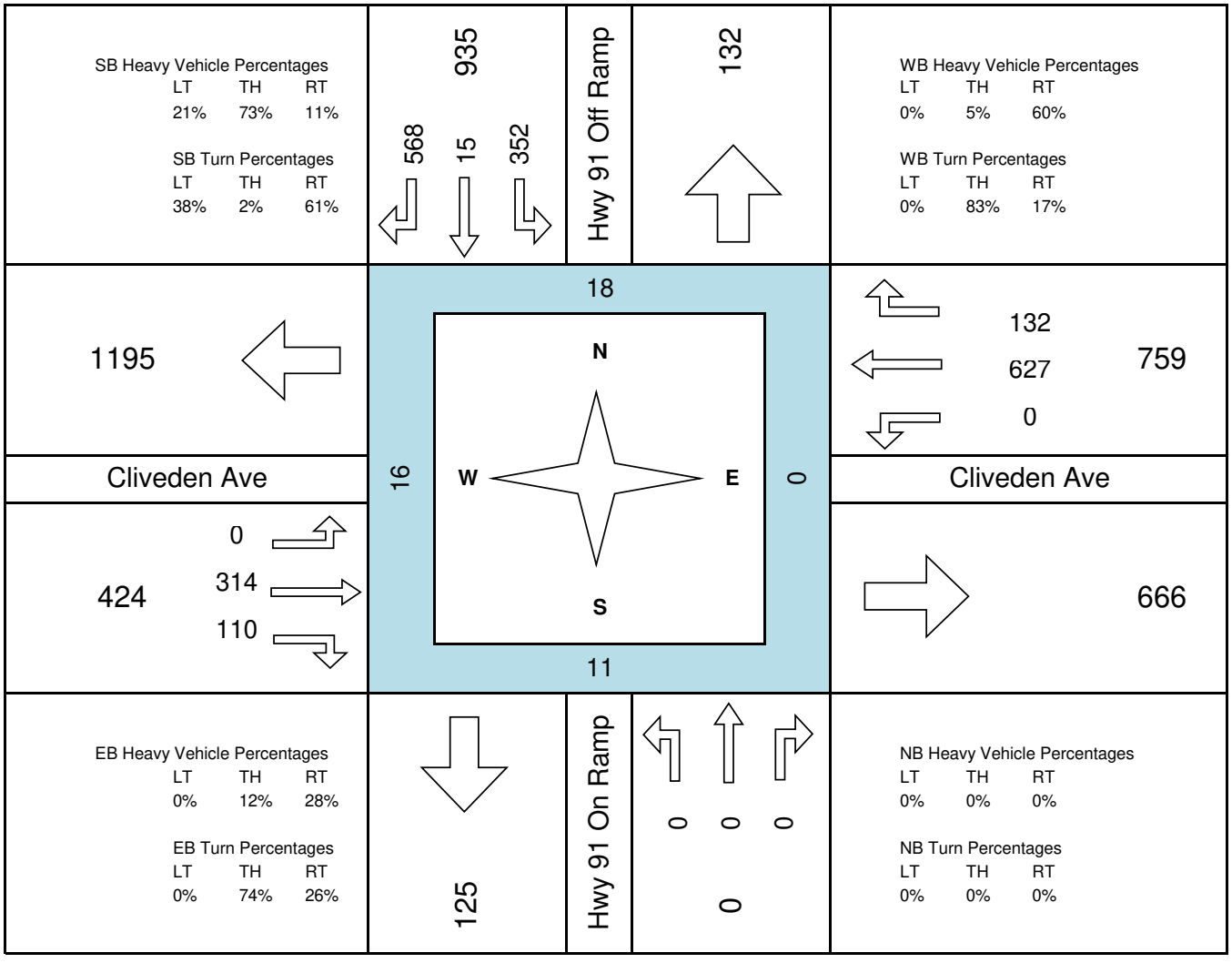
APPENDIX A: TURNING MOVEMENT COUNT DATA

Hwy 91 SB On/Off Ramp @ Cliveden Ave

Project #: 04-17-0025
Peak Hour: 07:15 — 08:15
Overall PHF: 0.96
Notes: 0

Date: Aug 3, 2017
Weather: Sunny
Road Cond: Dry

	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	0	0	64	1	71	0	69	25	0	113	38	9	0	0	0
06:15 - 06:30	0	0	0	80	4	104	0	61	31	0	147	33	3	5	0	7
06:30 - 06:45	0	0	0	82	2	82	0	83	44	0	154	54	7	4	0	6
06:45 - 07:00	0	0	0	89	1	129	0	61	26	0	140	42	6	12	0	10
07:00 - 07:15	0	0	0	79	2	118	0	52	24	0	136	69	5	2	0	8
07:15 - 07:30	0	0	0	102	4	121	0	76	28	0	153	43	5	6	0	8
07:30 - 07:45	0	0	0	65	7	151	0	84	27	0	160	29	5	4	0	4
07:45 - 08:00	0	0	0	86	2	138	0	70	31	0	158	34	4	0	0	2
08:00 - 08:15	0	0	0	99	2	158	0	84	24	0	156	26	4	1	0	2
08:15 - 08:30	0	0	0	79	3	167	0	77	21	0	120	37	10	1	0	1
08:30 - 08:45	0	0	0	60	3	117	0	83	25	0	96	35	1	0	0	0
08:45 - 09:00	0	0	0	77	3	127	0	86	27	0	89	26	1	1	0	3
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}				102	7	158		84	31		160	43				
PHF				0.86	0.54	0.90		0.93	0.89		0.98	0.77				



Hwy 91 SB On/Off Ramp @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	15:45 — 16:45	Weather:	Sunny
Overall PHF:	0.91	Road Cond:	Dry
Notes:	0		

	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	0	0	0	68	2	100	0	157	92	0	64	88	3	2	0	4
14:15 - 14:30	0	0	0	53	1	85	0	131	74	0	62	96	0	0	1	1
14:30 - 14:45	0	0	0	53	0	84	0	115	109	0	54	168	1	0	0	0
14:45 - 15:00	0	0	0	65	3	115	0	88	106	0	55	140	2	1	0	1
15:00 - 15:15	0	0	0	81	2	72	0	128	158	0	53	230	5	2	0	1
15:15 - 15:30	0	0	0	114	3	57	0	102	128	0	27	204	4	2	0	0
15:30 - 15:45	0	0	0	89	4	67	0	158	212	0	30	260	2	3	0	6
15:45 - 16:00	0	0	0	119	6	83	0	112	154	0	28	235	3	5	0	5
16:00 - 16:15	0	0	0	108	16	80	0	147	212	0	29	254	20	3	0	3
16:15 - 16:30	0	0	0	102	6	55	0	104	147	0	33	204	13	1	0	4
16:30 - 16:45	0	0	0	135	7	89	0	136	192	0	36	247	10	7	0	8
16:45 - 17:00	0	0	0	113	4	78	0	95	134	0	19	209	14	3	0	2
17:00 - 17:15	0	0	0	133	7	70	0	130	163	0	29	237	12	2	0	1
17:15 - 17:30	0	0	0	94	3	65	0	111	112	0	27	148	23	0	0	1
17:30 - 17:45	0	0	0	63	3	56	0	77	101	0	26	120	4	4	0	3
17:45 - 18:00	0	0	0	33	4	60	0	44	100	0	31	102	5	5	0	3
Peak V_{15min}				135	16	89		147	212		36	254				
PHF				0.86	0.55	0.86		0.85	0.83		0.88	0.93				

SB Heavy Vehicle Percentages

LT	TH	RT
14%	77%	16%

SB Turn Percentages

LT	TH	RT
58%	4%	38%

806

307 35 464

Hwy 91 Off Ramp

940

WB Heavy Vehicle Percentages

LT	TH	RT
0%	30%	11%

WB Turn Percentages

LT	TH	RT
0%	12%	88%

433

Cliveden Ave

46

20 N W E S 0

16

940 126 0

1066

Cliveden Ave

1204

0 499 705

963

EB Heavy Vehicle Percentages

LT	TH	RT
0%	6%	4%

EB Turn Percentages

LT	TH	RT
0%	41%	59%

740

Hwy 91 On Ramp

0 0 0

0

NB Heavy Vehicle Percentages

LT	TH	RT
0%	0%	0%

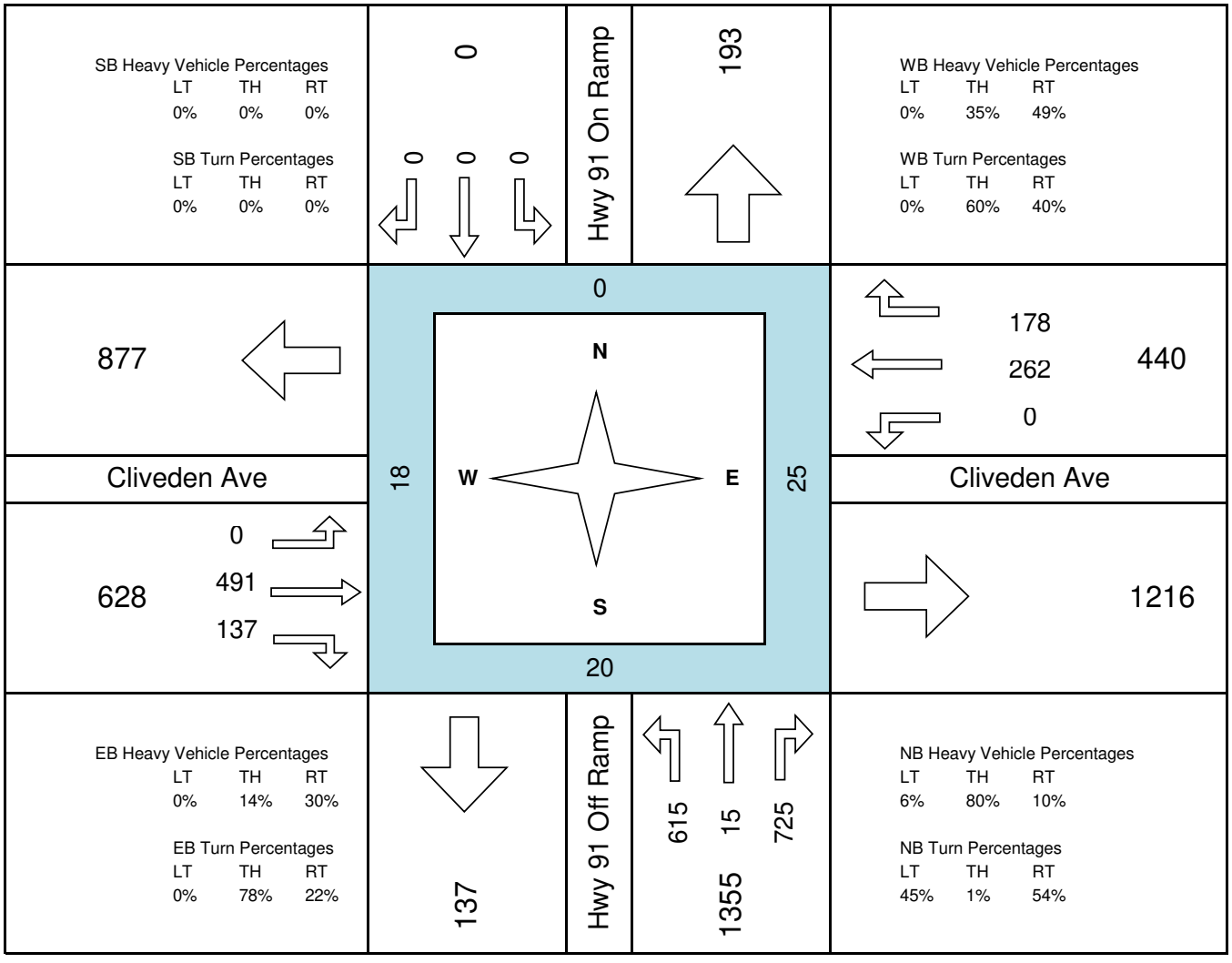
NB Turn Percentages

LT	TH	RT
0%	0%	0%

Hwy 91 NB On/Off Ramp @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	06:15 — 07:15	Weather:	Sunny
Overall PHF:	0.93	Road Cond:	Dry
Notes:	0		

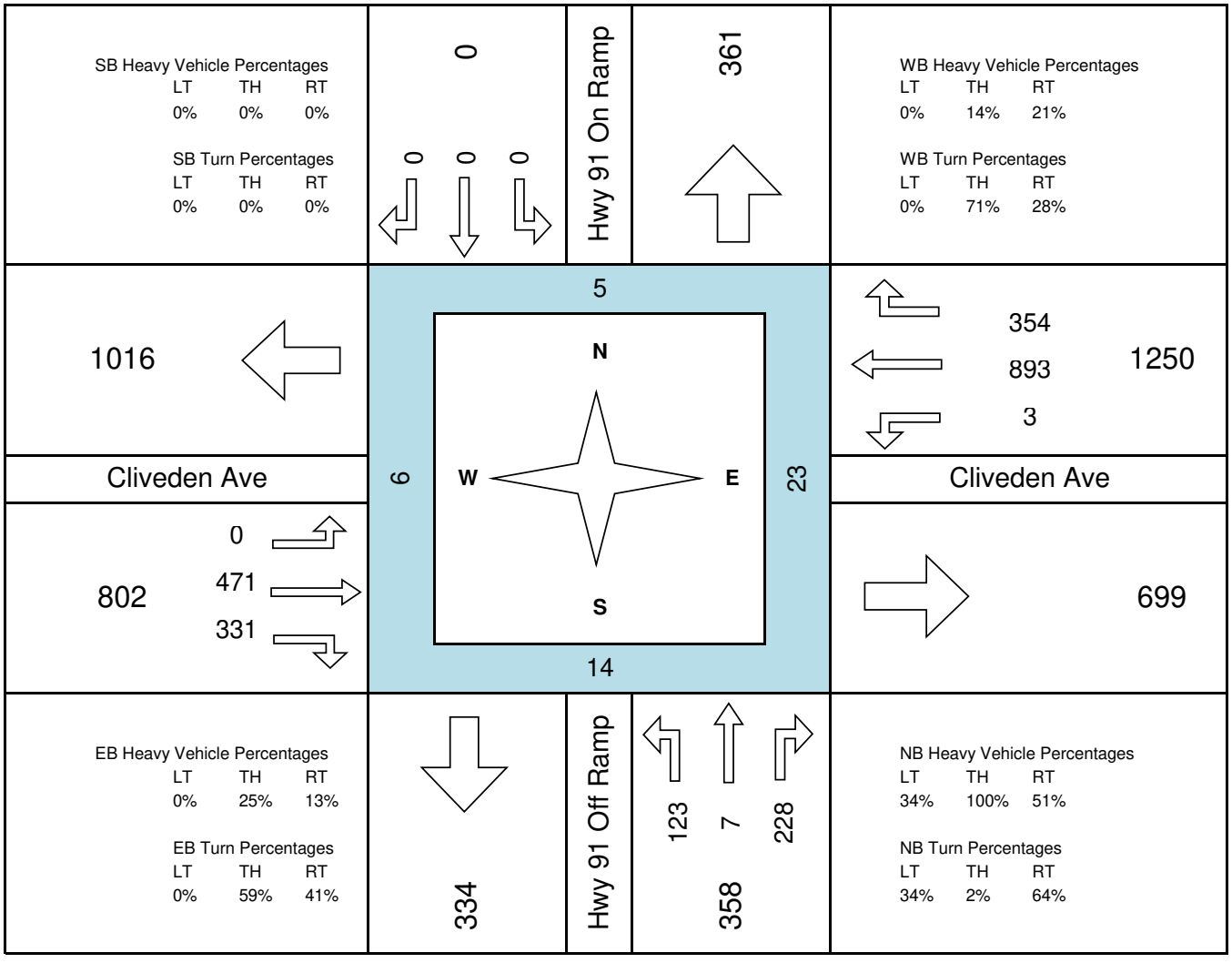
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	139	8	189	0	0	0	0	116	20	0	53	39	3	0	15	1
06:15 - 06:30	154	3	198	0	0	0	0	115	34	0	47	37	0	4	8	5
06:30 - 06:45	173	3	203	0	0	0	0	121	40	0	70	44	0	3	7	4
06:45 - 07:00	149	4	179	0	0	0	0	145	33	0	61	44	0	10	3	3
07:00 - 07:15	139	5	145	0	0	0	0	110	30	0	84	53	0	3	7	6
07:15 - 07:30	156	8	127	0	0	0	0	152	40	0	68	31	0	2	10	6
07:30 - 07:45	151	3	93	0	0	0	0	96	46	0	44	32	0	2	6	6
07:45 - 08:00	187	3	132	0	0	0	0	129	52	0	51	46	0	0	3	3
08:00 - 08:15	143	3	134	0	0	0	0	126	53	0	39	38	0	1	6	2
08:15 - 08:30	110	4	103	0	0	0	0	113	52	0	72	43	0	0	8	9
08:30 - 08:45	83	3	70	0	0	0	0	85	75	0	60	49	0	0	3	1
08:45 - 09:00	75	2	61	0	0	0	0	123	57	0	55	48	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}	173	5	203					145	40		84	53				
PHF	0.89	0.75	0.89					0.85	0.86		0.78	0.84				



Hwy 91 NB On/Off Ramp @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	15:00 — 16:00	Weather:	Sunny
Overall PHF:	0.91	Road Cond:	Dry
Notes:	0		

	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	51	2	68	0	0	0	0	80	94	0	115	62	0	1	1	2
14:15 - 14:30	20	1	65	0	0	0	0	77	95	2	102	64	0	0	0	0
14:30 - 14:45	35	1	82	0	0	0	0	75	79	0	201	81	0	5	3	3
14:45 - 15:00	42	3	60	0	0	0	0	80	47	1	165	69	0	4	2	0
15:00 - 15:15	42	1	64	0	0	0	0	80	96	1	265	90	0	4	4	1
15:15 - 15:30	34	1	56	0	0	0	0	114	70	2	177	99	5	1	5	3
15:30 - 15:45	23	3	61	0	0	0	0	147	94	0	241	91	0	5	9	2
15:45 - 16:00	24	2	47	0	0	0	0	130	71	0	210	74	0	4	5	0
16:00 - 16:15	15	4	46	0	0	0	0	103	107	0	211	102	0	0	13	0
16:15 - 16:30	25	3	38	0	0	0	0	103	75	1	187	87	0	4	3	0
16:30 - 16:45	9	3	25	0	0	0	0	128	113	4	220	88	0	0	5	0
16:45 - 17:00	9	6	43	0	0	0	0	112	69	0	177	76	0	1	5	4
17:00 - 17:15	14	1	31	0	0	0	0	133	107	1	238	98	0	0	4	0
17:15 - 17:30	23	3	30	0	0	0	1	116	89	1	144	38	1	2	5	1
17:30 - 17:45	22	3	54	0	0	0	0	65	71	0	118	46	0	2	5	4
17:45 - 18:00	23	2	46	0	0	0	0	36	39	0	116	33	0	1	0	1
Peak V_{15min}	42	3	64					147	96	2	265	99				
PHF	0.73	0.58	0.89					0.80	0.86	0.38	0.84	0.89				

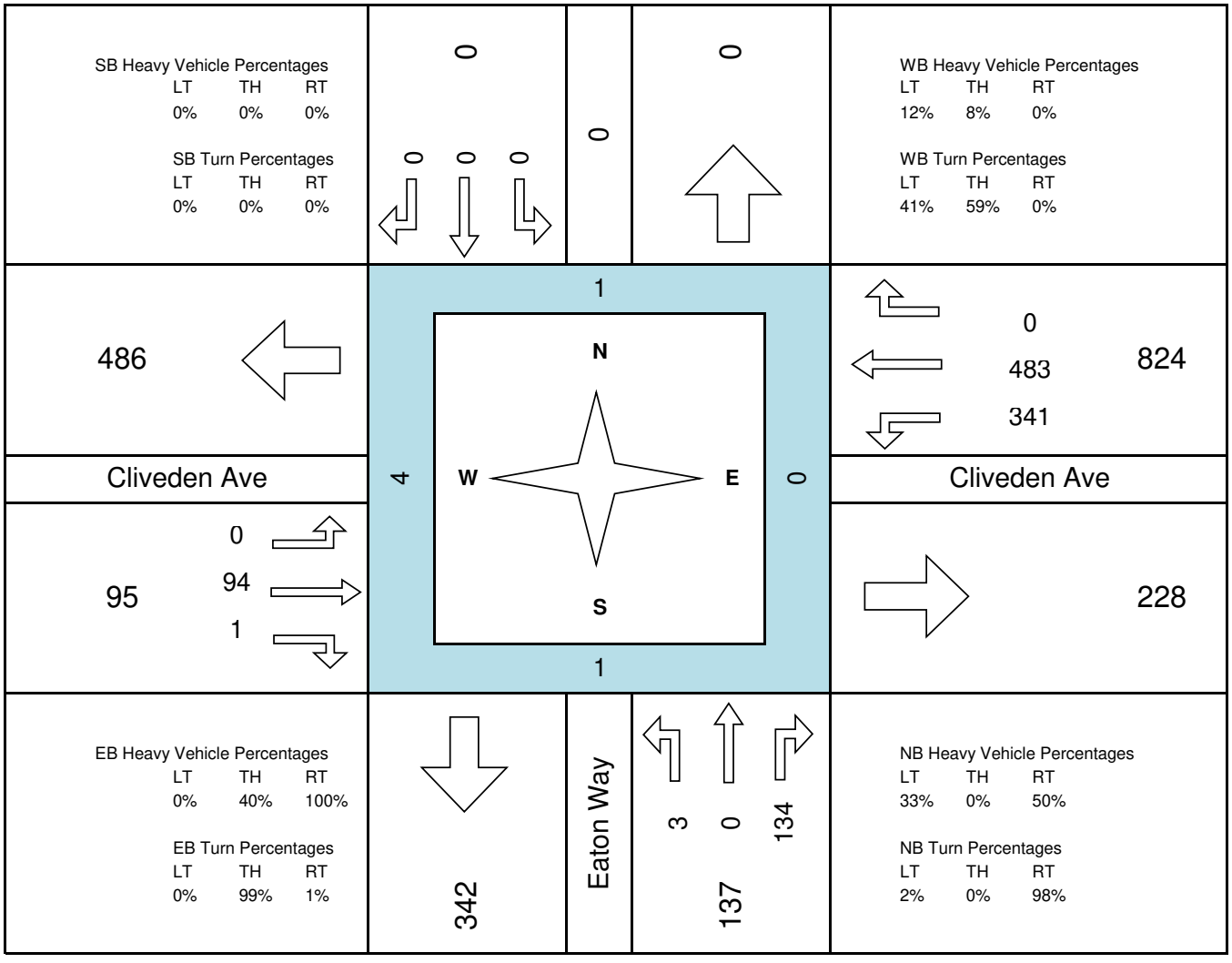


Eaton Way @ Cliveden Ave

Project #: 04-17-0025
Peak Hour: 07:15 — 08:15
Overall PHF: 0.92
Notes: 0

Date: Aug 3, 2017
Weather: Sunny
Road Cond: Dry

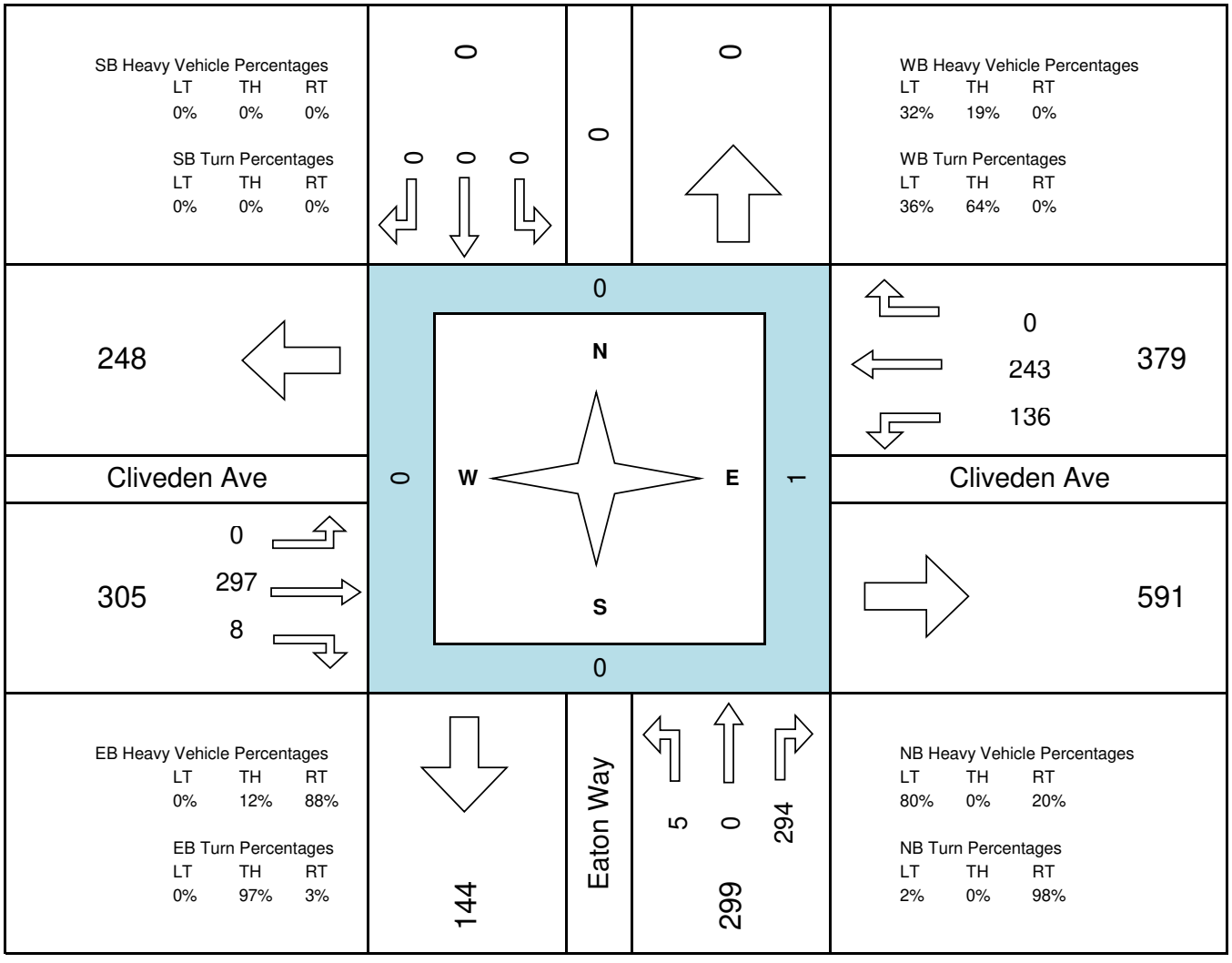
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	0	9	0	0	0	0	30	0	53	61	0	0	1	0	0
06:15 - 06:30	0	0	10	0	0	0	0	26	0	58	86	0	0	0	0	0
06:30 - 06:45	0	0	10	0	0	0	0	37	0	55	81	0	1	0	0	0
06:45 - 07:00	0	0	17	0	0	0	0	16	1	96	108	0	1	1	0	0
07:00 - 07:15	0	0	15	0	0	0	0	24	2	75	111	0	0	0	0	0
07:15 - 07:30	0	0	30	0	0	0	0	26	1	73	121	0	1	0	0	1
07:30 - 07:45	0	0	33	0	0	0	0	15	0	89	112	0	0	0	0	0
07:45 - 08:00	2	0	34	0	0	0	0	28	0	98	124	0	0	1	0	2
08:00 - 08:15	1	0	37	0	0	0	0	25	0	81	126	0	0	0	0	1
08:15 - 08:30	1	0	27	0	0	0	0	33	0	70	106	0	0	1	0	0
08:30 - 08:45	0	0	29	0	0	0	0	38	0	71	83	0	0	0	0	0
08:45 - 09:00	2	0	38	0	0	0	0	29	3	69	77	0	0	1	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}	2		37					28	1	98	126					
PHF	0.38		0.91					0.84	0.25	0.87	0.96					



Eaton Way @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	14:00 — 15:00	Weather:	Sunny
Overall PHF:	0.87	Road Cond:	Dry
Notes:	0		

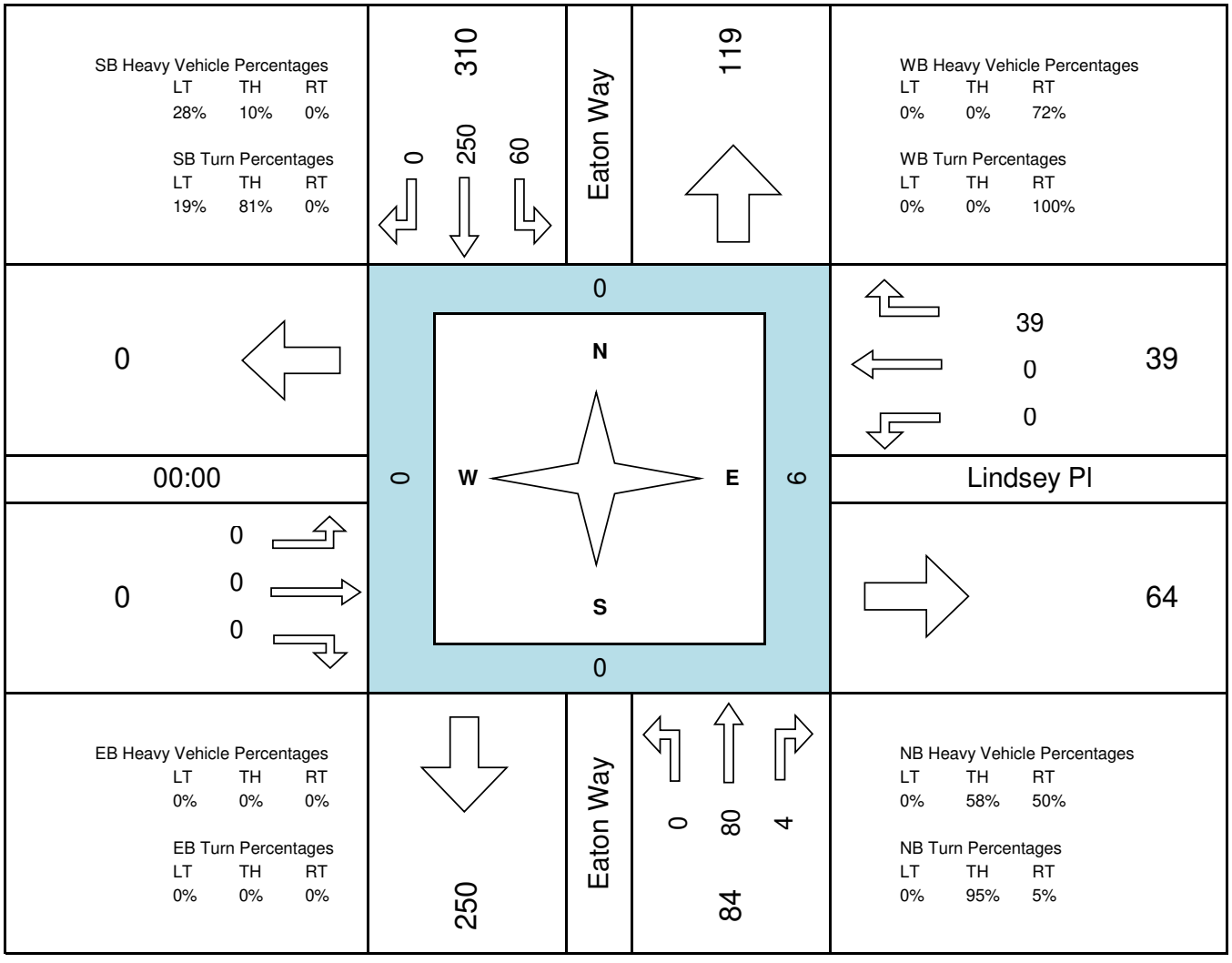
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	1	0	70	0	0	0	0	92	1	46	71	0	0	0	0	0
14:15 - 14:30	2	0	71	0	0	0	0	82	2	32	57	0	0	0	0	0
14:30 - 14:45	0	0	86	0	0	0	0	64	1	26	60	0	0	0	0	0
14:45 - 15:00	2	0	67	0	0	0	0	59	4	32	55	0	0	0	1	0
15:00 - 15:15	0	0	87	0	0	0	0	105	5	22	41	0	0	1	0	0
15:15 - 15:30	1	0	84	0	0	0	0	78	2	15	28	0	0	0	0	0
15:30 - 15:45	2	0	113	0	0	0	0	87	0	25	28	0	0	0	0	0
15:45 - 16:00	2	0	78	0	0	0	0	90	3	11	28	0	0	0	0	0
16:00 - 16:15	1	0	96	0	0	0	0	165	4	14	24	0	0	0	0	0
16:15 - 16:30	0	1	89	0	0	0	0	77	1	12	29	0	0	0	0	1
16:30 - 16:45	0	0	81	0	0	0	0	115	0	17	35	0	2	1	0	1
16:45 - 17:00	0	1	49	0	0	0	0	78	0	5	20	0	0	0	0	0
17:00 - 17:15	0	0	62	0	0	0	0	71	0	13	24	0	2	1	1	0
17:15 - 17:30	1	0	59	0	0	0	0	71	0	11	23	0	0	1	0	0
17:30 - 17:45	0	0	33	0	0	0	0	52	0	14	22	0	0	1	0	0
17:45 - 18:00	0	0	34	0	0	0	0	33	0	11	29	0	0	0	0	0
Peak V_{15min}	2		86					92	4	46	71					
PHF	0.63		0.85					0.81	0.50	0.74	0.86					



Eaton Way @ Lindsey Pl

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	07:15 — 08:15	Weather:	Sunny
Overall PHF:	0.92	Road Cond:	Dry
Notes:	0		

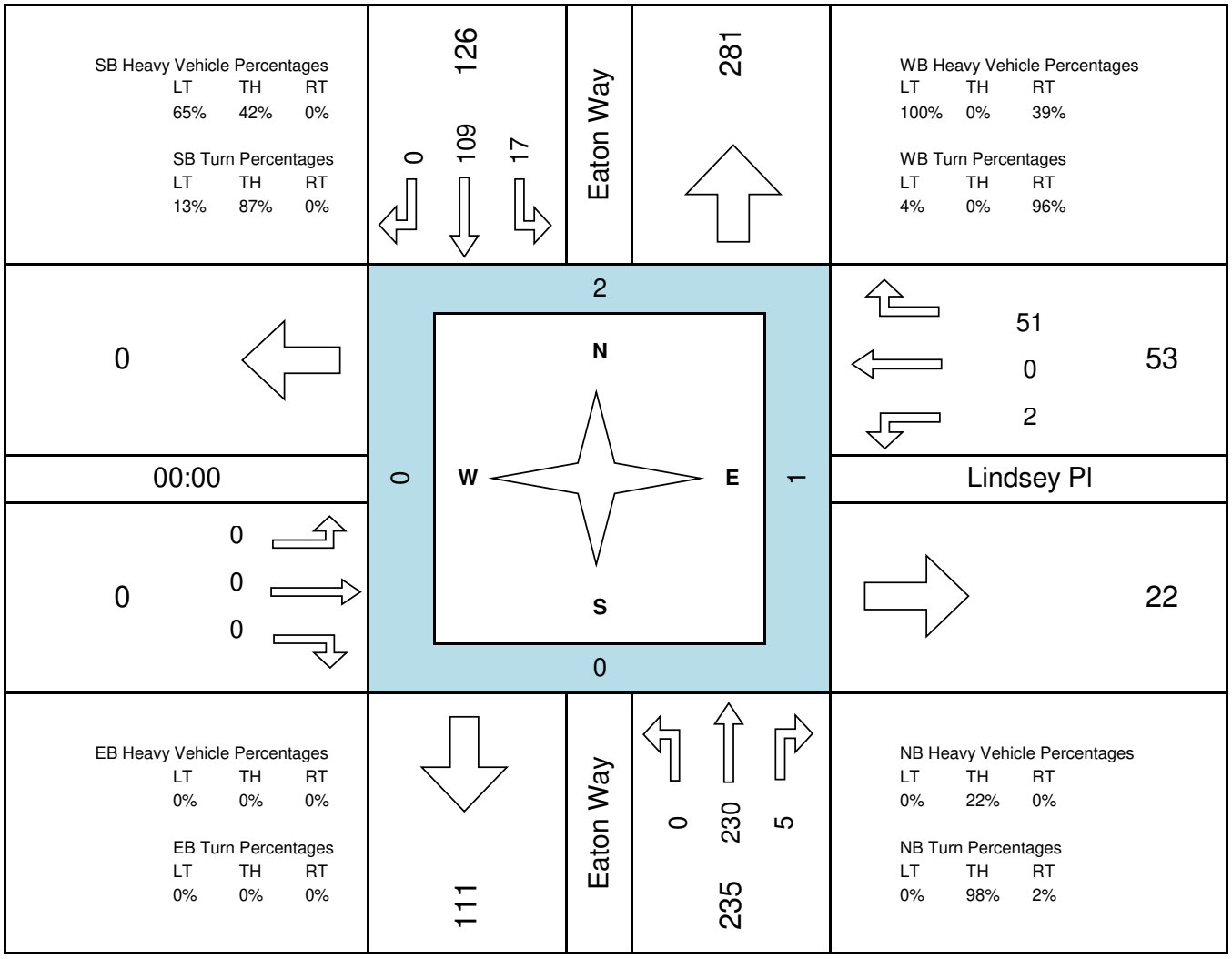
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	8	1	9	43	0	0	0	0	1	0	2	1	0	0	0
06:15 - 06:30	0	6	1	7	46	0	0	0	0	0	0	2	0	0	0	0
06:30 - 06:45	0	8	0	17	40	0	0	0	0	0	0	1	0	0	0	0
06:45 - 07:00	0	15	0	29	63	0	0	0	0	0	0	4	0	0	0	0
07:00 - 07:15	0	10	0	16	54	0	0	0	0	0	0	2	0	0	1	0
07:15 - 07:30	0	16	0	14	60	0	0	0	0	0	0	16	0	0	3	0
07:30 - 07:45	0	17	1	25	64	0	0	0	0	0	0	11	0	0	1	0
07:45 - 08:00	0	25	2	8	71	0	0	0	0	0	0	8	0	0	2	0
08:00 - 08:15	0	22	1	13	55	0	0	0	0	0	0	4	0	0	0	0
08:15 - 08:30	0	20	0	11	52	0	0	0	0	1	0	9	0	0	0	0
08:30 - 08:45	0	13	2	15	38	0	0	0	0	0	0	7	0	0	0	0
08:45 - 09:00	0	17	1	17	53	0	0	0	0	1	0	13	0	0	1	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}		25	2	25	71							16				
PHF		0.80	0.50	0.60	0.88							0.61				



Eaton Way @ Lindsey Pl

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	14:00 — 15:00	Weather:	Sunny
Overall PHF:	0.88	Road Cond:	Dry
Notes:	0		

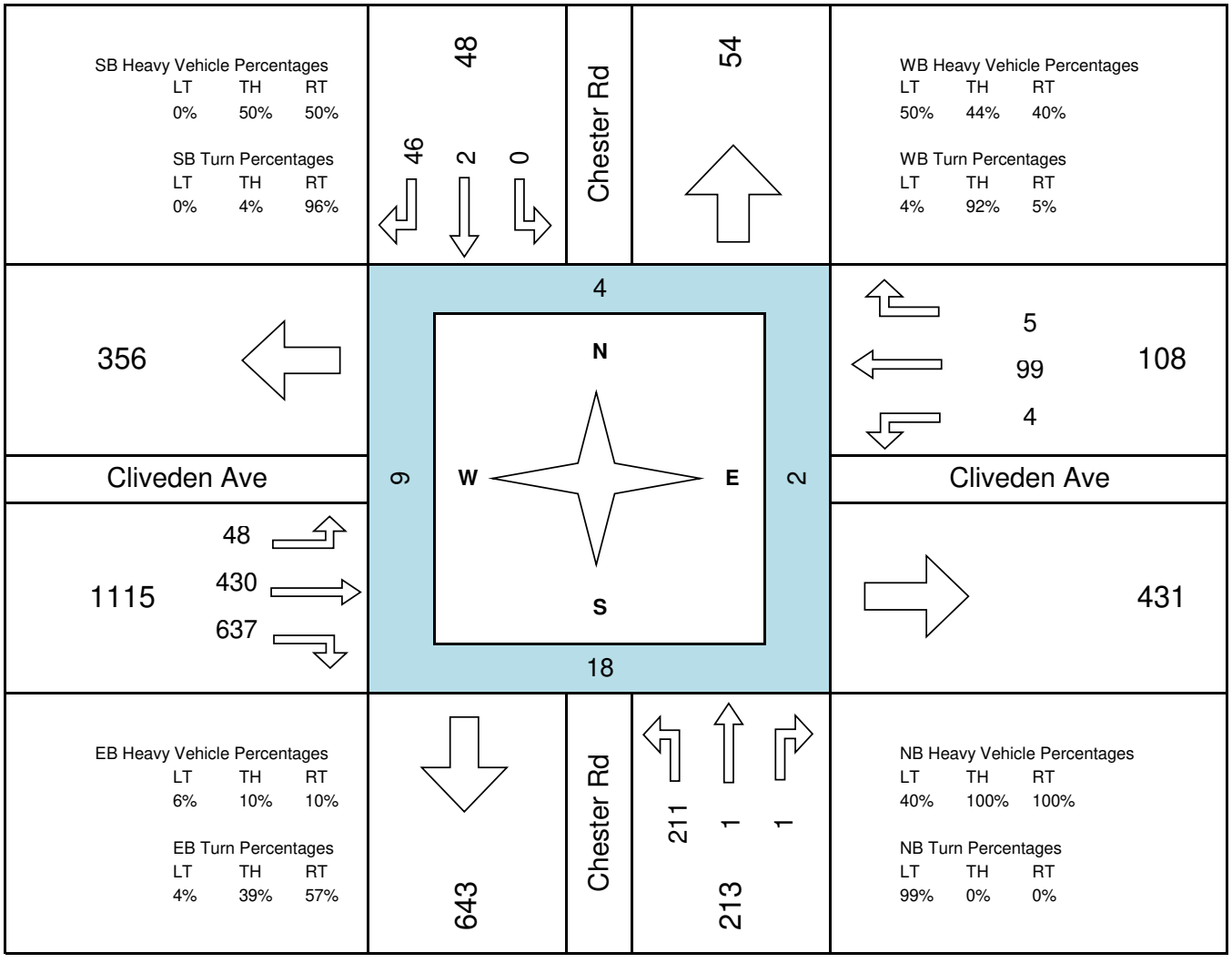
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	0	59	1	7	37	0	0	0	0	1	0	13	2	0	0	0
14:15 - 14:30	0	48	1	5	25	0	0	0	0	0	0	18	0	0	0	0
14:30 - 14:45	0	73	2	2	20	0	0	0	0	0	0	10	0	0	1	0
14:45 - 15:00	0	50	1	3	27	0	0	0	0	1	0	10	0	0	0	0
15:00 - 15:15	0	72	1	3	22	0	0	0	0	0	0	10	1	0	0	0
15:15 - 15:30	0	49	1	1	14	0	0	0	0	0	0	12	1	0	0	0
15:30 - 15:45	0	80	1	2	22	0	0	0	0	0	0	20	0	0	0	0
15:45 - 16:00	0	60	2	0	13	0	0	0	0	2	0	10	1	0	0	0
16:00 - 16:15	0	75	1	5	11	0	0	0	0	2	0	17	0	0	0	0
16:15 - 16:30	0	51	1	3	12	0	0	0	0	0	0	13	0	0	0	0
16:30 - 16:45	0	66	0	3	14	0	0	0	0	1	0	6	0	0	1	0
16:45 - 17:00	0	37	0	3	4	0	0	0	0	0	0	3	0	0	0	0
17:00 - 17:15	0	47	0	5	10	0	0	0	0	0	0	9	0	0	3	0
17:15 - 17:30	0	56	0	2	6	0	0	0	0	0	0	9	0	0	0	0
17:30 - 17:45	0	34	0	2	11	0	0	0	0	0	0	6	0	0	0	0
17:45 - 18:00	0	24	0	2	7	0	0	0	0	0	0	5	0	0	0	0
Peak V_{15min}		73	2	7	37					1		18				
PHF		0.79	0.63	0.61	0.74					0.50		0.71				



Chester Rd @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	06:00 — 07:00	Weather:	Sunny
Overall PHF:	0.91	Road Cond:	Dry
Notes:	0		

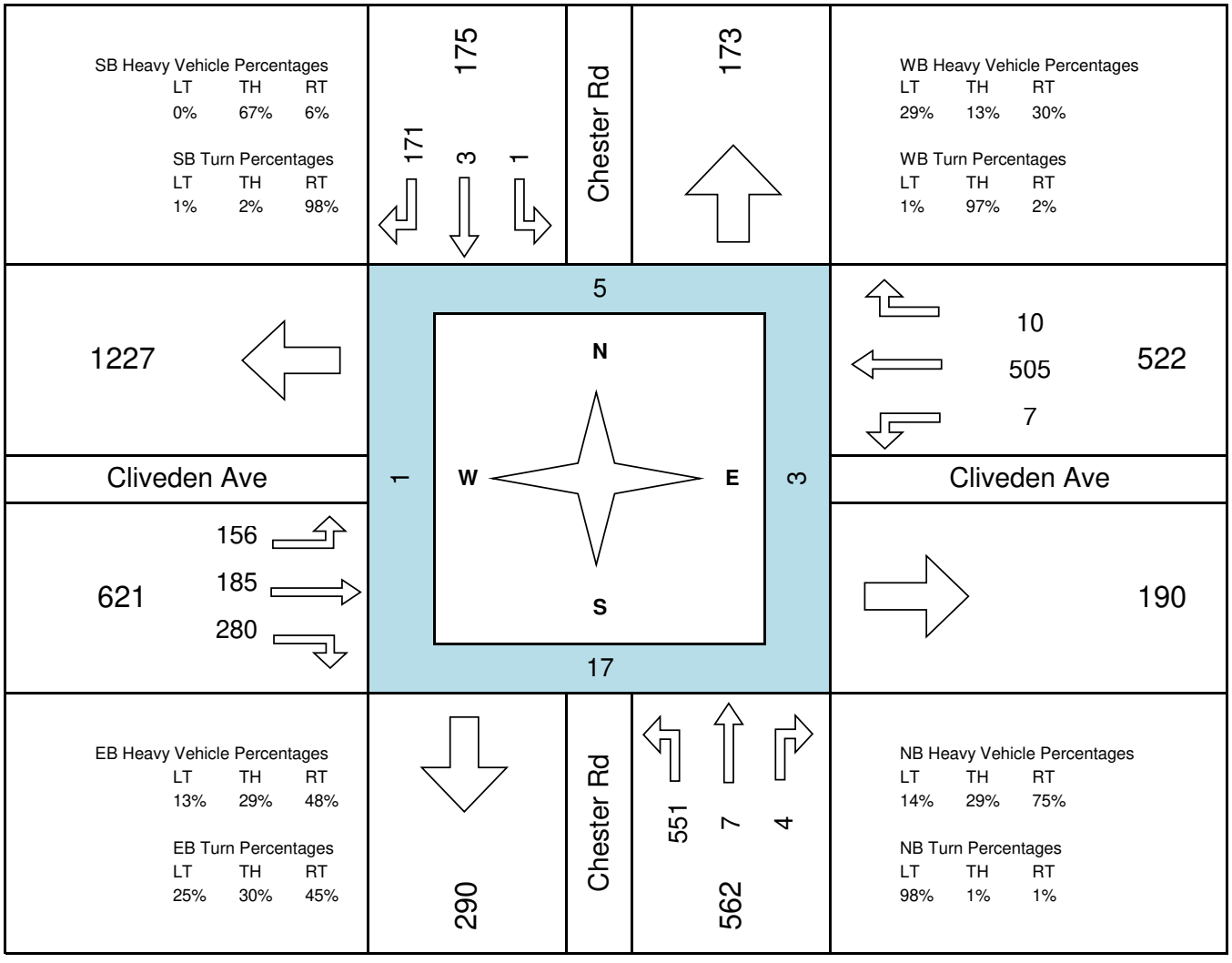
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	35	0	1	0	0	19	9	92	175	3	28	0	0	7	0	0
06:15 - 06:30	53	0	0	0	0	11	8	102	157	0	15	2	0	5	2	3
06:30 - 06:45	64	1	0	0	0	9	15	124	160	1	33	2	0	5	0	0
06:45 - 07:00	59	0	0	0	2	7	16	112	145	0	23	1	4	1	0	6
07:00 - 07:15	53	0	2	0	1	16	19	78	131	1	44	1	2	3	0	3
07:15 - 07:30	44	0	2	1	0	9	18	82	146	0	31	0	6	7	0	2
07:30 - 07:45	37	3	1	1	0	6	10	58	130	2	32	1	0	3	0	0
07:45 - 08:00	47	0	2	1	1	6	15	84	145	1	27	0	3	9	5	5
08:00 - 08:15	30	1	1	0	1	5	16	94	127	2	34	6	0	2	0	1
08:15 - 08:30	42	2	2	0	1	5	15	63	117	1	35	1	0	0	0	0
08:30 - 08:45	53	2	3	0	0	8	6	79	82	2	27	2	0	5	0	1
08:45 - 09:00	49	0	3	0	1	6	6	81	80	1	25	2	0	1	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}	64	1	1		2	19	16	124	175	3	33	2				
PHF	0.82	0.25	0.25		0.25	0.61	0.75	0.87	0.91	0.33	0.75	0.63				



Chester Rd @ Cliveden Ave

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	15:15 — 16:15	Weather:	Sunny
Overall PHF:	0.89	Road Cond:	Dry
Notes:	0		

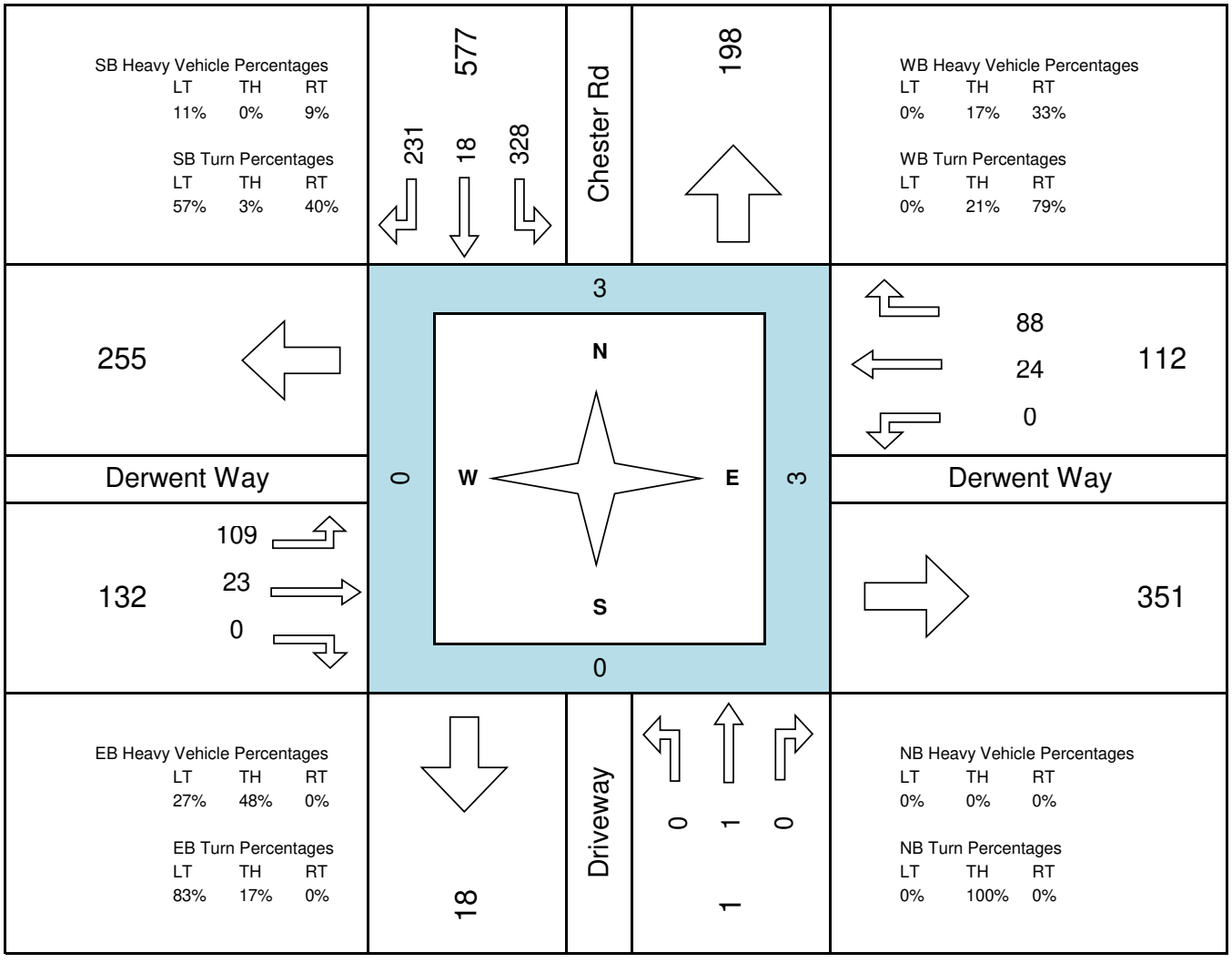
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	85	2	3	1	4	23	10	37	83	9	70	2	2	3	2	1
14:15 - 14:30	92	4	1	2	3	24	16	48	70	1	60	0	0	0	0	0
14:30 - 14:45	111	5	0	0	0	11	16	51	64	0	131	3	1	9	0	1
14:45 - 15:00	134	1	4	0	3	20	19	61	68	1	60	4	1	4	0	1
15:00 - 15:15	156	1	3	0	0	28	20	51	70	3	120	4	0	2	0	0
15:15 - 15:30	152	2	2	0	0	37	21	54	68	2	110	0	4	4	2	0
15:30 - 15:45	138	1	0	0	2	41	39	42	79	0	186	1	0	5	0	1
15:45 - 16:00	120	2	0	0	0	44	51	45	65	2	106	8	0	4	1	0
16:00 - 16:15	141	2	2	1	1	49	45	44	68	3	103	1	1	4	0	0
16:15 - 16:30	131	2	0	0	0	36	37	36	60	3	96	1	0	0	0	1
16:30 - 16:45	118	0	1	2	1	62	49	51	40	1	133	1	2	0	0	2
16:45 - 17:00	117	0	2	0	1	58	39	44	68	1	96	0	1	0	0	1
17:00 - 17:15	99	2	1	0	0	41	53	49	41	2	99	0	0	0	0	0
17:15 - 17:30	63	0	1	1	1	39	37	40	41	0	38	0	0	3	0	0
17:30 - 17:45	59	0	1	1	1	20	19	41	34	0	59	3	2	0	0	0
17:45 - 18:00	66	0	1	0	0	12	11	35	39	0	47	1	0	1	0	0
Peak V_{15min}	152	2	2	1	2	49	51	54	79	3	186	8				
PHF	0.91	0.88	0.50	0.25	0.38	0.87	0.76	0.86	0.89	0.58	0.68	0.31				



Chester Rd @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	06:00 — 07:00	Weather:	Sunny
Overall PHF:	0.94	Road Cond:	Dry
Notes:	0		

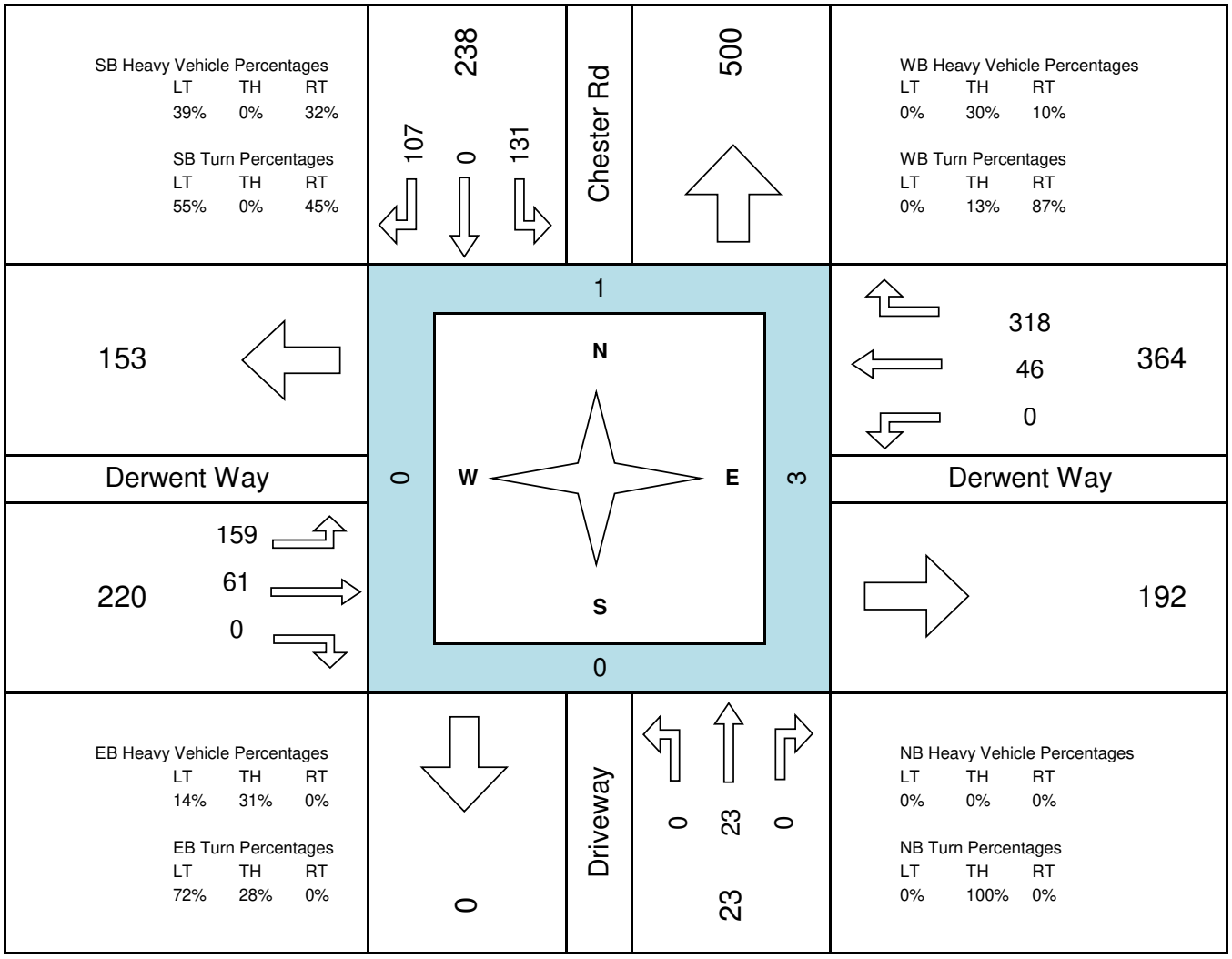
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	1	0	98	5	49	23	5	0	0	3	19	0	0	0	0
06:15 - 06:30	0	0	0	86	7	50	20	5	0	0	6	20	0	0	1	0
06:30 - 06:45	0	0	0	79	4	69	33	1	0	0	7	26	3	0	2	0
06:45 - 07:00	0	0	0	65	2	63	33	12	0	0	8	23	0	0	0	0
07:00 - 07:15	0	0	0	62	2	56	22	6	0	0	6	32	0	0	0	0
07:15 - 07:30	0	0	0	69	0	70	15	9	0	0	13	24	0	0	0	0
07:30 - 07:45	0	0	0	54	0	55	17	8	0	0	5	21	0	0	0	0
07:45 - 08:00	0	0	0	47	0	75	20	5	0	0	6	24	1	0	1	0
08:00 - 08:15	0	0	0	58	1	65	20	9	0	0	4	9	2	0	2	0
08:15 - 08:30	0	1	0	51	0	58	32	8	1	0	8	29	0	0	0	0
08:30 - 08:45	0	0	1	43	0	38	18	10	1	1	10	25	0	0	0	0
08:45 - 09:00	0	0	0	41	0	41	22	8	0	0	9	24	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}		1		98	7	69	33	12			8	26				
PHF		0.25		0.84	0.64	0.84	0.83	0.48			0.75	0.85				



Chester Rd @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	14:45 — 15:45	Weather:	Sunny
Overall PHF:	0.94	Road Cond:	Dry
Notes:	0		

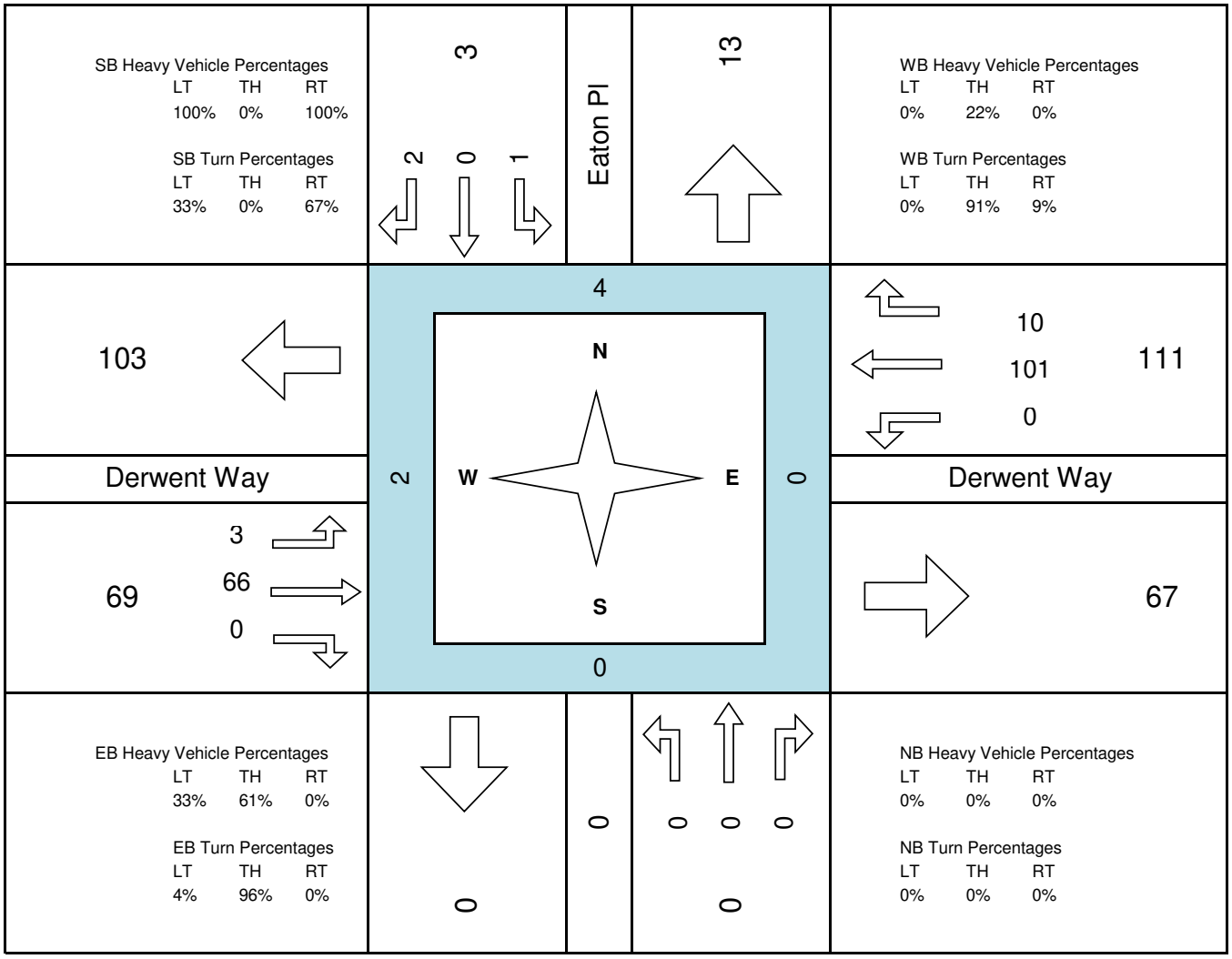
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	0	0	1	47	0	38	37	15	1	0	11	42	0	0	0	0
14:15 - 14:30	0	2	0	38	0	28	37	21	0	0	15	52	0	0	0	0
14:30 - 14:45	0	0	0	35	0	29	46	11	0	0	9	69	0	0	0	0
14:45 - 15:00	0	5	0	35	0	21	43	18	0	0	7	76	0	0	0	0
15:00 - 15:15	0	1	0	32	0	28	27	19	0	0	15	88	0	0	2	0
15:15 - 15:30	0	16	0	29	0	30	36	6	0	0	15	93	0	0	0	0
15:30 - 15:45	0	1	0	35	0	28	53	18	0	0	9	61	1	0	1	0
15:45 - 16:00	0	1	0	30	0	25	45	13	0	0	23	38	1	0	1	0
16:00 - 16:15	0	0	0	29	0	26	57	15	0	0	14	47	1	0	1	0
16:15 - 16:30	0	0	0	16	0	20	61	11	0	0	8	35	2	0	2	0
16:30 - 16:45	0	0	0	21	0	14	60	30	0	0	13	56	0	0	0	0
16:45 - 17:00	1	0	0	20	0	23	39	8	0	0	5	30	0	0	0	0
17:00 - 17:15	0	0	0	21	0	23	36	6	0	0	6	29	0	0	0	0
17:15 - 17:30	0	0	0	27	0	13	29	6	1	0	7	25	1	0	0	0
17:30 - 17:45	0	0	0	15	0	13	33	6	0	0	4	21	0	0	0	0
17:45 - 18:00	0	0	2	18	0	12	37	7	0	0	9	33	0	0	0	0
Peak V_{15min}		16		35		30	53	19			15	93				
PHF		0.36		0.94		0.89	0.75	0.80			0.77	0.85				



Eaton Pl @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	07:45 — 08:45	Weather:	Sunny
Overall PHF:	0.86	Road Cond:	Dry
Notes:	0		

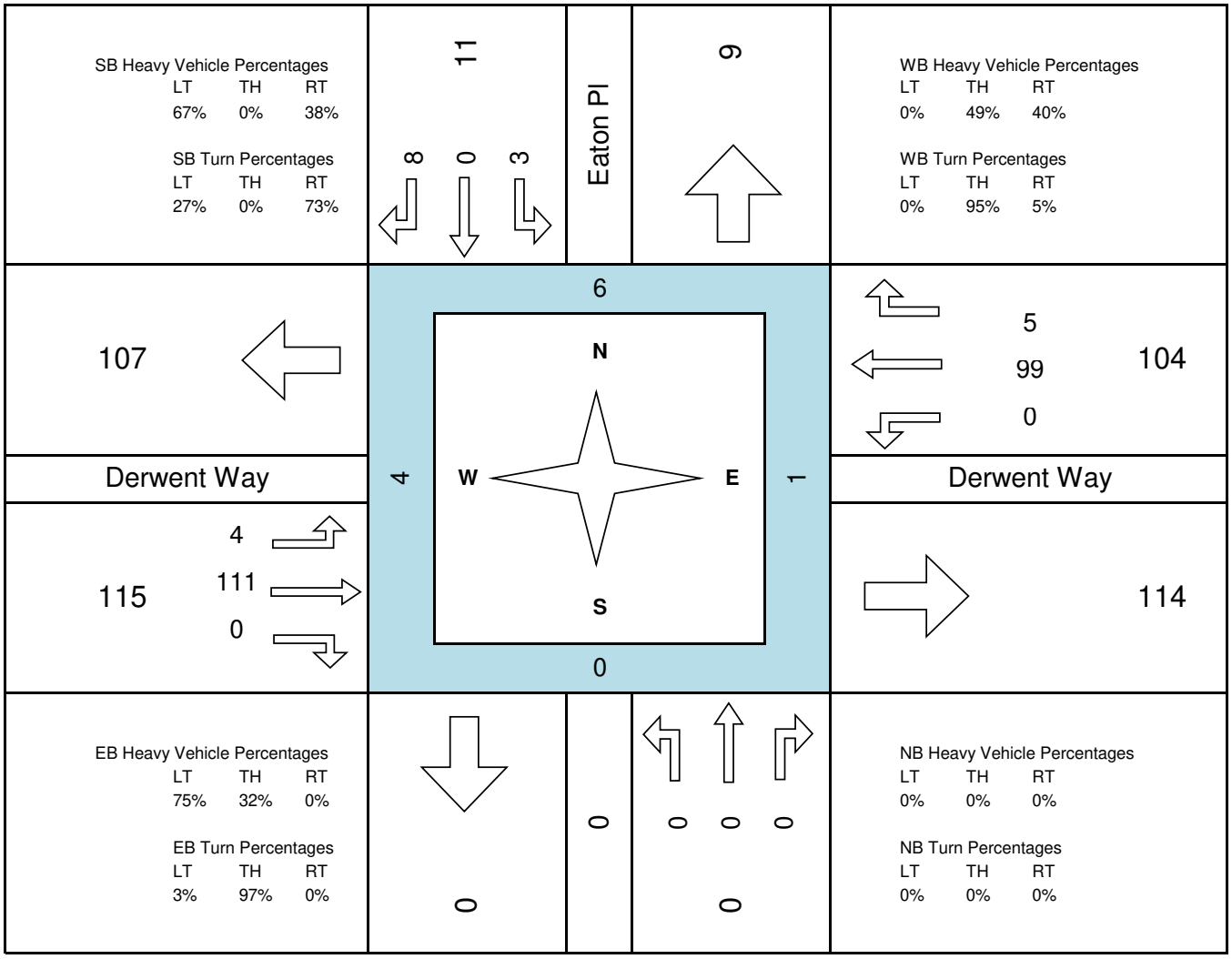
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	0	0	0	0	1	1	14	0	0	11	0	1	0	0	0
06:15 - 06:30	0	0	0	0	0	0	0	10	0	0	9	0	0	0	0	0
06:30 - 06:45	0	0	0	0	0	0	1	7	0	0	12	0	0	0	0	0
06:45 - 07:00	0	0	0	0	0	1	1	12	0	0	13	0	0	0	0	0
07:00 - 07:15	0	0	0	0	0	0	0	9	0	0	16	1	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	1	11	0	0	25	2	2	0	0	0
07:30 - 07:45	0	0	0	0	0	2	1	8	0	0	22	2	0	0	0	0
07:45 - 08:00	0	0	0	0	0	1	1	18	0	0	29	3	4	0	0	2
08:00 - 08:15	0	0	0	0	0	0	1	10	0	0	23	4	0	0	0	0
08:15 - 08:30	0	0	0	1	0	0	1	17	0	0	33	1	0	0	0	0
08:30 - 08:45	0	0	0	0	0	1	0	21	0	0	16	2	0	0	0	0
08:45 - 09:00	0	0	0	0	0	0	1	16	0	0	17	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}				1		1	1	21			33	4				
PHF				0.25		0.50	0.75	0.79			0.77	0.63				



Eaton Pl @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	14:00 — 15:00	Weather:	Sunny
Overall PHF:	0.91	Road Cond:	Dry
Notes:	0		

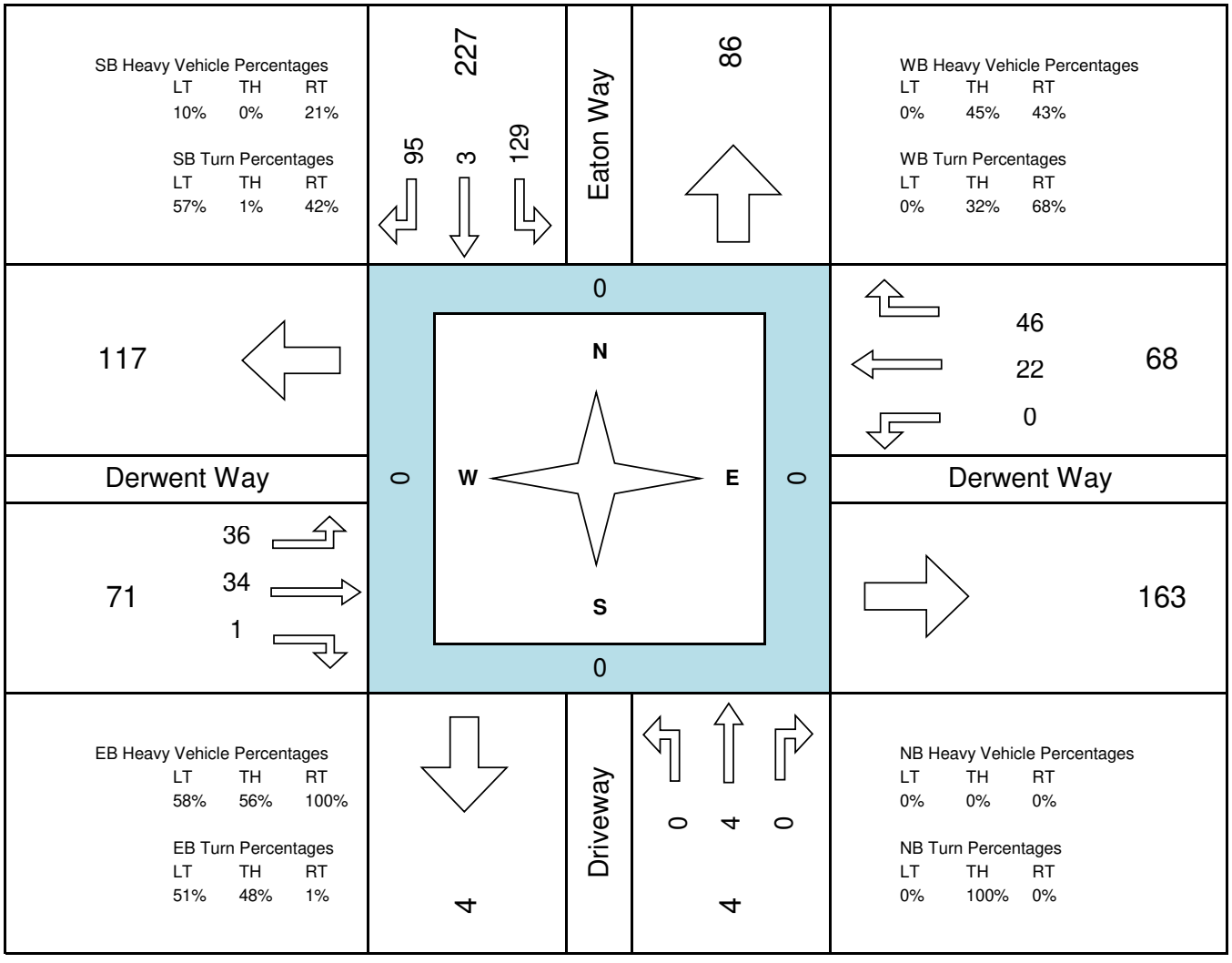
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	0	0	0	0	0	1	2	31	0	0	29	0	3	0	0	2
14:15 - 14:30	0	0	0	1	0	2	2	21	0	0	23	3	3	0	0	2
14:30 - 14:45	0	0	0	1	0	1	0	32	0	0	25	1	0	0	0	0
14:45 - 15:00	0	0	0	1	0	4	0	27	0	0	22	1	0	0	1	0
15:00 - 15:15	0	0	0	1	0	2	2	25	1	0	23	1	0	0	0	0
15:15 - 15:30	0	0	0	0	0	1	0	13	0	0	34	1	0	0	0	0
15:30 - 15:45	0	0	0	0	0	2	1	21	0	0	27	2	0	0	0	0
15:45 - 16:00	0	0	0	1	0	1	0	31	0	0	27	0	0	0	0	0
16:00 - 16:15	0	0	0	1	0	2	0	20	0	0	34	2	0	0	0	0
16:15 - 16:30	0	0	0	1	0	1	0	17	0	0	22	2	0	0	0	0
16:30 - 16:45	0	0	0	3	0	2	0	27	0	0	28	2	0	0	0	0
16:45 - 17:00	0	0	0	1	0	1	0	16	0	0	27	1	0	0	0	0
17:00 - 17:15	0	0	0	1	0	1	1	20	0	0	18	1	0	0	0	0
17:15 - 17:30	0	0	0	1	0	0	0	13	0	0	9	1	0	0	0	0
17:30 - 17:45	0	0	0	0	0	1	0	16	0	0	7	0	0	0	0	0
17:45 - 18:00	0	0	0	2	0	0	0	5	0	0	6	1	0	0	0	0
Peak V_{15min}				1		4	2	32			29	3				
PHF				0.75		0.50	0.50	0.87			0.85	0.42				



Eaton Way @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	07:45 — 08:45	Weather:	Sunny
Overall PHF:	0.91	Road Cond:	Dry
Notes:	0		

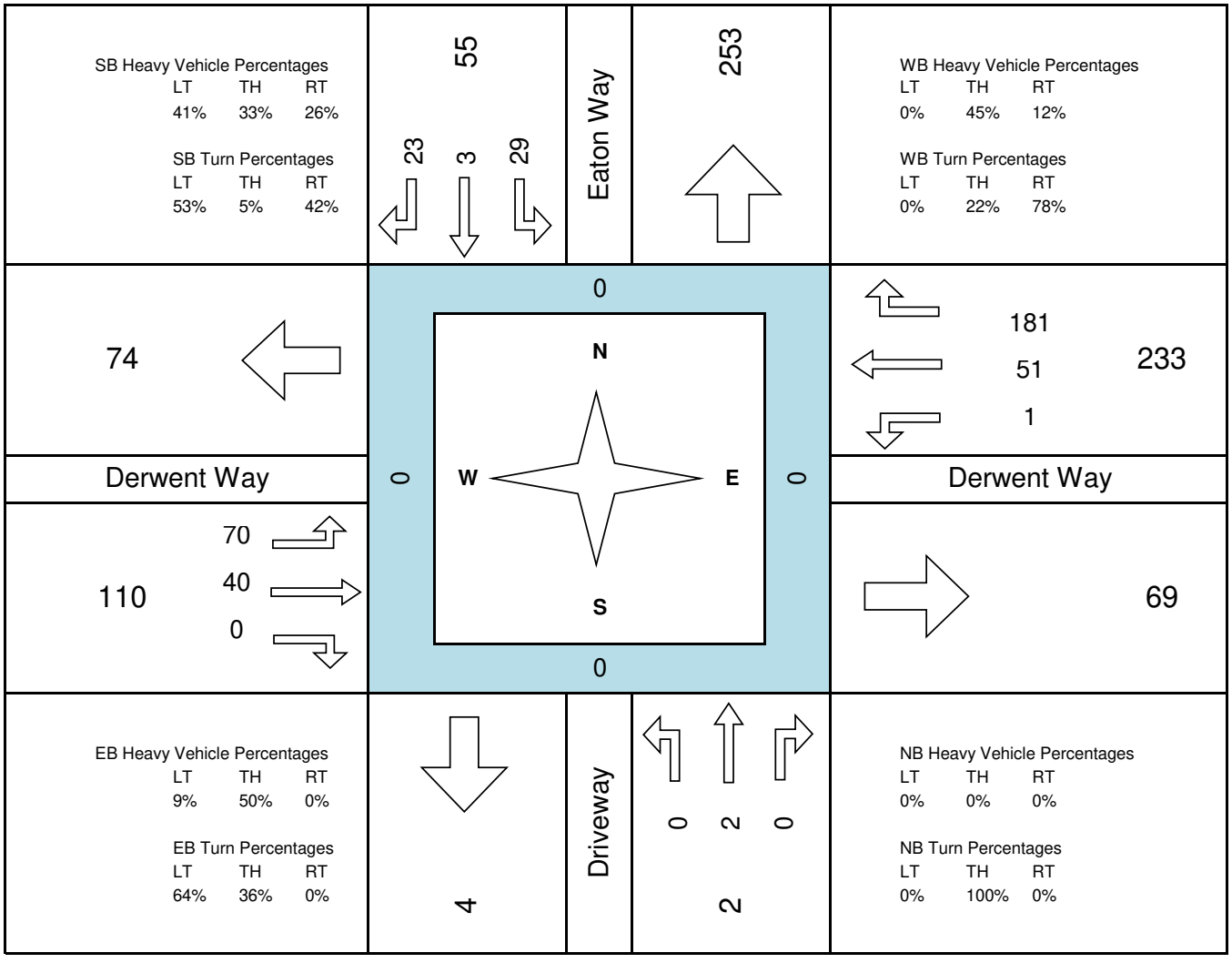
	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
06:00 - 06:15	0	0	0	22	0	6	4	6	0	0	4	6	0	0	0	0
06:15 - 06:30	0	0	0	26	1	13	1	5	0	0	0	6	0	0	0	0
06:30 - 06:45	0	0	0	16	2	13	2	3	0	0	1	5	0	0	0	0
06:45 - 07:00	0	0	0	21	0	13	1	6	0	0	2	6	0	0	0	0
07:00 - 07:15	0	0	0	5	0	4	1	3	0	0	2	1	0	0	0	0
07:15 - 07:30	0	0	0	21	0	17	8	2	0	0	6	7	0	0	0	0
07:30 - 07:45	3	1	1	17	2	24	8	8	1	1	8	7	0	0	0	0
07:45 - 08:00	0	2	0	35	1	30	7	8	0	0	6	13	0	0	0	0
08:00 - 08:15	0	1	0	39	2	19	15	6	0	0	3	11	0	0	0	0
08:15 - 08:30	0	1	0	27	0	22	6	11	0	0	7	13	0	0	0	0
08:30 - 08:45	0	0	0	28	0	24	8	9	1	0	6	9	0	0	0	0
08:45 - 09:00	0	0	0	17	3	18	9	5	0	0	8	12	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N/A - N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak V_{15min}		2		39	2	30	15	11	1		7	13				
PHF		0.50		0.83	0.38	0.79	0.60	0.77	0.25		0.79	0.88				



Eaton Way @ Derwent Way

Project #:	04-17-0025	Date:	Aug 3, 2017
Peak Hour:	15:15 — 16:15	Weather:	Sunny
Overall PHF:	0.92	Road Cond:	Dry
Notes:	0		

	All Vehicles Movements												Pedestrians			
Time Intervals	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	N	S	E	W
14:00 - 14:15	0	0	0	20	2	14	27	14	1	0	14	32	0	0	0	0
14:15 - 14:30	1	0	0	15	1	12	16	11	0	0	16	25	0	0	0	0
14:30 - 14:45	0	0	0	8	1	6	12	9	0	0	9	55	0	0	1	0
14:45 - 15:00	0	0	0	12	0	4	6	8	0	0	8	26	0	0	0	0
15:00 - 15:15	0	0	0	7	0	2	14	6	0	0	7	28	0	0	3	0
15:15 - 15:30	0	0	0	10	0	6	18	11	0	0	10	38	0	0	0	0
15:30 - 15:45	0	0	0	5	0	8	18	13	0	0	14	51	0	0	0	0
15:45 - 16:00	0	0	0	9	3	4	11	6	0	0	11	48	0	0	0	0
16:00 - 16:15	0	2	0	5	0	5	23	10	0	1	16	44	0	0	0	0
16:15 - 16:30	0	1	0	6	0	5	19	9	0	0	7	33	0	0	0	0
16:30 - 16:45	0	0	0	6	0	11	25	10	0	0	7	36	0	0	1	0
16:45 - 17:00	0	3	0	1	0	5	14	3	0	0	6	25	0	0	0	0
17:00 - 17:15	0	0	0	4	0	4	20	3	0	1	5	26	1	0	0	0
17:15 - 17:30	0	2	0	3	0	4	21	5	0	0	3	29	0	0	0	0
17:30 - 17:45	0	0	0	3	0	6	9	3	0	0	3	16	0	0	0	0
17:45 - 18:00	0	0	0	3	1	3	16	4	0	0	2	15	0	0	0	0
Peak V_{15min}		2		10	3	8	23	13		1	16	51				
PHF		0.25		0.73	0.25	0.72	0.76	0.77		0.25	0.80	0.89				



Intersection: Cliveden Ave - Eaton Way
Surveyor: Marvin Liu
Date: Thursday, August 03, 2017
Time: 6 - 9 am and 2 - 6pm

EB	
Timestamp	**Queue (m)**
6:00	0
6:05	0
6:10	0
6:15	0
6:20	0
6:25	0
6:30	0
6:35	0
6:40	0
6:45	0
6:50	0
6:55	0
7:00	0
7:05	0
7:10	0
7:15	0
7:20	0
7:25	0
7:30	0
7:35	0
7:40	0
7:45	0
7:50	0
7:55	0
8:00	0
8:05	0
8:10	0
8:15	0
8:20	0
8:25	0
8:30	0
8:35	0
8:40	0
8:45	0
8:50	0
8:55	0
14:00	74 m
14:05	74 m
14:10	160 m
14:15	160 m
14:20	0
14:25	0
14:30	0
14:35	0
14:40	160 m
14:45	0
14:50	0
14:55	0
15:00	0
15:05	74 m
15:10	74 m
15:15	0
15:20	0
15:25	0
15:30	74 m
15:35	311 m
15:40	160 m
15:45	74 m
15:50	0
15:55	74 m
16:00	74 m
16:05	160 m
16:10	74 m
16:15	0
16:20	74 m
16:25	0
16:30	0
16:35	74 m
16:40	74 m
16:45	0
16:50	74 m
16:55	0
17:00	0
17:05	0
17:10	0
17:15	0
17:20	0
17:25	0
17:30	0
17:35	0
17:40	0
17:45	0
17:50	74 m
17:55	0

Intersection: Chester Rd @ Cliveden Ave
Surveyor: Dennis Robertson
Date: Thursday, August 03, 2017
Time: 6 - 9 am and 2 - 6pm

NB	
Timestamp	**Queue (m)**
6:00	< 85m
6:05	< 85m
6:10	< 85m
6:15	< 85m
6:20	< 85m
6:25	< 85m
6:30	< 85m
6:35	< 85m
6:40	< 85m
6:45	< 85m
6:50	< 85m
6:55	< 85m
7:00	< 85m
7:05	< 85m
7:10	< 85m
7:15	< 85m
7:20	< 85m
7:25	< 85m
7:30	< 85m
7:35	< 85m
7:40	< 85m
7:45	< 85m
7:50	< 85m
7:55	< 85m
8:00	< 85m
8:05	< 85m
8:10	< 85m
8:15	< 85m
8:20	< 85m
8:25	< 85m
8:30	< 85m
8:35	< 85m
8:40	< 85m
8:45	< 85m
8:50	< 85m
8:55	< 85m
14:00	< 85m
14:05	< 85m
14:10	< 85m
14:15	< 85m
14:20	< 85m
14:25	189 m
14:30	< 85m
14:35	661 m
14:40	592 m
14:45	532 m
14:50	243 m
14:55	< 85m
15:00	< 85m
15:05	661 m
15:10	243 m
15:15	< 85m
15:20	< 85m
15:25	385 m
15:30	< 85m
15:35	< 85m
15:40	243 m
15:45	243 m
15:50	479 m
15:55	479 m
16:00	479 m
16:05	< 85m
16:10	189 m
16:15	189 m
16:20	329 m
16:25	329 m
16:30	243 m
16:35	243 m
16:40	661 m
16:45	661 m
16:50	189 m
16:55	< 85m
17:00	< 85m
17:05	189 m
17:10	< 85m
17:15	< 85m
17:20	< 85m
17:25	< 85m
17:30	< 85m
17:35	< 85m
17:40	< 85m
17:45	< 85m
17:50	< 85m
17:55	< 85m

APPENDIX B: DETAILED SYNCHRO CALCULATION SHEETS

HCM Signalized Intersection Capacity Analysis
1: Highway 91 SB Ramps & Cliveden Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	314	0	0	627	0	352	15	568	0	0	0
Future Volume (vph)	0	314	0	0	627	0	352	15	568	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.8	6.8				
Lane Util. Factor		0.95			0.95		1.00	1.00				
Frt		1.00			1.00		1.00	0.86				
Flt Protected		1.00			1.00		0.95	1.00				
Satd. Flow (prot)		3223			3438		1492	1432				
Flt Permitted		1.00			1.00		0.95	1.00				
Satd. Flow (perm)		3223			3438		1492	1432				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.98	0.92	0.86	0.54	0.90	0.92	0.92	0.92
Adj. Flow (vph)	0	338	0	0	640	0	409	28	631	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	43	0	0	0	0
Lane Group Flow (vph)	0	338	0	0	640	0	409	616	0	0	0	0
Heavy Vehicles (%)	0%	12%	0%	0%	5%	0%	21%	73%	11%	2%	2%	2%
Turn Type		NA			NA		Perm	NA				
Protected Phases		2			2			3				
Permitted Phases							3					
Actuated Green, G (s)		27.2			27.2		43.6	43.6				
Effective Green, g (s)		27.2			27.2		43.6	43.6				
Actuated g/C Ratio		0.33			0.33		0.52	0.52				
Clearance Time (s)		6.0			6.0		6.8	6.8				
Vehicle Extension (s)		4.0			4.0		5.0	5.0				
Lane Grp Cap (vph)		1048			1118		778	746				
v/s Ratio Prot		0.10			c0.19			c0.43				
v/s Ratio Perm							0.27					
v/c Ratio		0.32			0.57		0.53	0.83				
Uniform Delay, d1		21.3			23.4		13.2	16.8				
Progression Factor		1.00			1.00		1.00	1.00				
Incremental Delay, d2		0.2			0.9		1.2	8.3				
Delay (s)		21.5			24.2		14.4	25.2				
Level of Service		C			C		B	C				
Approach Delay (s)		21.5			24.2			21.0			0.0	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	12.8
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	491	0	0	262	0	0	0	0	615	15	725
Future Volume (vph)	0	491	0	0	262	0	0	0	0	615	15	725
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8					6.2	6.2	
Lane Util. Factor		0.95			0.95					0.97	1.00	
Frt		1.00			1.00					1.00	0.85	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3167			2674					3303	1452	
Flt Permitted		1.00			1.00					0.95	1.00	
Satd. Flow (perm)		3167			2674					3303	1452	
Peak-hour factor, PHF	0.92	0.85	0.92	0.92	0.78	0.92	0.92	0.92	0.92	0.89	0.75	0.89
Adj. Flow (vph)	0	578	0	0	336	0	0	0	0	691	20	815
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	17	0
Lane Group Flow (vph)	0	578	0	0	336	0	0	0	0	691	818	0
Heavy Vehicles (%)	0%	14%	0%	0%	35%	0%	2%	2%	2%	6%	80%	10%
Turn Type		NA			NA					Perm	NA	
Protected Phases		2			2						4	
Permitted Phases										4		
Actuated Green, G (s)		18.0			18.0					46.1	46.1	
Effective Green, g (s)		18.0			18.0					46.1	46.1	
Actuated g/C Ratio		0.24			0.24					0.61	0.61	
Clearance Time (s)		5.8			5.8					6.2	6.2	
Vehicle Extension (s)		3.0			3.0					3.0	3.0	
Lane Grp Cap (vph)		749			632					2000	879	
v/s Ratio Prot		c0.18			0.13						c0.56	
v/s Ratio Perm										0.21		
v/c Ratio		0.77			0.53					0.35	0.93	
Uniform Delay, d1		27.1			25.4					7.5	13.6	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		4.9			0.9					0.1	16.1	
Delay (s)		32.1			26.2					7.6	29.7	
Level of Service		C			C					A	C	
Approach Delay (s)		32.1			26.2			0.0			19.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	76.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.2

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	3	134	94	1	341	483
Future Vol, veh/h	3	134	94	1	341	483
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	38	91	84	25	87	96
Heavy Vehicles, %	33	50	40	100	12	8
Mvmt Flow	8	147	112	4	392	503

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1399	112	0	0	112	0
Stage 1	112	-	-	-	-	-
Stage 2	1287	-	-	-	-	-
Critical Hdwy	6.73	6.7	-	-	4.22	-
Critical Hdwy Stg 1	5.73	-	-	-	-	-
Critical Hdwy Stg 2	5.73	-	-	-	-	-
Follow-up Hdwy	3.797	3.75	-	-	2.308	-
Pot Cap-1 Maneuver	133	826	-	-	1418	-
Stage 1	841	-	-	-	-	-
Stage 2	223	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	82	826	-	-	1418	-
Mov Cap-2 Maneuver	82	-	-	-	-	-
Stage 1	841	-	-	-	-	-
Stage 2	137	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	10	0	3.7
HCM LOS	B		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	870	1418	-
HCM Lane V/C Ratio	-	-	0.178	0.276	-
HCM Control Delay (s)	-	-	10	8.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	1.1	-

Intersection	
Int Delay, s/veh	2.6

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	60	250	80	4	0	39
Future Vol, veh/h	60	250	80	4	0	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	60	88	80	50	92	61
Heavy Vehicles, %	28	10	58	50	0	72
Mvmt Flow	100	284	100	8	0	64

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	108	0	-	0	588	104
Stage 1	-	-	-	-	104	-
Stage 2	-	-	-	-	484	-
Critical Hdwy	4.38	-	-	-	6.4	6.92
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.452	-	-	-	3.5	3.948
Pot Cap-1 Maneuver	1335	-	-	-	475	790
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1335	-	-	-	433	790
Mov Cap-2 Maneuver	-	-	-	-	433	-
Stage 1	-	-	-	-	925	-
Stage 2	-	-	-	-	568	-

Approach	SE	NW	SW
HCM Control Delay, s	2.1	0	10
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	1335	-	790
HCM Lane V/C Ratio	-	-	0.075	-	0.081
HCM Control Delay (s)	-	-	7.9	0	10
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0.2	-	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	531	637	4	183	5	211	1	1	0	2	46
Future Volume (veh/h)	48	531	637	4	183	5	211	1	1	0	2	46
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1792	1727	1727	1267	1321	1900	1357	950	1900	0	1267	1900
Adj Flow Rate, veh/h	64	610	0	12	244	8	257	4	4	0	8	0
Adj No. of Lanes	1	1	1	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.75	0.87	0.91	0.33	0.75	0.63	0.82	0.25	0.25	0.92	0.25	0.61
Percent Heavy Veh, %	6	10	10	50	44	44	40	100	100	0	50	50
Cap, veh/h	451	589	500	111	791	26	424	173	173	0	299	0
Arrive On Green	0.06	0.34	0.00	0.02	0.32	0.32	0.08	0.40	0.40	0.00	0.24	0.00
Sat Flow, veh/h	1707	1727	1468	1206	2480	81	1293	436	436	0	1267	0
Grp Volume(v), veh/h	64	610	0	12	123	129	257	0	8	0	8	0
Grp Sat Flow(s),veh/h/ln	1707	1727	1468	1206	1255	1306	1293	0	873	0	1267	0
Q Serve(g_s), s	2.0	27.4	0.0	0.5	6.0	6.0	6.1	0.0	0.4	0.0	0.4	0.0
Cycle Q Clear(g_c), s	2.0	27.4	0.0	0.5	6.0	6.0	6.1	0.0	0.4	0.0	0.4	0.0
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.50	0.00		0.00
Lane Grp Cap(c), veh/h	451	589	500	111	400	417	424	0	345	0	299	0
V/C Ratio(X)	0.14	1.04	0.00	0.11	0.31	0.31	0.61	0.00	0.02	0.00	0.03	0.00
Avail Cap(c_a), veh/h	481	589	500	180	449	468	424	0	345	0	299	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	16.5	26.5	0.0	22.0	20.7	20.7	23.7	0.0	14.8	0.0	23.6	0.0
Incr Delay (d2), s/veh	0.2	46.8	0.0	0.5	0.5	0.5	2.7	0.0	0.1	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	20.6	0.0	0.2	2.1	2.2	3.2	0.0	0.1	0.0	0.1	0.0
LnGrp Delay(d),s/veh	16.7	73.3	0.0	22.5	21.2	21.2	26.4	0.0	15.0	0.0	23.8	0.0
LnGrp LOS	B	F		C	C	C	C		B		C	
Approach Vol, veh/h		674			264			265			8	
Approach Delay, s/veh		68.0			21.3			26.0			23.8	
Approach LOS		E			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s		38.0	9.2	33.2	12.8	25.2	11.0	31.4
Change Period (Y+Rc), s		* 6.2	* 7.8	* 5.8	* 6.7	* 6.2	* 6.4	* 5.8
Max Green Setting (Gmax), s		* 32	* 6	* 27	* 6.1	* 19	* 6	* 29
Max Q Clear Time (g_c+I1), s		2.4	2.5	29.4	8.1	2.4	4.0	8.0
Green Ext Time (p_c), s		0.1	0.0	0.0	0.0	0.0	0.0	7.0

Intersection Summary	
HCM 2010 Ctrl Delay	48.3
HCM 2010 LOS	D

Notes

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	109	23	0	0	24	88	328	18	231	0	1	0
Future Volume (veh/h)	109	23	0	0	24	88	328	18	231	0	1	0
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1496	1284	1900	1900	1470	1900	1712	1757	1900	1900	1900	1900
Adj Flow Rate, veh/h	131	48	0	0	32	0	390	28	275	0	4	0
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.83	0.48	0.92	0.92	0.75	0.85	0.84	0.64	0.84	0.92	0.25	0.92
Percent Heavy Veh, %	27	48	48	0	17	17	11	0	0	0	0	0
Cap, veh/h	338	230	0	160	264	0	857	76	742	0	1027	0
Arrive On Green	0.18	0.18	0.00	0.00	0.18	0.00	0.54	0.54	0.54	0.00	0.54	0.00
Sat Flow, veh/h	1102	1284	0	1379	1470	0	1293	140	1374	0	1900	0
Grp Volume(v), veh/h	131	48	0	0	32	0	390	0	303	0	4	0
Grp Sat Flow(s),veh/h/ln	1102	1284	0	1379	1470	0	1293	0	1514	0	1900	0
Q Serve(g_s), s	5.1	1.4	0.0	0.0	0.8	0.0	9.0	0.0	5.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.9	1.4	0.0	0.0	0.8	0.0	9.0	0.0	5.2	0.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.91	0.00		0.00
Lane Grp Cap(c), veh/h	338	230	0	160	264	0	857	0	818	0	1027	0
V/C Ratio(X)	0.39	0.21	0.00	0.00	0.12	0.00	0.45	0.00	0.37	0.00	0.00	0.00
Avail Cap(c_a), veh/h	583	517	0	468	592	0	857	0	818	0	1027	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	18.0	15.7	0.0	0.0	15.5	0.0	6.8	0.0	5.9	0.0	4.8	0.0
Incr Delay (d2), s/veh	0.9	0.5	0.0	0.0	0.2	0.0	1.7	0.0	1.3	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.5	0.0	0.0	0.3	0.0	3.6	0.0	2.4	0.0	0.0	0.0
LnGrp Delay(d),s/veh	18.8	16.3	0.0	0.0	15.7	0.0	8.6	0.0	7.2	0.0	4.8	0.0
LnGrp LOS	B	B			B		A		A		A	
Approach Vol, veh/h		179			32			693			4	
Approach Delay, s/veh		18.1			15.7			8.0			4.8	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.6		14.4		30.6		14.4
Change Period (Y+Rc), s		* 6.3		* 6.3		* 6.3		* 6.3
Max Green Setting (Gmax), s		* 24		* 18		* 24		* 18
Max Q Clear Time (g_c+I1), s		2.0		7.9		11.0		2.8
Green Ext Time (p_c), s		4.3		0.8		3.5		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.5

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	1	2	3	66	101	10
Future Vol, veh/h	1	2	3	66	101	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	50	75	79	77	63
Heavy Vehicles, %	100	100	33	61	91	9
Mvmt Flow	4	4	4	84	131	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	231	139	147	0	-	0
Stage 1	139	-	-	-	-	-
Stage 2	92	-	-	-	-	-
Critical Hdwy	7.4	7.2	4.43	-	-	-
Critical Hdwy Stg 1	6.4	-	-	-	-	-
Critical Hdwy Stg 2	6.4	-	-	-	-	-
Follow-up Hdwy	4.4	4.2	2.497	-	-	-
Pot Cap-1 Maneuver	584	703	1266	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	735	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	582	703	1266	-	-	-
Mov Cap-2 Maneuver	582	-	-	-	-	-
Stage 1	695	-	-	-	-	-
Stage 2	733	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	10.7	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1266	-	637	-	-
HCM Lane V/C Ratio	0.003	-	0.013	-	-
HCM Control Delay (s)	7.9	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	36	34	1	0	22	46	0	4	0	129	3	95
Future Vol, veh/h	36	34	1	0	22	46	0	4	0	129	3	95
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	79	88	92	50	92	83	38	79
Heavy Vehicles, %	58	56	2	0	45	43	0	0	0	10	0	21
Mvmt Flow	23	28	1	0	28	52	0	8	0	155	8	120

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	80	0	0	29	0	0	194	156	29	134	130	54
Stage 1	-	-	-	-	-	-	76	76	-	54	54	-
Stage 2	-	-	-	-	-	-	118	80	-	80	76	-
Critical Hdwy	4.68	-	-	4.1	-	-	7.1	6.5	6.2	7.2	6.5	6.41
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.2	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.2	5.5	-
Follow-up Hdwy	2.722	-	-	2.2	-	-	3.5	4	3.3	3.59	4	3.489
Pot Cap-1 Maneuver	1228	-	-	1597	-	-	770	740	1052	819	764	962
Stage 1	-	-	-	-	-	-	938	836	-	939	854	-
Stage 2	-	-	-	-	-	-	891	832	-	909	836	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1228	-	-	1597	-	-	659	726	1052	800	749	962
Mov Cap-2 Maneuver	-	-	-	-	-	-	659	726	-	800	749	-
Stage 1	-	-	-	-	-	-	920	820	-	921	854	-
Stage 2	-	-	-	-	-	-	772	832	-	883	820	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.6	0	10	11.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	726	1228	-	-	1597	-	-	860
HCM Lane V/C Ratio	0.011	0.019	-	-	-	-	-	0.33
HCM Control Delay (s)	10	8	0	-	0	-	-	11.2
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0	0.1	-	-	0	-	-	1.4

HCM Signalized Intersection Capacity Analysis
1: Highway 91 SB Ramps & Cliveden Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	499	0	0	126	0	464	35	307	0	0	0
Future Volume (vph)	0	499	0	0	126	0	464	35	307	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.8	6.8				
Lane Util. Factor		0.95			0.95		1.00	1.00				
Frt		1.00			1.00		1.00	0.87				
Flt Protected		1.00			1.00		0.95	1.00				
Satd. Flow (prot)		3406			2777		1583	1324				
Flt Permitted		1.00			1.00		0.95	1.00				
Satd. Flow (perm)		3406			2777		1583	1324				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.88	0.93	0.86	0.55	0.86	0.92	0.92	0.92
Adj. Flow (vph)	0	542	0	0	143	0	540	64	357	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	146	0	0	0	0
Lane Group Flow (vph)	0	542	0	0	143	0	540	275	0	0	0	0
Heavy Vehicles (%)	0%	6%	0%	0%	30%	0%	14%	77%	16%	2%	2%	2%
Turn Type		NA			NA		Perm	NA				
Protected Phases		2			2			3				
Permitted Phases							3					
Actuated Green, G (s)		18.4			18.4		29.4	29.4				
Effective Green, g (s)		18.4			18.4		29.4	29.4				
Actuated g/C Ratio		0.30			0.30		0.49	0.49				
Clearance Time (s)		6.0			6.0		6.8	6.8				
Vehicle Extension (s)		4.0			4.0		5.0	5.0				
Lane Grp Cap (vph)		1034			843		767	642				
v/s Ratio Prot		c0.16			0.05			0.21				
v/s Ratio Perm							c0.34					
v/c Ratio		0.52			0.17		0.70	0.43				
Uniform Delay, d1		17.5			15.5		12.2	10.1				
Progression Factor		1.00			1.00		1.00	1.00				
Incremental Delay, d2		0.6			0.1		3.7	1.0				
Delay (s)		18.1			15.6		15.9	11.1				
Level of Service		B			B		B	B				
Approach Delay (s)		18.1			15.6			13.8			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	12.8
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	471	0	0	943	0	0	0	0	123	7	228
Future Volume (vph)	0	471	0	0	943	0	0	0	0	123	7	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8					6.2	6.2	
Lane Util. Factor		0.95			0.95					0.97	1.00	
Frt		1.00			1.00					1.00	0.86	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		2888			3167					2613	1063	
Flt Permitted		1.00			1.00					0.95	1.00	
Satd. Flow (perm)		2888			3167					2613	1063	
Peak-hour factor, PHF	0.92	0.80	0.92	0.92	0.84	0.92	0.92	0.92	0.92	0.73	0.58	0.89
Adj. Flow (vph)	0	589	0	0	1123	0	0	0	0	168	12	256
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	106	0
Lane Group Flow (vph)	0	589	0	0	1123	0	0	0	0	168	162	0
Heavy Vehicles (%)	0%	25%	0%	0%	14%	0%	2%	2%	2%	34%	100%	51%
Turn Type		NA			NA					Perm	NA	
Protected Phases		2			2						4	
Permitted Phases										4		
Actuated Green, G (s)		23.8			23.8					12.8	12.8	
Effective Green, g (s)		23.8			23.8					12.8	12.8	
Actuated g/C Ratio		0.49			0.49					0.26	0.26	
Clearance Time (s)		5.8			5.8					6.2	6.2	
Vehicle Extension (s)		3.0			3.0					3.0	3.0	
Lane Grp Cap (vph)		1414			1550					688	279	
v/s Ratio Prot		0.20			c0.35						c0.15	
v/s Ratio Perm										0.06		
v/c Ratio		0.42			0.72					0.24	0.58	
Uniform Delay, d1		7.9			9.8					14.1	15.6	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.2			1.7					0.2	3.1	
Delay (s)		8.1			11.5					14.3	18.6	
Level of Service		A			B					B	B	
Approach Delay (s)		8.1			11.5			0.0			16.9	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	13.2

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Vol, veh/h	5	376	419	8	62	109
Future Vol, veh/h	5	376	419	8	62	109
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Yield	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	63	85	81	50	74	86
Heavy Vehicles, %	2	2	12	88	32	19
Mvmt Flow	8	442	517	16	84	127

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	811	517	0	0	517	0
Stage 1	517	-	-	-	-	-
Stage 2	294	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.42	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.488	-
Pot Cap-1 Maneuver	349	558	-	-	912	-
Stage 1	598	-	-	-	-	-
Stage 2	756	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	314	558	-	-	912	-
Mov Cap-2 Maneuver	314	-	-	-	-	-
Stage 1	598	-	-	-	-	-
Stage 2	681	-	-	-	-	-

Approach	NW	NE	SW
HCM Control Delay, s	33.2	0	3.7
HCM LOS	D		

Minor Lane/Major Mvmt	NET	NER	NWLn1	SWL	SWT
Capacity (veh/h)	-	-	557	912	-
HCM Lane V/C Ratio	-	-	0.808	0.092	-
HCM Control Delay (s)	-	-	33.2	9.3	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	7.9	0.3	-

Intersection	
Int Delay, s/veh	1.9

Movement	SEL	SET	NWT	NWR	SWL	SWR
Lane Configurations						
Traffic Vol, veh/h	17	109	280	5	2	51
Future Vol, veh/h	17	109	280	5	2	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	61	74	79	63	50	71
Heavy Vehicles, %	65	42	22	0	100	39
Mvmt Flow	28	147	354	8	4	72

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	362	0	-	0	561	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	203	-
Critical Hdwy	4.75	-	-	-	7.4	6.59
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	2.785	-	-	-	4.4	3.651
Pot Cap-1 Maneuver	919	-	-	-	357	611
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	644	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	919	-	-	-	345	611
Mov Cap-2 Maneuver	-	-	-	-	345	-
Stage 1	-	-	-	-	535	-
Stage 2	-	-	-	-	623	-

Approach	SE	NW	SW
HCM Control Delay, s	1.4	0	12
HCM LOS			B

Minor Lane/Major Mvmt	NWT	NWR	SEL	SET	SWLn1
Capacity (veh/h)	-	-	919	-	587
HCM Lane V/C Ratio	-	-	0.03	-	0.129
HCM Control Delay (s)	-	-	9	0	12
HCM Lane LOS	-	-	A	A	B
HCM 95th %tile Q(veh)	-	-	0.1	-	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	156	263	280	7	575	10	551	7	4	1	3	171
Future Volume (veh/h)	156	263	280	7	575	10	551	7	4	1	3	171
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1681	1473	1284	1473	1672	1900	1667	1250	1900	1900	1756	1900
Adj Flow Rate, veh/h	205	306	0	12	846	32	605	8	8	4	8	0
Adj No. of Lanes	1	1	1	1	2	0	1	1	0	0	1	0
Peak Hour Factor	0.76	0.86	0.89	0.58	0.68	0.31	0.91	0.88	0.50	0.25	0.38	0.87
Percent Heavy Veh, %	13	29	48	29	13	13	14	29	29	67	67	67
Cap, veh/h	264	521	386	269	896	34	549	220	220	158	281	0
Arrive On Green	0.10	0.35	0.00	0.02	0.29	0.29	0.08	0.38	0.38	0.24	0.24	0.00
Sat Flow, veh/h	1601	1473	1091	1403	3122	118	1587	574	574	418	1197	0
Grp Volume(v), veh/h	205	306	0	12	430	448	605	0	16	12	0	0
Grp Sat Flow(s),veh/h/ln	1601	1473	1091	1403	1589	1651	1587	0	1149	1614	0	0
Q Serve(g_s), s	7.1	13.7	0.0	0.5	21.4	21.4	6.3	0.0	0.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.1	13.7	0.0	0.5	21.4	21.4	6.3	0.0	0.7	0.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.50	0.33		0.00
Lane Grp Cap(c), veh/h	264	521	386	269	456	474	549	0	441	439	0	0
V/C Ratio(X)	0.78	0.59	0.00	0.04	0.94	0.94	1.10	0.00	0.04	0.03	0.00	0.00
Avail Cap(c_a), veh/h	264	521	386	349	456	474	549	0	441	439	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	20.2	21.3	0.0	20.1	28.2	28.2	28.4	0.0	15.6	23.8	0.0	0.0
Incr Delay (d2), s/veh	15.5	2.7	0.0	0.1	29.0	28.3	69.5	0.0	0.2	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	5.9	0.0	0.2	13.0	13.4	20.1	0.0	0.2	0.2	0.0	0.0
LnGrp Delay(d),s/veh	35.7	24.0	0.0	20.3	57.1	56.4	97.8	0.0	15.7	23.9	0.0	0.0
LnGrp LOS	D	C		C	E	E	F		B	C		
Approach Vol, veh/h		511			890			621			12	
Approach Delay, s/veh		28.7			56.3			95.7			23.9	
Approach LOS		C			E			F			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s		37.2	9.2	34.4	12.0	25.2	14.6	29.0
Change Period (Y+Rc), s		* 6.2	* 7.8	* 5.8	* 5.7	* 6.2	* 6.4	* 5.8
Max Green Setting (Gmax), s		* 31	* 6	* 24	* 6.3	* 19	* 8.2	* 23
Max Q Clear Time (g_c+I1), s		2.7	2.5	15.7	8.3	2.4	9.1	23.4
Green Ext Time (p_c), s		0.2	0.0	6.3	0.0	0.1	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	61.2
HCM 2010 LOS	E

Notes

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	159	61	0	0	46	318	131	0	107	0	23	0
Future Volume (veh/h)	159	61	0	0	46	318	131	0	107	0	23	0
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1667	1450	1900	1900	1691	1900	1367	1439	1900	1900	1900	1900
Adj Flow Rate, veh/h	212	76	0	0	38	0	139	0	120	0	64	0
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.75	0.80	0.92	0.92	0.92	0.92	0.94	0.92	0.89	0.92	0.36	0.92
Percent Heavy Veh, %	14	31	31	0	30	30	39	0	0	0	0	0
Cap, veh/h	453	365	0	167	426	0	594	0	558	0	867	0
Arrive On Green	0.25	0.25	0.00	0.00	0.25	0.00	0.46	0.00	0.46	0.00	0.46	0.00
Sat Flow, veh/h	1221	1450	0	1344	1691	0	978	0	1223	0	1900	0
Grp Volume(v), veh/h	212	76	0	0	38	0	139	0	120	0	64	0
Grp Sat Flow(s),veh/h/ln	1221	1450	0	1344	1691	0	978	0	1223	0	1900	0
Q Serve(g_s), s	6.9	1.8	0.0	0.0	0.7	0.0	4.0	0.0	2.6	0.0	0.8	0.0
Cycle Q Clear(g_c), s	7.7	1.8	0.0	0.0	0.7	0.0	4.8	0.0	2.6	0.0	0.8	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		1.00	0.00		0.00
Lane Grp Cap(c), veh/h	453	365	0	167	426	0	594	0	558	0	867	0
V/C Ratio(X)	0.47	0.21	0.00	0.00	0.09	0.00	0.23	0.00	0.21	0.00	0.07	0.00
Avail Cap(c_a), veh/h	788	763	0	535	889	0	594	0	558	0	867	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh	15.3	12.8	0.0	0.0	12.4	0.0	8.0	0.0	7.1	0.0	6.6	0.0
Incr Delay (d2), s/veh	0.9	0.3	0.0	0.0	0.1	0.0	0.9	0.0	0.9	0.0	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.8	0.0	0.0	0.4	0.0	1.2	0.0	1.0	0.0	0.5	0.0
LnGrp Delay(d),s/veh	16.2	13.1	0.0	0.0	12.5	0.0	8.9	0.0	8.0	0.0	6.8	0.0
LnGrp LOS	B	B			B		A		A		A	
Approach Vol, veh/h		288			38			259			64	
Approach Delay, s/veh		15.4			12.5			8.5			6.8	
Approach LOS		B			B			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		26.0		17.2		26.0		17.2
Change Period (Y+Rc), s		* 6.3		* 6.3		* 6.3		* 6.3
Max Green Setting (Gmax), s		* 20		* 23		* 20		* 23
Max Q Clear Time (g_c+I1), s		2.8		9.7		6.8		2.7
Green Ext Time (p_c), s		2.0		1.4		1.7		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B

Notes

Intersection	
Int Delay, s/veh	0.9

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	3	8	4	111	99	5
Future Vol, veh/h	3	8	4	111	99	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	50	50	87	85	42
Heavy Vehicles, %	67	38	75	32	49	40
Mvmt Flow	4	16	8	128	116	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	266	122	128	0	-	0
Stage 1	122	-	-	-	-	-
Stage 2	144	-	-	-	-	-
Critical Hdwy	7.07	6.58	4.85	-	-	-
Critical Hdwy Stg 1	6.07	-	-	-	-	-
Critical Hdwy Stg 2	6.07	-	-	-	-	-
Follow-up Hdwy	4.103	3.642	2.875	-	-	-
Pot Cap-1 Maneuver	603	841	1109	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	746	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	598	841	1109	-	-	-
Mov Cap-2 Maneuver	598	-	-	-	-	-
Stage 1	765	-	-	-	-	-
Stage 2	740	-	-	-	-	-

Approach	SE	NE	SW
HCM Control Delay, s	9.7	0.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NEL	NET	SELn1	SWT	SWR
Capacity (veh/h)	1109	-	778	-	-
HCM Lane V/C Ratio	0.007	-	0.026	-	-
HCM Control Delay (s)	8.3	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0.1	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	40	0	1	51	181	0	2	0	29	3	23
Future Vol, veh/h	70	40	0	1	51	181	0	2	0	29	3	23
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	77	92	25	80	89	92	25	92	73	25	72
Heavy Vehicles, %	9	50	0	0	45	12	0	0	0	41	33	26
Mvmt Flow	92	52	0	4	64	203	0	8	0	40	12	32

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	267	0	0	52	0	0	431	511	52	413	409	165
Stage 1	-	-	-	-	-	-	236	236	-	173	173	-
Stage 2	-	-	-	-	-	-	195	275	-	240	236	-
Critical Hdwy	4.19	-	-	4.1	-	-	7.1	6.5	6.2	7.51	6.83	6.46
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.51	5.83	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.51	5.83	-
Follow-up Hdwy	2.281	-	-	2.2	-	-	3.5	4	3.3	3.869	4.297	3.534
Pot Cap-1 Maneuver	1257	-	-	1567	-	-	538	469	1021	487	487	821
Stage 1	-	-	-	-	-	-	772	713	-	746	701	-
Stage 2	-	-	-	-	-	-	811	686	-	684	656	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1257	-	-	1567	-	-	477	433	1021	452	449	821
Mov Cap-2 Maneuver	-	-	-	-	-	-	477	433	-	452	449	-
Stage 1	-	-	-	-	-	-	714	660	-	690	699	-
Stage 2	-	-	-	-	-	-	764	684	-	625	607	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.2	0.1	13.5	12.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	433	1257	-	-	1567	-	-	545
HCM Lane V/C Ratio	0.018	0.073	-	-	0.003	-	-	0.154
HCM Control Delay (s)	13.5	8.1	0	-	7.3	-	-	12.8
HCM Lane LOS	B	A	A	-	A	-	-	B
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0	-	-	0.5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