

752 Marine Drive, West Vancouver
**Transportation Impact
Assessment**

Draft Report

Prepared for
Larco Investments Ltd.

Date
January 31, 2018

Project No.
04-17-0159

January 31, 2018
04-17-0159

Wendy LeBreton
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Dear Wendy:

**Re: 752 Marine Drive – Residential Mixed Use Development
Transportation Impact Assessment – Draft Report**

Please find attached our Draft Report of Bunt & Associates' Transportation Impact Assessment, as requested, for circulation to the District of West Vancouver and the Ministry of Transportation and Infrastructure. The purpose of this study was to assess the potential off-site impacts of the proposed mixed use residential and commercial redevelopment of the 752 Marine Drive site in West Vancouver. We have also included a parking supply rationale and a supporting Transportation Demand Management strategy for the site.

We trust that this study assists you in advancing the 752 Marine Drive project. Please contact us should you have any questions.

Yours truly,
Bunt & Associates

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CORPORATE AUTHORIZATION

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TABLE OF CONTENTS

- 1. INTRODUCTION 1
 - 1.1 Development Proposal 1
 - 1.2 Key Issues 1
 - 1.3 Study Scope & Area..... 2
- 2. EXISTING CONDITIONS 5
 - 2.1 Land Use..... 5
 - 2.2 Existing Transportation Network 5
 - 2.2.1 Road Network 5
 - 2.2.2 Transit Network..... 5
 - 2.2.3 Cycling & Pedestrian Networks 5
 - 2.3 Current Relevant Polices & Plans 6
 - 2.4 Data Collection 6
 - 2.4.1 Traffic Data Collection Program 6
 - 2.4.2 Peak Hour Vehicle Volumes 7
 - 2.4.3 Existing Site Vehicle Trip Generation 7
 - 2.4.4 Existing Shopping Centre Parking Supply and Demand..... 7
 - 2.5 Existing Operations 11
 - 2.5.1 Performance Thresholds 11
 - 2.5.2 Analysis Assumptions 12
 - 2.5.3 Existing Operational Analysis Results 12
- 3. SUSTAINABLE DEVELOPMENT – TRANSPORTATION 16
- 4. FUTURE TRAFFIC CONDITIONS 17
 - 4.1 Traffic Forecasts 17
 - 4.1.1 Background Traffic Forecasts 17
 - 4.1.2 Site Traffic 17
 - 4.1.3 Total Traffic 20
 - 4.2 Future Traffic Operations 26
 - 4.2.1 Future Background Traffic Operations 26
 - 4.2.1 Future Total Traffic Operations 31
 - 4.2.1 Taylor Way & Park Royal South Road Intersection 36
 - 4.2.2 Summary of Traffic Impacts & Recommended Mitigations 38
- 5. SITE PLAN DESIGN REVIEW 40
 - 5.1 Site Access Design 40

- 5.2 Cycling Facilities 40
- 5.3 Vehicle Parking Supply 40
 - 5.3.1 Existing Parking Supply 40
 - 5.3.2 Development Parking Strategy 41
 - 5.3.3 Resident Parking 41
 - 5.3.4 Shared Commercial, Childcare and Residential Visitor Parking..... 41
- 5.4 Service Vehicle Operations 42
- 6. TRANSPORTATION DEMAND MANAGEMENT 50
 - 6.1 Definition 50
 - 6.2 TDM Strategy 50
- 7. SUMMARY & RECOMMENDATIONS 52
 - 7.1 Summary 52
 - 7.2 Recommendations 52

APPENDIX A Synchro Reports

EXHIBITS

Exhibit 1.1: Site Location.....	3
Exhibit 1.2: Site Plan.....	4
Exhibit 2.1: Existing Laning & Traffic Control.....	8
Exhibit 2.2: Existing Peak Hour Vehicle Volumes.....	9
Exhibit 2.3: Parking Study Area.....	10
Exhibit 4.1: Opening Day (2020) Background Traffic Forecasts.....	21
Exhibit 4.2: Opening Day + 10 (2030) Background Traffic Forecasts.....	22
Exhibit 4.3: Site Traffic Forecasts.....	23
Exhibit 4.4: Opening Day (2020) Total Traffic Forecasts.....	24
Exhibit 4.5: Opening Day + 10 (2030) Total Traffic Forecasts.....	25
Exhibit 4.6: Park Royal South Road Turn Restriction Traffic Impacts.....	37
Exhibit 5.1: Parkade Access - Loading Vehicle Swept-Path.....	43
Exhibit 5.2: Loading Space #1 Swept-Path.....	44
Exhibit 5.3: Loading Space #2 Swept-Path.....	45
Exhibit 5.4: Parkade Access - Garbage Truck Swept-Path.....	46
Exhibit 5.5: West Tower Garbage Compactor Swept-Path.....	47
Exhibit 5.6: Commercial Garbage Compactor Swept-Path.....	48
Exhibit 5.7: East Tower Garbage Compactor Swept-Path.....	49

TABLES

Table 2.1: Existing Peak Hour Roadway Link Volumes.....	7
Table 2.2: Intersection Level of Service Thresholds.....	11
Table 2.3: Existing Traffic Operations.....	14
Table 4.1: Peak Hour Vehicle Trip Rates.....	18
Table 4.2: Gross Peak Hour Site Vehicle Trips.....	18
Table 4.3: Net New Site Vehicle Trips.....	18
Table 4.4: Estimated Trip Distribution - Net New Trips.....	19
Table 4.5: Estimated Trip Distribution - Pass-by Trips.....	19
Table 4.6: Net Change in Future Intersection Vehicle Volumes with New Site Trips (2030).....	20
Table 4.7: Opening Day (2020) Background Vehicle Operations.....	27
Table 4.8: Opening Day + 10 (2030) Background Vehicle Operations.....	29
Table 4.9: Opening Day (2020) Total Vehicle Operations.....	32
Table 4.10: Opening Day + 10 (2030) Total Vehicle Operations.....	34
Table 4.11: Opening Day + 10 (2030) Total Vehicle Operations.....	38
Table 5.1: Commercial Parking Demand Analysis - Saturday.....	42

1. INTRODUCTION

1.1 Development Proposal

The 752 Marine Drive project is located at the SW corner of the intersection of Marine Drive and Taylor Way in West Vancouver (**Exhibit 1.1**), which formerly was occupied by a White Spot restaurant up until 2014. The proposed development will replace the existing surface parking lot and a TD Bank on the site with two high-rise residential buildings as well as a two storey commercial building. A total of 201 residential dwelling units are planned, plus approximately 30,000 square feet of commercial retail space and 3,000 square feet for childcare. The site plan is shown in **Exhibit 1.2**.

The heart of the new development at the ground plane will be the Village Common plaza area which is planned as with both green space and programming area to accommodate a range of outdoor activities such as cultural performances, community fairs and markets, and neighbourhood socializing at outdoor cafes.

Underground parking will provide 285 bicycle stalls and 254 vehicle stalls beneath the new development. Driveway access to the underground parking will connect to the Park Royal internal road network.

1.2 Key Issues

Planning and design considerations for the 752 Marine Drive project has been informed by input received at a series of public consultation events including a Park Royal hosted Presentation Centre in the shopping centre that recorded nearly 19,000 visits over a five week period (June-July 2011), and two Open House events (May 29th 2012 and July 18th 2012).

The community feedback has generally been favourable, though transportation concerns (traffic congestion in the vicinity of the Marine/Taylor intersection) is a key issue for the community with more information required for the following items:

- How much vehicle traffic is the proposed development likely to generate and how does this compare to the former White Spot restaurant that operated from this site up until 2014;
- How will the traffic access arrangement for the proposed development affect traffic operations on the adjacent street system, in particular at the intersection of Marine Drive and Taylor Way, the section of Taylor Way south of Marine Drive extending south to the existing 4-way stop controlled intersection connecting to the Low Level bridge crossing of the Capilano River, and the new traffic signal controlled intersection on Marine Drive recently brought into operation to replace the Park Royal western vehicle overpass.

- What sustainable transportation or Transportation Demand Management (TDM) measures are being provided with the proposed development to reduce vehicle traffic and better manage existing traffic operations in the area?

1.3 Study Scope & Area

To assist with the technical review of the 752 Marine Drive development proposal, the District of West Vancouver has required that a Transportation Impact Assessment (TIA) for the project be provided. Bunt & Associates Engineering Ltd. has been retained by the Owner and Applicant, Park Royal Shopping Centre Holdings Inc., to prepare a TIA report for the project.

Bunt's TIA of the 752 Marine Drive development is structured on a conventional analysis methodology for traffic studies of this type, and evaluates future traffic conditions assuming both with and without the proposed development. It is noted that Bunt completed a comprehensive TIA for the previous development proposal for the 752 Marine Drive site back in 2013, that being a substantially larger project with 289 residential units planned together with 20,000 square feet of commercial and community serving uses.

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-  Arterial
-  Collector
-  Local
-  Two Way Stop
-  All Way Stop
-  Roundabout
-  Traffic Signal

Exhibit 1.1
Site Location

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752 Marine Drive
January 2018



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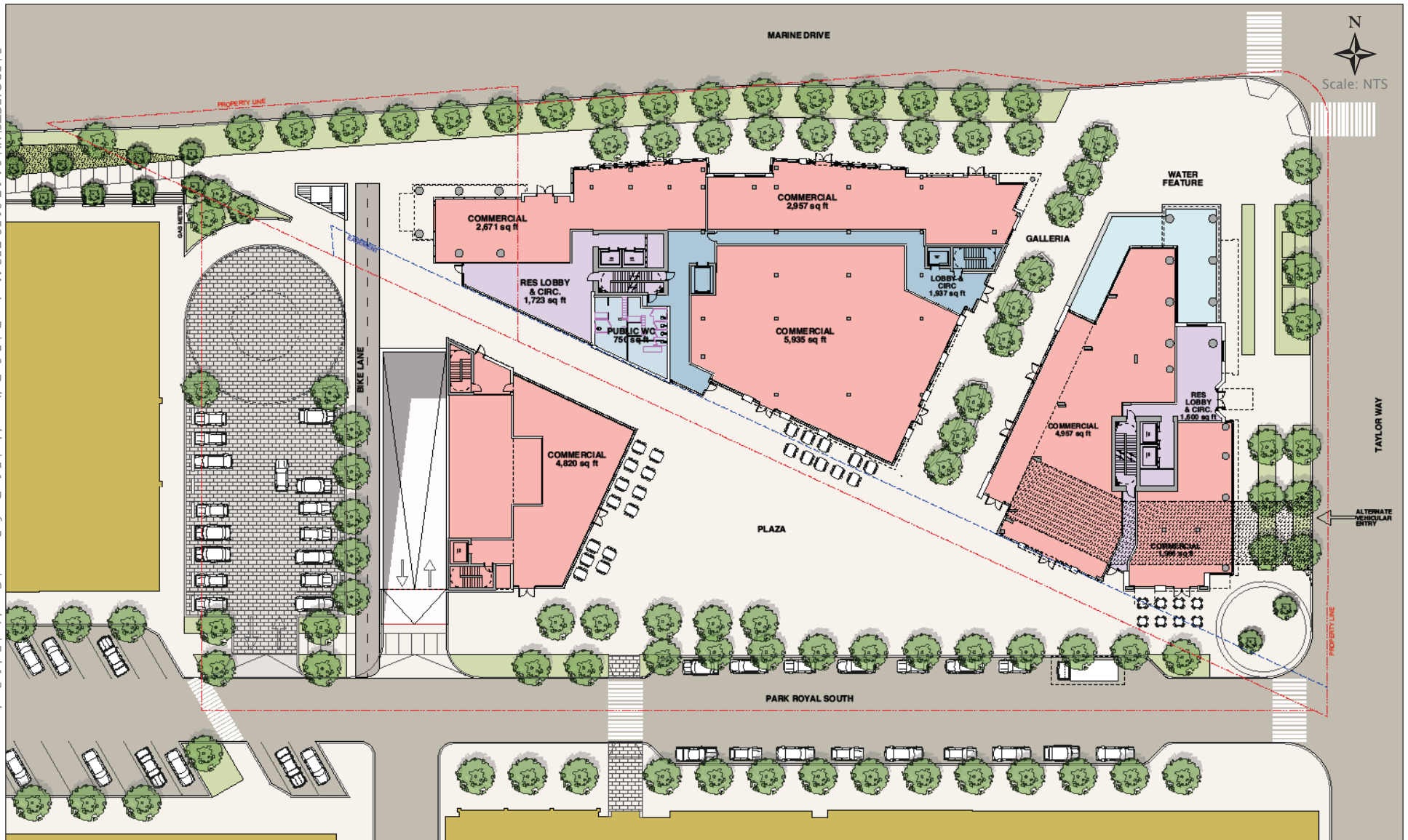


Exhibit 1.2 Site Plan

752 Marine Drive
January 2018

04-17-0159



2. EXISTING CONDITIONS

2.1 Land Use

The proposed development is located at the southwest corner of the intersection of Marine Drive and Taylor Way on the Park Royal South shopping centre site. This area, once dominated by the Park Royal shopping centre now is becoming increasingly mixed use with medium to high density residential buildings both to the east of Taylor Way and to the north of the Park Royal North shopping centre.

The development will consist of three buildings: the east and west block are located in land which is currently zoned C-1 and the south block is located on Squamish First Nation (SFN) land and is thus not zoned. The division between the currently C-1 zoned land and SFN land is shown as a diagonal line through the property in Exhibit 1.2.

2.2 Existing Transportation Network

2.2.1 Road Network

A summary of the existing road network, traffic laning, and intersection traffic control for the traffic study area is shown in **Exhibit 2.1**.

Marine Drive and Taylor Way (north of Marine Drive) operate as major arterial traffic routes in the District of West Vancouver. Taylor Way south of Marine Drive is also a key traffic route and provides local traffic access to Park Royal shopping centre, the 100 Park Royal office building, a self storage facility, and the West Royal residential development located opposite the proposed 752 Marine Drive project. Taylor Way south of Marine Drive and the roadway extending along the south side of the shopping centre also serve as routes for area traffic connecting to the War Dance bridge crossing of Capilano River, providing an important alternate route to Marine Drive for connection to the District of North Vancouver.

2.2.2 Transit Network

The development site is located on Marine Drive which is part of TransLink's frequent transit network. Within 200 metres of the site there are eastbound and westbound bus stops for 11 bus routes which provide direct connections through West Vancouver, North Vancouver and Vancouver. Marine Drive has an eastbound bus lane in front of Park Royal, from Pound Road to Taylor Way.

2.2.3 Cycling & Pedestrian Networks

Marine Drive is designated by the District of Vancouver as a cycling route. The route offers minimal dedicated space for people cycling but does have a westbound bike lane in front of Park Royal Towers and people are allowed to cycle in the eastbound bus lane. Keith Road is also a designated cycling route with cyclists required to share the roadway with motorists.

The Sprit Trail offers a designated walking and cycling path across a large portion of the North Shore's waterfront. There is also the Capilano Pacific Trail which is located on the western side of the Capilano River (200 metres from the site) and connects to the Spirit Trail.

Marine Drive and Taylor Way have sidewalks on both sides within the study area. Park Royal South Road is currently missing a sidewalk along the development site's south edge however one will be constructed as part of the 752 Marine Drive development. Marine Drive has signalized pedestrian crossings at regular intervals. At denser, neighbourhood nodes, crossings are as frequent as every 200 metres however they are further apart where there is no commercial activity. Recent developments at Park Royal have created a high street environment on Park Royal South Road, which will be further enhanced by the proposed development.

2.3 Current Relevant Policies & Plans

The West Vancouver Marine Drive Local Area Plan and Design Guidelines provide policy and direction for the Marine Drive corridor around Lions Gate Bridge and Park Royal. Three of the plan's objectives relating to transportation include:

- **Connect the dots.** Additional pedestrian paths would encourage pedestrian movement between centres. In addition, Marine Drive is an undesirable environment for pedestrians and cyclists and should be improved to encourage alternatives to vehicle travel.
- **Housing.** Increase density to provide for affordable or rental housing is appropriate within the study area where walking, cycling or taking transit can lower transportation costs for residents. Supportive housing is also appropriate, as the area is generally flat and highly accessible for mobility devices.
- **Minimize trip generation.** Commercial uses (office or retail) generate more traffic than residential uses, as visiting customers / clients outnumber resident trips over the course of a typical day. As well, residents in this location can meet their daily needs (employment, shops, services) on foot or by bus, taking pressure off the road system. Land use planning should therefore generally prioritize residential uses and seek to minimize required residential vehicle parking.

In addition to the plan's overall objectives, the plan is also supportive of transit supportive development and transportation demand management. Example strategies noted in the plan include: reducing resident parking, promoting car share initiatives around the Park Royal hub, providing pedestrian and cycle infrastructure and improving public realm connections to transit facilities.

2.4 Data Collection

2.4.1 Traffic Data Collection Program

Bunt collected traffic data at the nine study intersections. The weekday PM counts occurred on Thursday, October 19, 2017 and Thursday, October 26, 2017 from 3pm to 6pm. The Saturday counts occurred on November 21, 2017 and November 28, 2017 from 1pm to 4pm. The overall weekday PM peak hour was 3pm to 4pm and the overall Saturday peak hour was 1pm to 2pm.

2.4.2 Peak Hour Vehicle Volumes

Exhibit 2.2 provides a summary of the existing 2017 vehicle volumes at key intersections within the traffic study area. The traffic volumes reported are for the weekday PM and Saturday PM peak traffic periods. The vehicle volumes were obtained from the traffic data collected by Bunt, with some minor balancing of volumes between intersections. Although vehicles are not allowed to turn left from Clyde Avenue to Taylor Way, a number of vehicles were recorded completing this illegal movement. **Table 2.1** presents a summary of the two-way peak-hour vehicle movements for the streets in the study area. Marine Drive has similar vehicle volumes during the weekday PM and Saturday peak hours however the vehicle volumes increase on Taylor Way on Saturdays.

Table 2.1: Existing Peak Hour Roadway Link Volumes

ROAD LINK	PEAK LINK VOLUMES (VEH/HR)	
	WEEKDAY PM	SATURDAY
Marine Drive (East of Taylor Way)	3,500	3,400
Marine Drive (West of Taylor Way)	2,100	2,100
Taylor Way (North of Marine Drive)	1,800	2,100
Taylor Way (South of Marine Drive)	1,100	1,400

2.4.3 Existing Site Vehicle Trip Generation

The development site is currently occupied by a recently opened 2,400 square foot TD Bank pad building. Based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, a standalone bank of this size in a suburban setting generates 30 to 60 vehicle trips during the weekday PM peak hour (no data available for Saturdays).

The former White Sport restaurant that was recently removed from the site used to generate approximately 84 vehicle trips during the weekday PM peak hour period, with 44 inbound and 40 outbound vehicles. This traffic volume measure is based on observations by Bunt on Monday, March 5, 2012 from 3pm to 5pm. A comparable volume was observed by Bunt during a second survey of the White Spot site on Wednesday, October 3, 2012.

2.4.4 Existing Shopping Centre Parking Supply and Demand

The vehicle parking supply and demand was assessed at, and surrounding the development site on Saturday, October 28, 2017. The parking study area is shown in **Exhibit 2.3** and includes the five level parkade to the south of the site, multiple surface parking areas and on-street parking. The parking study area included 1,262 of approximately 5,300 parking stalls at Park Royal. From 1pm to 4pm the parking occupancy ranged from 65% to 68% of the 1,262 stalls contained in the survey area.

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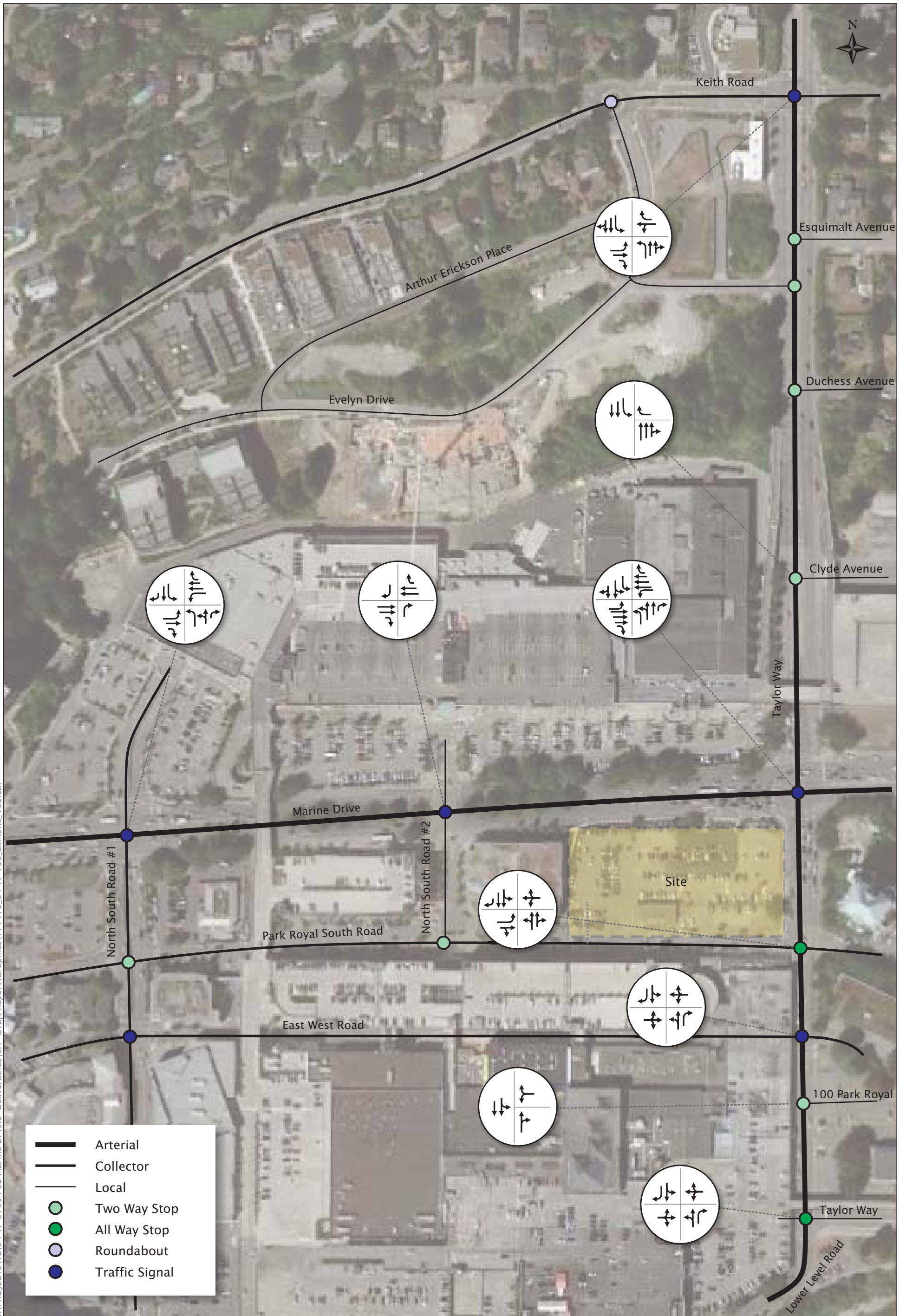
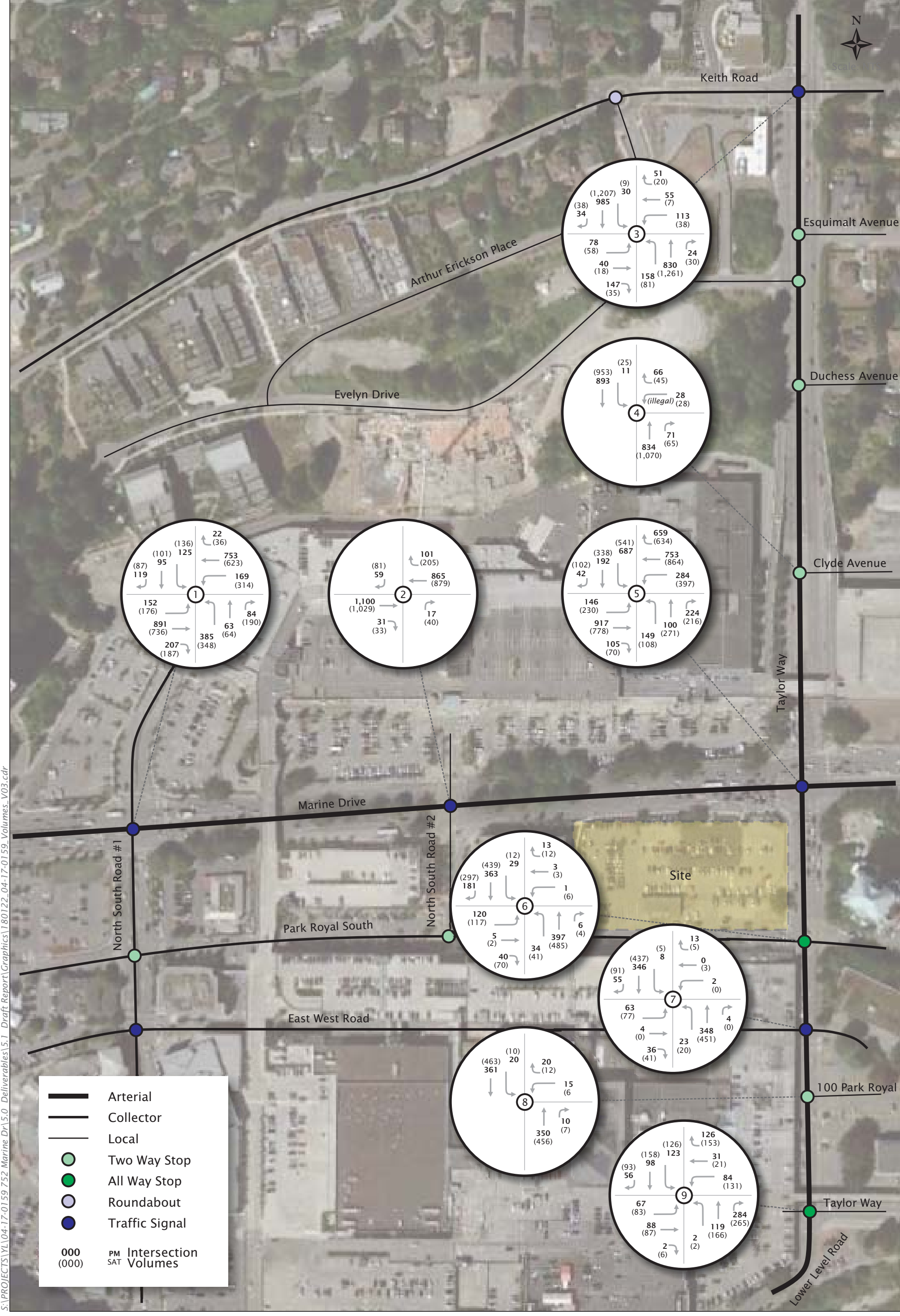


Exhibit 2.1
Existing Laning & Traffic Control

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752 Marine Drive
January 2018





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Exhibit 2.2 Existing Peak Hour Vehicle Volumes

04-17-0159 752 Marine Drive
January 2018



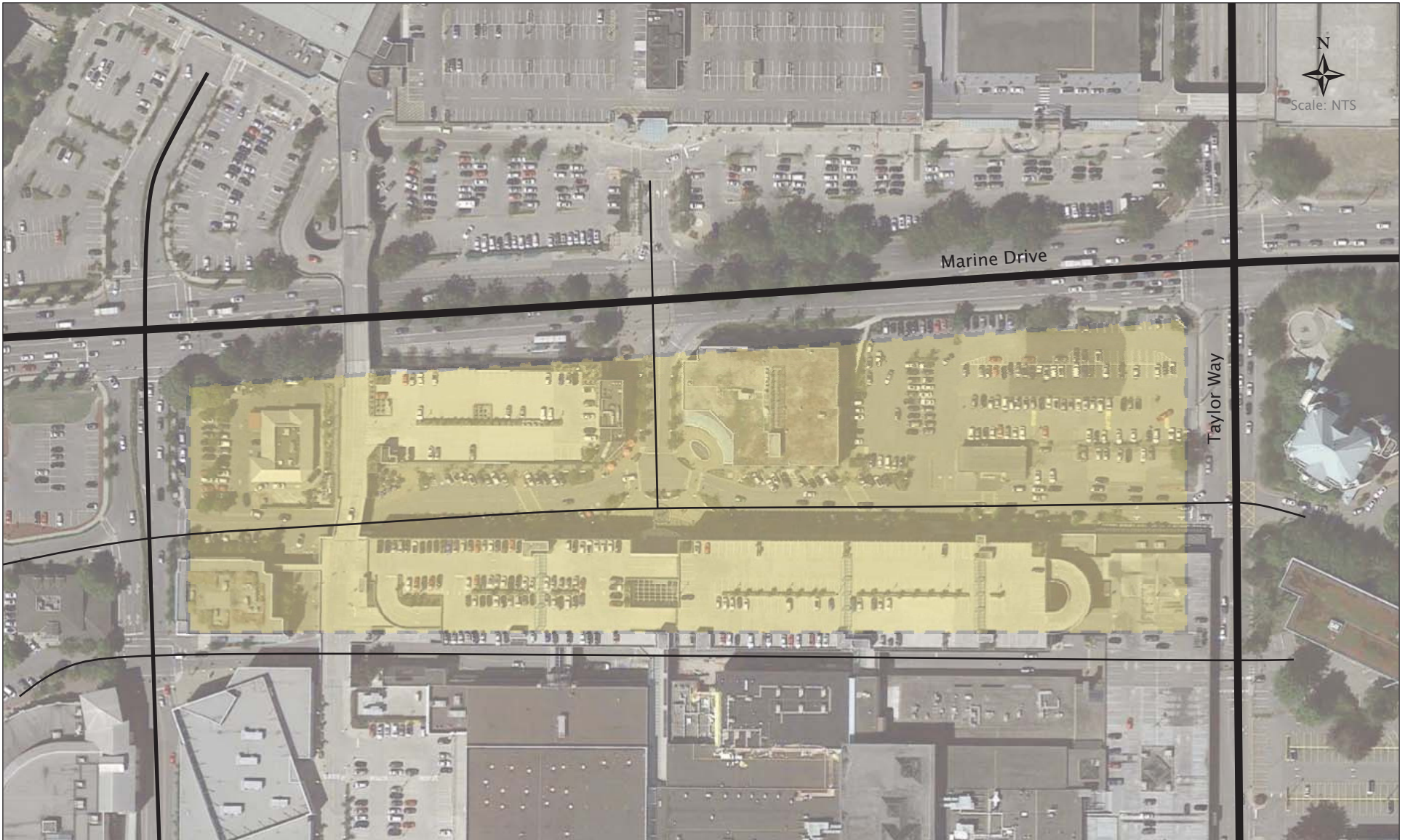


Exhibit 2.3 Parking Study Area

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752 Marine Drive
January 2018

2.5 Existing Operations

2.5.1 Performance Thresholds

The existing operations of study area intersections and access points were assessed using the methods outlined in the 2000 Highway Capacity Manual (HCM), using the Synchro 9 analysis software. The traffic operations were assessed using the performance measures of Level of Service (LOS) and volume-to-capacity (V/C) ratio.

The LOS rating is based on average vehicle delay and ranges from “A” to “F” based on the quality of operation at the intersection. LOS “A” represents optimal, minimal delay conditions while a LOS “F” represents an over-capacity condition with considerable congestion and/or delay. Delay is calculated in seconds and is based on the average intersection delay per vehicle.

Table 2.2 below summarizes the LOS thresholds for the five Levels of Service, for both signalized and unsignalized intersections.

Table 2.2: Intersection Level of Service Thresholds

LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: Highway Capacity Manual

The volume to capacity (V/C) ratio of an intersection represents ratio between the demand volume and the available capacity. A V/C ratio less than 0.85 indicates that there is sufficient capacity to accommodate demands and generally represents reasonable traffic conditions in suburban settings. A V/C value between 0.85 and 0.95 indicates an intersection is approaching practical capacity; a V/C ratio over 0.95 indicates that traffic demands are close to exceeding the available capacity, resulting in saturated conditions. A V/C ratio over 1.0 indicates a very congested intersection where drivers may have to wait through several signal cycles. In downtown and Town Centre contexts, during peak demand periods, V/C ratios over 0.90 and even 1.0 are common.

The performance thresholds that were used to consider roadway or traffic control improvements to support roadway or traffic control improvements employed in this study are listed below:

Signalized Intersections:

- Overall intersection Level of Service = LOS D or better;
- Overall intersection V/C ratio = 0.90 or less;

- Individual movement Level of Service = LOS E or better; and,
- Individual movement V/C ratio = 0.95 or less.

Unsignalized Intersections:

- Individual movement Level of Service = LOS E or better, unless the volume is very low in which case LOS F is acceptable.

In interpreting of the analysis results, note that the HCM methodology reports performance differently for various types of intersection traffic control. In this report, the performance reporting convention is as follows:

- For signalized intersections: HCM 2000 output for overall LOS and V/C as well as individual movement LOS and V/C is reported. 95th Percentile Queues are reported as estimated by Synchro;
- For unsignalized two-way stop controlled intersections: HCM 2000 LOS and V/C output is reported just for individual lanes as the HCM methodology does not report overall performance.
- For unsignalized All-way Stop controlled intersections: HCM 2000 unsignalized LOS is reported for the overall intersection as well as by intersection approach LOS. The HCM 2000 methodology does not report an overall V/C ratio for All Way Stop controlled intersections. Degree of Utilization calculated with the HCM 2000 methodology is reported for individual movements in place of V/C, which is not part of the HCM 2000 report.

The performance reporting conventions noted above have been consistently applied throughout this document and the detailed outputs are provided in **Appendix A**.

2.5.2 Analysis Assumptions

Signal timings were obtained from the two road authorities and incorporated into the traffic analysis. The overall peak hour factor for each intersection was applied to each of the intersection's movements. A peak hour factor of 1.0 was applied to locations that operate in congested conditions throughout the peak hour. Heavy vehicle factors were obtained from the collected traffic data and applied to each individual movement.

2.5.3 Existing Operational Analysis Results

Table 2.3 summarizes the existing 2017 traffic operations at the study intersections, for the weekday PM and Saturday PM peak hour traffic periods. Traffic performance for the overall intersection and for individual traffic movements at the intersection is reported. Results that do not meet the performance thresholds outlined in **Section 2.5.1** and are of potential concern are highlighted in red.

The analysis indicates that all intersections presently operate within capacity and with acceptable traffic delay during peak traffic periods provided that there are no vehicle queue back-ups extending back from the Lions Gate Bridge. The traffic congestion that regularly develops at the Taylor Way & Marine Drive intersection and at times extends up Taylor Way through the Keith Road intersection is a function of traffic operations on the Lions Gate Bridge and is not a capacity issue per se at either the intersection of Taylor Way & Marine Drive or Taylor Way & Keith Road. Despite all intersections operating within capacity, noticeable queues do develop at the Park Royal's western signalized access and the intersection of Taylor Way & Marine Drive.

Table 2.3: Existing Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	PM PEAK HOUR			SATURDAY PEAK HOUR		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
North-South Road #1 & Marine Drive <i>Signalized</i>	OVERALL	D	0.67		D	0.73	
	EBL	C	0.55	25	C	0.54	30
	EBT	D	0.91	125	D	0.82	90
	EBR	C	0.20	20	C	0.18	15
	WBL	C	0.61	30	D	0.89	90
	WBT	C	0.69	80	C	0.55	65
	WBR	C	0.02	0	C	0.03	0
	NBL/T	C	0.43	60	C	0.40	55
	NBR	C	0.06	0	C	0.14	15
	SBL	E	0.74	55	E	0.82	60
	SBT	D	0.53	35	E	0.58	40
	SBR	D	0.07	10	D	0.05	0
North-South Road #2 & Marine Drive <i>Signalized</i>	OVERALL	B	0.37		B	0.35	
	EBT	B	0.58	80	B	0.55	75
	EBR	A	0.02	5	A	0.02	5
	WBT	B	0.45	55	B	0.46	60
	WBR	A	0.06	5	A	0.13	10
	NBR	B	0.01	0	B	0.03	0
	SBR	B	0.04	0	B	0.05	0
Taylor Way & Keith Road <i>Signalized</i>	OVERALL	B	0.58		A	0.55	
	EBL	C	0.39	25	D	0.48	20
	EBT	C	0.11	15	C	0.11	10
	EBR	C	0.10	15	C	0.02	5
	WBL/T	D	0.61	45	D	0.37	16
	WBR	C	0.03	5	C	0.07	0
	WBL	A	0.47	20	A	0.28	6
	NBT/R	B	0.44	80	A	0.56	90
	SBL	A	0.09	5	A	0.04	0
	SBT/R	B	0.58	105	A	0.59	90
Taylor Way & Clyde Road <i>Minor Leg Stop</i>	OVERALL						
	WBL	E	0.26	10	D	0.21	5
	WBR	B	0.17	5	B	0.09	0
	NBT	A	0.26	0	A	0.33	0
	NBR	A	0.06	0	A	0.04	0
	SBL	B	0.02	0	B	0.05	0
SBT	A	0.28	0	A	0.30	0	

Table 2.3: Existing Traffic Operations (continued)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	PM PEAK HOUR			SATURDAY PEAK HOUR		
		LOS	V/C	95TH Q	LOS	V/C	95TH Q
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	D	0.83		D	0.91	
	EBL	D	0.51	35	D	0.74	55
	EBT	E	0.89	125	E	0.80	95
	EBR	D	0.07	0	D	0.05	0
	WBL	D	0.77	105	E	0.89	170
	WBT	C	0.39	70	C	0.44	90
	WBR	C	0.42	30	C	0.41	30
	NBL/T	E	0.69	50	F	0.96	100
	NBR	D	0.14	25	E	0.14	25
	SBL	E	0.84	135	E	0.83	140
SBT/R	D	0.70	95	E	0.82	120	
Taylor Way & Park Royal South Road <i>Minor Leg Stop</i>	OVERALL						
	EBL	D	0.47	20	D	0.47	20
	EBT/R	B	0.07	0	B	0.10	5
	WBL/T/R	B	0.04	0	C	0.06	0
	NBL/T/R	A	0.13	0	A	0.15	0
	SBL/T	A	0.03	0	A	0.01	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.38		A	0.47	
	EBL/T/R	B	0.44	10	B	0.41	10
	WBL/T/R	B	0.01	0	B	0.01	0
	NBL/T/R	A	0.19	10	A	0.25	15
	SBL/T	A	0.31	25	A	0.41	35
	SBR	A	0.04	0	A	0.06	5
Taylor Way & 100 Park Royal <i>Minor Leg Stop</i>	OVERALL						
	WBL/T	B	0.08	15	B	0.05	0
	NBT/R	A	0.24	0	A	0.29	0
	SBL	A	0.02	10	A	0.01	0
Taylor Way & Lower Level Road <i>All Way Stop</i>	OVERALL	C			C		
	EBL/T/R	B	0.34		C	0.39	
	WBL	B	0.19		B	0.30	
	WBT/R	B	0.31		B	0.34	
	NBL	C	0.00		D	0.00	
	NBT/R	C	0.73		D	0.81	
	SBL	B	0.27		B	0.28	
SBT/R	B	0.30		B	0.50		

3. SUSTAINABLE DEVELOPMENT – TRANSPORTATION

The Park Royal Neighbourhood is strategically located on major corridors for vehicle, public transit and pedestrian/bicycle movement on the North Shore, and near to the Lions Gate Bridge connecting to the City of Vancouver. This strong connectivity to its surrounding community has contributed to Park Royal's success over the past 60 plus years as a commercial hub for the North Shore and will factor largely in the continuing evolution of the Park Royal Neighbourhood.

Expanded travel mode choice, particularly for pedestrian, cycling, and transit trips, is a central element of the District of West Vancouver's Strategic Transportation Plan. The variety of housing, community amenities, and commercial shops and services to be located in the Park Royal Neighbourhood, all within comfortable walking and cycling distance, and well connected to a highly serviced public transit corridor provides for this broad range of travel choice for the future residents of the Neighbourhood as well as existing and future employees, customers and visitors to the area.

Park Royal continues to be very supportive of measures to improve sustainable transportation access to the area. Improved 'connectivity' on the site and to surrounding lands and neighbourhoods, including walking, cycling, and public transit, is one of the key principles set out for the Park Royal Neighbourhood vision.

Improved connections for pedestrians, cyclists, and transit users are in fact already taking shape with the newly constructed bicycle lanes and traffic signal controlled pedestrian crosswalks on Marine Drive and on the Park Royal site. Additional bicycle and pedestrian facilities are planned for, including along the Taylor Way corridor south of Marine Drive, to provide better connections to the nearby and highly popular Spirit Trail facility to the south. The recent upgrades to Marine Drive including notably the eastbound bus lane fronting the Park Royal site, with increased capability to handle more transit buses in the future, has been well received by the West Vancouver Community. Park Royal has recently partnered with the District of West Vancouver to providing funding for upgrades to the Wardance Bridge to widen sidewalks and narrow traffic lanes to improve conditions for pedestrians and cyclists.

New development projects in the Park Royal Neighbourhood, including the proposed redevelopment of the existing White Spot restaurant site at 752 Marine Drive development, will be brought forward with sustainable transportation considerations first and foremost.

4. FUTURE TRAFFIC CONDITIONS

4.1 Traffic Forecasts

4.1.1 Background Traffic Forecasts

Background traffic is traffic that would be present on the road network if the site did not redevelop.

Similar to Bunt's previous work at Park Royal and for the Marine Drive Signal, general growth in background traffic volumes within the study area was assumed to occur at 1% per year which is generally representative of population growth in the District of West Vancouver over the past decade.. It was assumed that this growth would be applied to the volumes on Marine Drive, Taylor Way (north of Marine Drive) and Keith Road, with no additional growth to the vehicle movements south of Marine Drive and the inbound/outbound movements to Park Royal (north and south).

In addition to the 1% general background growth, the background traffic volumes also include a layer of traffic associated with several nearby known proposed and/or currently under development projects within West Vancouver. The traffic volume estimates for these projects are based ITE trip generation rates. The considered developments include the remaining parcels of 'Evelyn', and the contemplated new mixed-use development at 660 Clyde and 657 & 675 Marine Drive. These developments result in an estimated 127 vehicle trips during weekday PM peak hour and 125 vehicle trips during Saturday PM peak hour.

The background traffic volume forecasts, not including the new 752 Marine Drive development, are presented in **Exhibit 4.1** for the 2020 horizon year and in **Exhibit 4.2** for the 2030 horizon year.

4.1.2 Site Traffic

Trip Generation

The vehicle trip rates used in this study are shown in **Table 4.1**. Bunt collected traffic data at the Park Royal Towers in February, 2017 to determine the trip rate for residential component of the proposed development. The observed trip rates were consistent with other traffic data collected in November 21, 2017 which included the driveway to the 171 unit West Royal Towers residential development on Taylor Way.

The trip generation rate assumed for the non residential uses proposed for the 752 Marine Drive project are similar to that applied for our previous analysis of this space as part of Bunt's evaluation of the Marine Drive traffic signal controlled intersection. For the weekday PM peak hour, the assumed trip rate for the commercial space is 2.61 spaces per 1,000 square feet of area and for the Saturday PM peak hour the rate assumed is 3.82 trips per 1,000 square feet. The trip generation rate for the childcare was obtained from the Institute of Transportation Engineer's Trip General Manual, 10th edition (land use code 565 in a general urban/suburban setting). **Table 4.2** summarizes the anticipated future site generated vehicle trips for the proposed development based on the rates in Table 4.1.

Table 4.1: Peak Hour Vehicle Trip Rates

LAND USE	UNITS	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	201 units	70%	30%	0.31 trips per unit	46%	54%	0.23 trips per unit
Commercial	30,362 ft ²	50%	50%	2.61 trips per 1,000 sq.ft.	50%	50%	3.82 trips per 1,000 sq.ft.
Childcare	3,427 ft ²	47%	53%	11.12 trips per 1,000 sq.ft.	N/A	N/A	0.00

Table 4.2: Gross Peak Hour Site Vehicle Trips

LAND USE	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Residential	44	18	62	21	25	46
Commercial	39	40	79	58	58	116
Childcare	18	20	38	0	0	0
TOTALS	101	78	179	79	83	162

Pass-by trips, which are vehicles already accounted for in the existing volumes that pass by the site and that would continue to do so whether or not the project develops, were assumed to be 30% during the weekday PM peak periods and 20% during the Saturday peak period for the commercial and child care land uses. As indicated in **Table 4.3**, after adjustment for pass-by trips, the 752 Marine Drive site is expected to generate approximately 144 net new vehicle trips during the PM peak hour (84 in, 60 out) and 138 vehicle trips during the Saturday peak hour (67 in, 71 out).

Table 4.3: Net New Site Vehicle Trips

TRIP TYPE	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Total Gross Trips	101	78	179	79	83	162
<i>Pass-by Trips</i>	<i>(17)</i>	<i>(18)</i>	<i>(35)</i>	<i>(12)</i>	<i>(12)</i>	<i>(24)</i>
NET NEW TRIPS	84	60	144	67	71	138

Taking into account the vehicle trips generated by the existing TD Bank which will be eliminated to make way for the 752 Marine Drive development, the actual net traffic addition to the area road network is even less. In addition, the site was previously occupied by White Spot which generated 84 vehicle trips during the weekday PM peak hour. Compared to the site’s previous state (with White Spot) the proposed development will generate an additional 60 trips during the weekday PM peak hour and less than 100 trips during the Saturday peak hour , or on average between one to two vehicle trips per minute added to the area road system. At other times of the day, the net additional traffic onto the area streets would be even lower.

Trip Distribution & Assignment

The assumed trip distribution to the study area intersections is as per previous work completed by Bunt & Associates for Park Royal. The traffic distribution is based on observed existing directional splits, as well as assumed origin/destination points, and is summarized in **Tables 4.4** and **4.5**.

Table 4.4: Estimated Trip Distribution – Net New Trips

ORGIN/DESTINATION	WEEKDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
	IN (%)	OUT (%)	IN (%)	OUT (%)
Marine Drive West	30%	30%	35%	35%
Marine Drive East	40%	25%	25%	25%
Taylor Way North	20%	35%	25%	25%
Low Level Road South	10%	10%	15%	15%
TOTAL	100%	100%	100%	100%

Table 4.5: Estimated Trip Distribution – Pass-by Trips

ORGIN/DESTINATION	WEEKDAY PM PEAK HOUR		SATURDAY PM PEAK HOUR	
	IN (%)	OUT (%)	IN (%)	OUT (%)
Marine Drive West	40%	60%	45%	55%
Marine Drive East	60%	40%	55%	45%
Taylor Way North	0%	0%	0%	0%
Low Level Road South	0%	0%	0%	0%
TOTAL	100%	100%	100%	100%

A summary of the predicted new site generated vehicle trips associated with the proposed 752 Marine Drive development is provided in **Exhibit 4.3**. As indicated, the distribution of the 752 Marine Drive development traffic is assumed to be dispersed across several driveways on the Park Royal South site. As indicated in **Table 4.6**, the development is anticipated to have minimal impact on the overall vehicle volumes travelling through the key intersections in the study area. In The 2030 horizon year, the development's trips will account for only 1-2% of the overall vehicle traffic volume travelling through the key intersections within the study area.

Table 4.6: Net Change in Future Intersection Vehicle Volumes with New Site Trips (2030)

INTERSECTION	WEEKDAY PM PEAK HOUR VOLUMES			SATURDAY PEAK HOUR VOLUMES		
	BACK-GROUND	SITE	% CHANGE	BACK-GROUND	SITE	% CHANGE
Marine Drive & Signalized Park Royal Access	3292	36	1%	3186	35	1%
Keith Road & Taylor Way	2896	43	1%	3189	35	1%
Marine Drive & Taylor Way	4700	87	2%	5031	76	2%
Low Level Road & Taylor Way	1080	22	2%	1291	28	2%

4.1.3 Total Traffic

Total traffic was estimated by summing the background and site traffic forecasts and is presented in **Exhibit 4.4** for the 2020 horizon year and in **Exhibit 4.5** for the 2030 horizon year.

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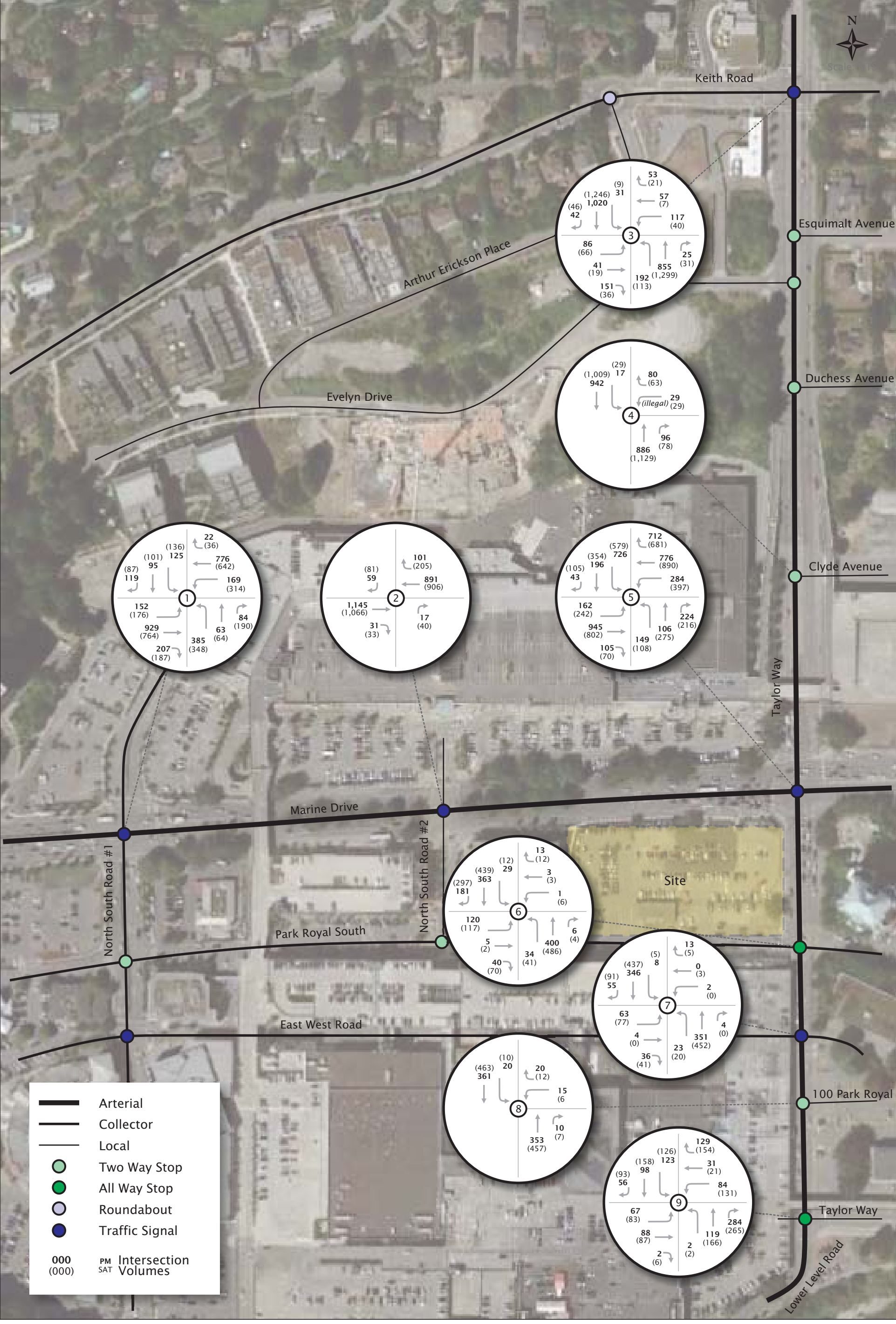
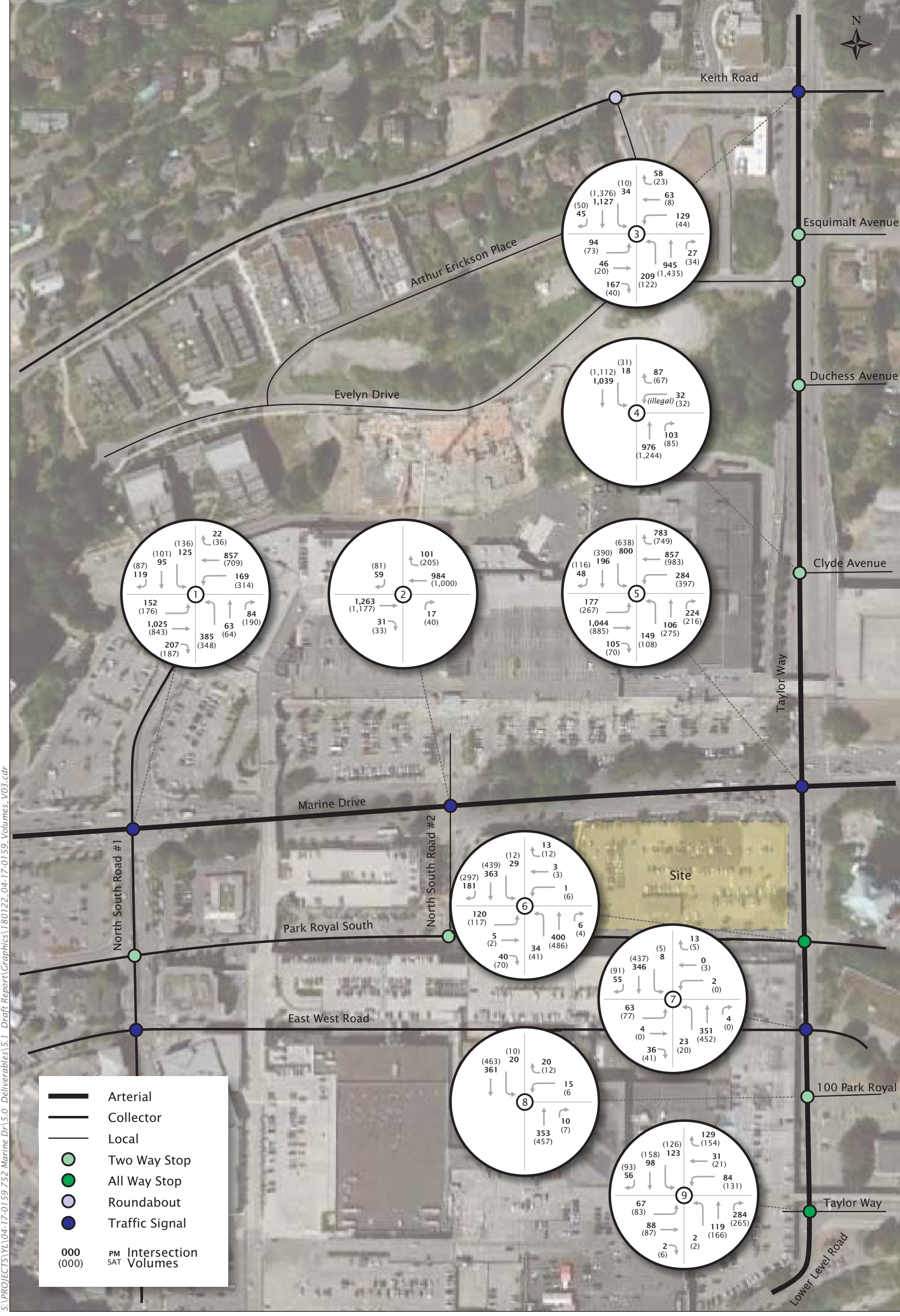


Exhibit 4.1 Opening Day (2020) Background Traffic Forecasts





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Exhibit 4.2 Opening Day + 10 (2030) Background Traffic Forecasts

752 Marine Drive
January 2018



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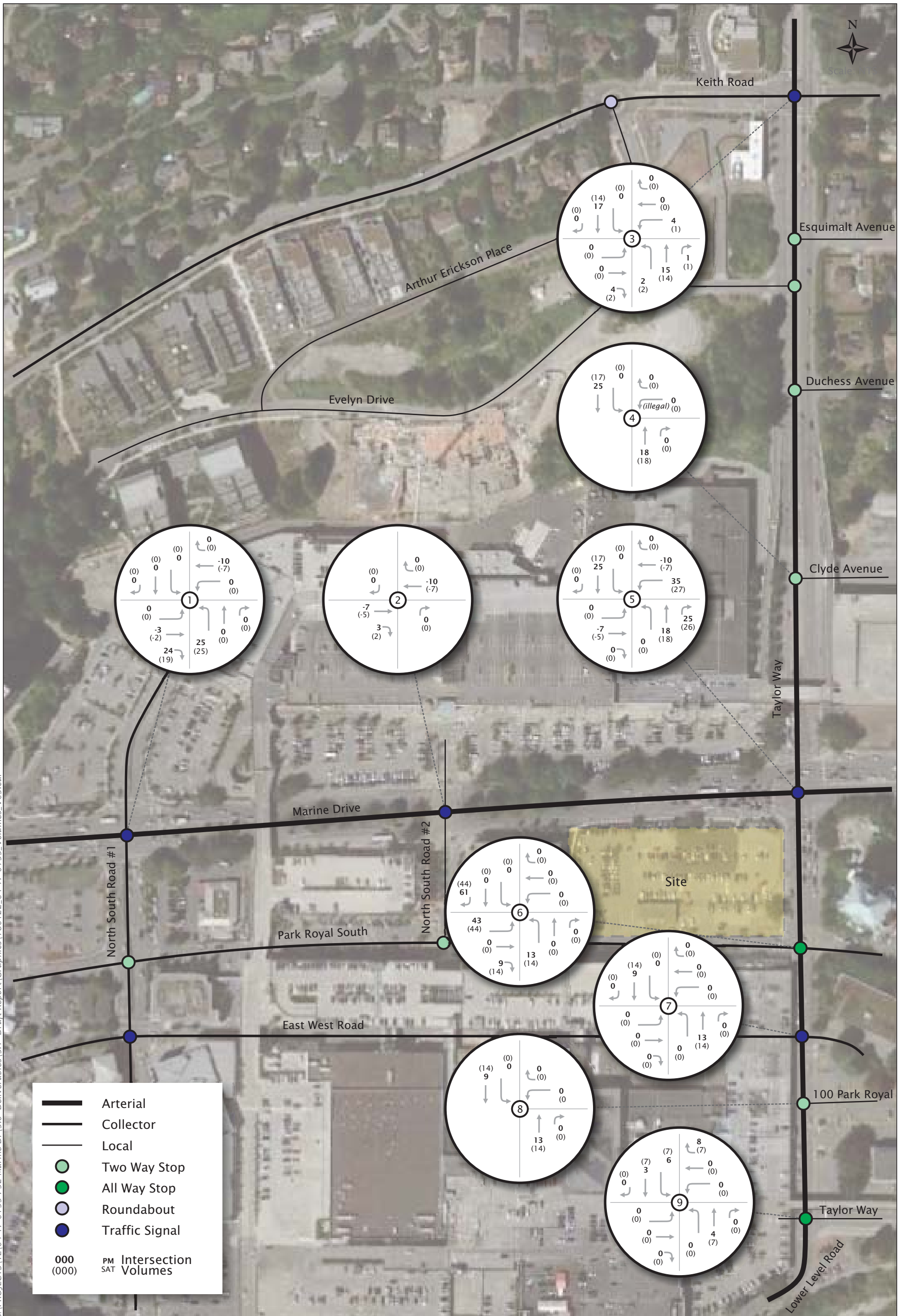


Exhibit 4.3 Site Traffic Forecasts

04-17-0159 752 Marine Drive
January 2018



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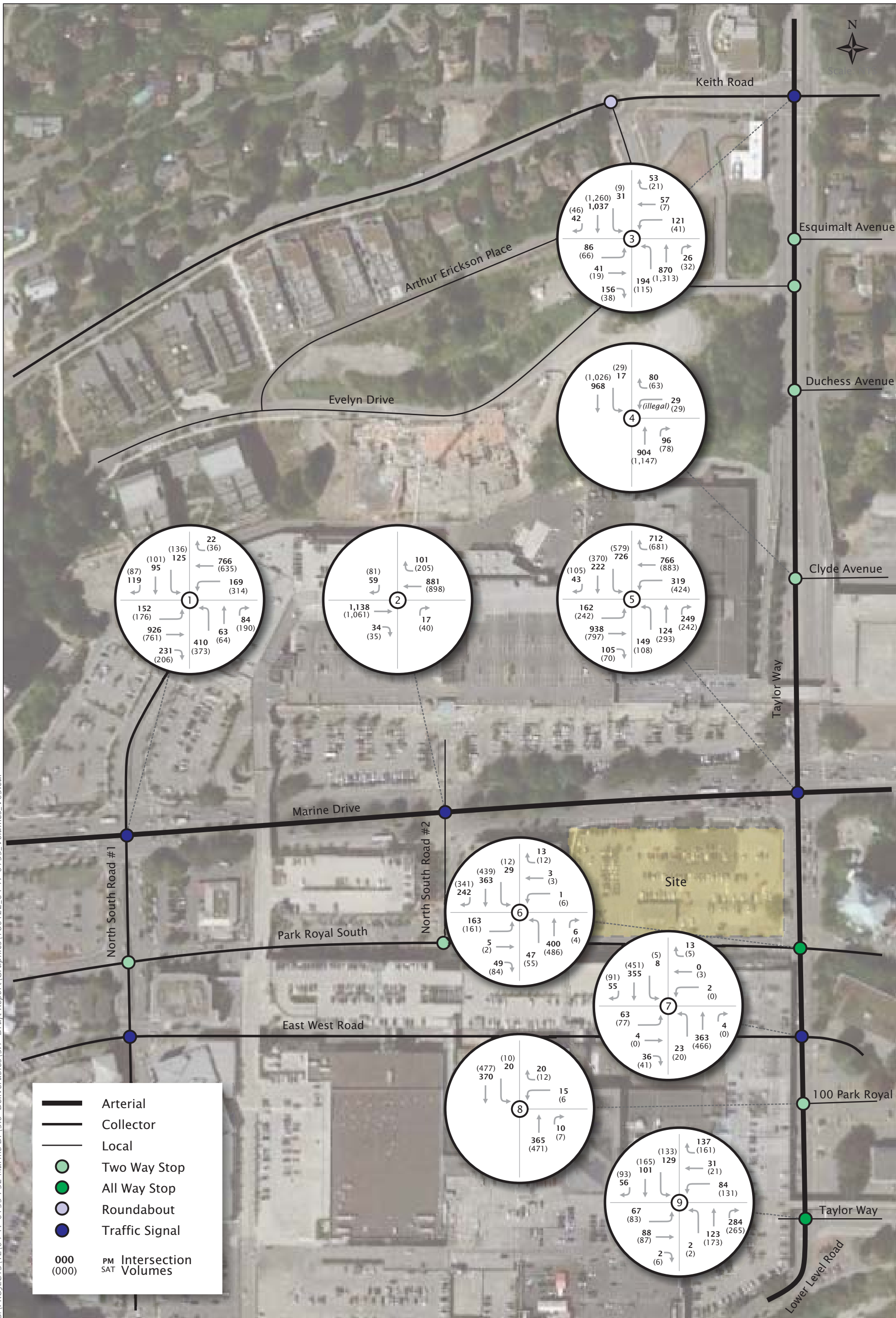


Exhibit 4.4 Opening Day (2020) Total Traffic Forecasts

04-17-0159

752 Marine Drive
January 2018



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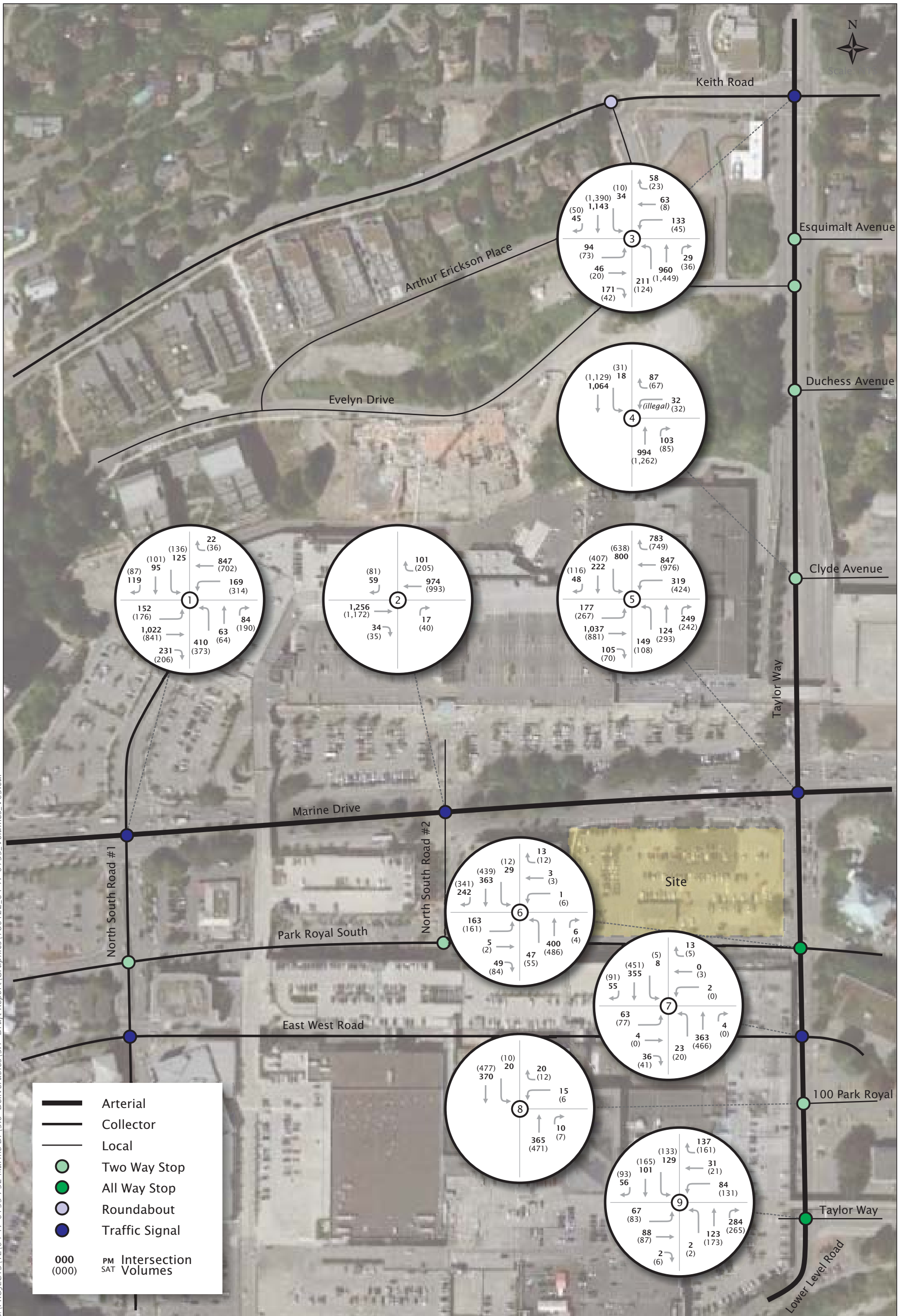


Exhibit 4.5 Opening Day + 10 (2030) Total Traffic Forecasts

04-17-0159

752 Marine Drive
January 2018



4.2 Future Traffic Operations

4.2.1 Future Background Traffic Operations

The background traffic operation results for the 2020 and 2030 horizon years are shown in **Tables 4.7** and **4.8**. As with the existing conditions the two intersections the two locations with potential operational issues are Park Royal's western signalized access and the Taylor Way & Marine Drive intersection.

At Park Royal's western signalized access the westbound and southbound left turn bays occasionally exceed their storage capacity. The westbound left-turn queues typically clear during the advance left-turn signal phase at the intersection enabling the westbound through traffic movement that follows to clear the intersection without further delay.

The Taylor Way & Marine Drive intersection is generally characterized as a congested intersection though this is for the most part a consequence of traffic back-ups extending back from Lions Gate Bridge. When bridge traffic is moving well, the Taylor/Marine intersection is typically operating within capacity and with moderate queues and delays that clear every signal cycle. The critical movements at this intersection are the eastbound Marine Drive through movement (weekday PM, 2030), westbound Marine Drive left-turn movement (Saturday PM, 2020/2030) and the northbound Taylor Way left/through movement (Saturday PM, 2020/2030) which operates from a shared lane.

Table 4.7: Opening Day (2020) Background Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
North-South Road #1 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>D</i>	<i>0.69</i>		<i>D</i>	<i>0.73</i>	
	EBL	C	0.56	25	C	0.55	30
	EBT	D	0.93	135	D	0.84	95
	EBR	C	0.20	20	C	0.18	15
	WBL	C	0.61	35	D	0.89	90
	WBT	C	0.70	85	C	0.56	70
	WBR	C	0.02	0	C	0.03	0
	NBL/T	C	0.44	60	C	0.41	55
	NBR	C	0.06	0	C	0.14	15
	SBL	E	0.74	55	E	0.82	60
	SBT	D	0.54	35	E	0.58	40
	SBR	D	0.07	10	D	0.05	0
North-South Road #2 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.39</i>		<i>B</i>	<i>0.36</i>	
	EBT	B	0.61	85	B	0.56	75
	EBR	A	0.02	5	A	0.02	5
	WBT	B	0.46	60	B	0.47	60
	WBR	A	0.06	5	A	0.13	10
	NBR	B	0.01	0	B	0.03	0
	SBR	B	0.04	0	B	0.05	5
Taylor Way & Keith Road <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.62</i>		<i>B</i>	<i>0.60</i>	
	EBL	C	0.44	25	D	0.53	20
	EBT	C	0.11	15	C	0.11	10
	EBR	C	0.10	15	C	0.02	5
	WBL/T	D	0.62	50	D	0.37	15
	WBR	C	0.04	5	C	0.01	0
	NBL	B	0.59	30	A	0.38	10
	NBT/R	B	0.45	80	A	0.58	100
	SBL	A	0.09	5	A	0.05	0
SBT/R	B	0.61	110	B	0.63	110	
Taylor Way & Clyde Road <i>Minor Leg Stop</i>	<i>OVERALL</i>	<i>A</i>			<i>A</i>		
	WBL	E	0.31	10	E	0.24	5
	WBR	B	0.22	5	B	0.13	5
	NBT	A	0.28	0	A	0.35	0
	NBR	A	0.08	0	A	0.05	0
	SBL	B	0.04	0	B	0.06	0
SBT	A	0.29	0	A	0.32	0	

Table 4.7: Opening Day (2020) Background Vehicle Operations (continued)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c			LOS	v/c
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	D	0.86		E	0.93	
	EBL	D	0.57	40	D	0.77	55
	EBT	E	0.93	130	E	0.82	100
	EBR	D	0.07	0	D	0.05	0
	WBL	D	0.75	105	E	0.90	170
	WBT	C	0.42	75	C	0.47	95
	WBR	C	0.46	30	C	0.48	50
	NBL/T	E	0.70	50	F	0.98	100
	NBR	D	0.14	25	E	0.14	25
	SBL	E	0.86	150	E	0.86	160
	SBT/R	D	0.71	100	E	0.84	130
Taylor Way & Park Royal South Road <i>Minor Leg Stop</i>	OVERALL						
	EBL	D	0.47	20	D	0.47	20
	EBT/R	B	0.07	0	B	0.10	5
	WBL/T/R	B	0.04	0	C	0.06	0
	NBL/T/R	A	0.13	0	A	0.15	0
	SBL/T	A	0.15	0	A	0.01	0
	SBR	A	0.12	0	A	0.18	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.38		A	0.47	
	EBL/T/R	B	0.44	10	B	0.41	10
	WBL/T/R	B	0.01	0	B	0.01	0
	NBL/T/R	A	0.19	10	A	0.25	15
	SBL/T	A	0.31	25	A	0.41	35
	SBR	A	0.04	0	A	0.06	5
Taylor Way & 100 Park Royal <i>Minor Leg Stop</i>	OVERALL	A			A		
	WBL/T	B	0.09	0	B	0.05	0
	NBT/R	A	0.24	0	A	0.29	0
	SBL	A	0.02	0	A	0.01	0
	SBT	A	0.24	0	A	0.29	0
Taylor Way & Lower Level Road <i>All Way Stop</i>	OVERALL	C			C		
	EBL/T/R	B	0.34		C	0.39	
	WBL	B	0.19		B	0.30	
	WBT/R	B	0.31		B	0.35	
	NBL	C	0.00		D	0.00	
	NBT/R	C	0.73		D	0.81	
	SBL	B	0.27		B	0.28	
SBT/R	B	0.30		B	0.50		

Table 4.8: Opening Day + 10 (2030) Background Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
North-South Road #1 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>D</i>			<i>D</i>	<i>0.74</i>	
	EBL	C	0.62	30	C	0.58	30
	EBT	E	1.02	155	D	0.90	115
	EBR	C	0.20	20	C	0.18	15
	WBL	C	0.61	35	D	0.90	90
	WBT	C	0.77	95	C	0.60	75
	WBR	C	0.02	0	C	0.03	0
	NBL/T	C	0.44	60	C	0.41	55
	NBR	C	0.06	0	C	0.14	15
	SBL	E	0.74	55	F	0.83	60
	SBT	D	0.54	35	E	0.59	40
	SBR	D	0.07	10	D	0.05	0
North-South Road #2 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.42</i>		<i>B</i>	<i>0.40</i>	
	EBT	B	0.67	100	B	0.62	90
	EBR	A	0.02	5	A	0.02	5
	WBT	B	0.51	70	B	0.52	70
	WBR	A	0.06	5	A	0.13	10
	NBR	B	0.01	0	B	0.03	5
	SBR	B	0.04	0	B	0.05	5
Taylor Way & Keith Road <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.73</i>		<i>B</i>	<i>0.66</i>	
	EBL	C	0.50	30	D	0.56	25
	EBT	C	0.12	15	C	0.11	10
	EBR	C	0.11	15	C	0.03	5
	WBL/T	D	0.67	55	D	0.40	20
	WBR	C	0.04	5	C	0.02	0
	NBL	B	0.72	50	A	0.46	15
	NBT/R	B	0.51	95	A	0.64	120
	SBL	A	0.12	5	A	0.06	0
SBT/R	B	0.69	130	B	0.70	130	
Taylor Way & Clyde Road <i>Minor Leg Stop</i>	<i>OVERALL</i>	<i>A</i>			<i>A</i>		
	WBL	F	0.41	15	F	0.34	10
	WBR	B	0.25	10	B	0.15	5
	NBT	A	0.31	0	A	0.39	0
	NBR	A	0.09	0	A	0.06	0
	SBL	B	0.04	0	B	0.07	0
SBT	A	0.33	0	A	0.35	0	

Table 4.8: Opening Day + 10 (2030) Background Vehicle Operations (continued)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c			LOS	v/c
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	E	0.93		E	0.98	
	EBL	D	0.63	40	D	0.82	70
	EBT	F	1.05	150	E	0.87	110
	EBR	D	0.07	0	D	0.05	0
	WBL	D	0.79	105	E	0.93	170
	WBT	C	0.47	80	D	0.53	105
	WBR	C	0.54	50	D	0.62	100
	NBL/T	E	0.71	50	F	1.02	100
	NBR	D	0.14	25	E	0.14	25
	SBL	E	0.90	175	E	0.91	185
	SBT/R	D	0.86	110	E	0.89	150
Taylor Way & Park Royal South Road <i>Minor Leg Stop</i>	OVERALL	A			A		
	EBL	D	0.47	20	D	0.47	20
	EBT/R	B	0.07	0	B	0.10	5
	WBL/T/R	B	0.04	0	C	0.06	0
	NBL/T/R	A	0.13	0	A	0.15	0
	SBL/T	A	0.03	0	A	0.01	0
	SBR	A	0.15	0	A	0.18	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.38		A	0.47	
	EBL/T/R	B	0.44	10	B	0.41	10
	WBL/T/R	B	0.01	0	B	0.01	0
	NBL/T/R	A	0.19	10	A	0.25	15
	SBL/T	A	0.31	25	A	0.41	35
	SBR	A	0.04	0	A	0.06	5
Taylor Way & 100 Park Royal <i>Minor Leg Stop</i>	OVERALL	A			A		
	WBL/T	B	0.09	0	B	0.05	0
	NBT/R	A	0.24	0	A	0.29	0
	SBL	A	0.02	0	A	0.01	0
	SBT	A	0.24	0	A	0.29	0
Taylor Way & Lower Level Road <i>All Way Stop</i>	OVERALL	C			C		
	EBL/T/R	B	0.34		C	0.39	
	WBL	B	0.19		B	0.30	
	WBT/R	B	0.31		B	0.35	
	NBL	C	0.00		D	0.00	
	NBT/R	C	0.73		D	0.81	
	SBL	B	0.27		B	0.28	
SBT/R	B	0.30		B	0.50		

4.2.1 Future Total Traffic Operations

The total traffic operation results for the 2020 and 2030 horizon years are shown in **Tables 4.9** and **4.10**. The traffic operations at the study operations with the net new traffic associated with the proposed development (between one to two additional vehicles per minute during peak traffic periods) are anticipated to have only minimal impact over and above the forecast future background traffic conditions. At the Taylor Way & Marine Drive intersection, the development will put slightly added pressure on the westbound left and northbound through movements.

During the Saturday PM peak hour the development is anticipated to add approximately three vehicles to the westbound left turn 95th percentile vehicle queue, bringing the 95th percentile queue up to 190 metres from 170 metres in the background condition (in both the 2020 and 2030 horizon years). The existing storage capacity of the westbound left turn lane is 70 metres.

The proposed development is anticipated to add 18 vehicles to the northbound through movement during the Saturday PM peak hour. The added traffic is anticipated to add approximately one vehicle to the 95th percentile queue during both the 2020 and 2030 horizon years.

For the future weekday PM peak hour traffic condition, during those times when there are no traffic back-ups associated with the Lions Gate Bridge, our analysis indicates that northbound queues on Taylor Way at Marine Drive will not block the adjacent intersection to the south (Park Royal South Road and driveway access to the West Royal Towers residential building).

During the Saturday PM peak hour; however, the northbound queues on Taylor Way south of Marine Drive are expected to regularly extend beyond Park Royal South Road intersection with, or without, back-ups stemming from the Lions Gate Bridge. Intersection pavement marking, signage, and occasional police enforcement are recommended to strengthen the messaging to drivers that the intersection cannot be blocked by vehicles.

Table 4.9: Opening Day (2020) Total Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
North-South Road #1 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>D</i>	<i>0.69</i>		<i>D</i>	<i>0.74</i>	
	EBL	C	0.55	25	C	0.54	30
	EBT	D	0.93	135	D	0.84	95
	EBR	C	0.22	20	C	0.20	20
	WBL	C	0.61	35	D	0.89	90
	WBT	C	0.69	85	C	0.55	70
	WBR	C	0.02	0	C	0.03	0
	NBL/T	C	0.46	65	C	0.43	60
	NBR	C	0.06	0	C	0.14	15
	SBL	E	0.74	55	E	0.83	60
	SBT	D	0.54	35	E	0.58	40
	SBR	D	0.07	10	D	0.05	0
North-South Road #2 & Marine Drive <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.38</i>		<i>B</i>	<i>0.36</i>	
	EBT	B	0.60	85	B	0.56	75
	EBR	A	0.02	5	A	0.02	5
	WBT	B	0.46	60	B	0.47	60
	WBR	A	0.06	5	A	0.13	10
	NBR	B	0.01	0	B	0.03	0
	SBR	B	0.04	0	B	0.05	5
Taylor Way & Keith Road <i>Signalized</i>	<i>OVERALL</i>	<i>B</i>	<i>0.64</i>		<i>B</i>	<i>0.60</i>	
	EBL	C	0.44	25	D	0.53	20
	EBT	C	0.11	15	C	0.11	10
	EBR	C	0.10	15	C	0.03	5
	WBL/T	D	0.64	50	D	0.38	20
	WBR	C	0.04	5	C	0.01	0
	NBL	B	0.61	30	A	0.39	10
	NBT/R	B	0.46	85	A	0.58	100
	SBL	A	0.10	5	A	0.05	0
SBT/R	B	0.63	115	B	0.64	110	
Taylor Way & Clyde Road <i>Minor Leg Stop</i>	<i>OVERALL</i>	<i>A</i>			<i>A</i>		
	WBL	E	0.32	10	E	0.23	5
	WBR	B	0.22	5	B	0.13	5
	NBT	A	0.28	0	A	0.36	0
	NBR	A	0.08	0	A	0.05	0
	SBL	B	0.04	0	B	0.06	0
SBT	A	0.30	0	A	0.32	0	

Table 4.9: Opening Day (2020) Total Vehicle Operations (continued)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q	LOS	v/c	95th Q
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	D	0.87		E	0.97	
	EBL	D	0.57	40	D	0.77	55
	EBT	E	0.94	130	E	0.82	100
	EBR	D	0.07	0	D	0.05	0
	WBL	D	0.84	130	E	0.95	190
	WBT	C	0.41	70	C	0.46	90
	WBR	C	0.45	30	D	0.48	55
	NBL/T	E	0.75	55	F	1.04	105
	NBR	D	0.16	25	E	0.15	25
	SBL	E	0.86	150	E	0.86	160
	SBT/R	D	0.74	105	E	0.86	135
Taylor Way & Park Royal South Road <i>Minor Leg Stop</i>	OVERALL	A			A		
	EBL	E	0.68	35	E	0.69	35
	EBT/R	B	0.09	0	B	0.12	5
	WBL/T/R	B	0.04	0	C	0.07	0
	NBL/T/R	A	0.13	0	A	0.15	0
	SBL/T	A	0.15	0	A	0.18	0
	SBR	A	0.15	0	A	0.21	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.39		A	0.48	
	EBL/T/R	B	0.44	10	B	0.41	10
	WBL/T/R	B	0.01	0	B	0.01	0
	NBL/T/R	A	0.19	10	A	0.25	15
	SBL/T	A	0.32	25	A	0.42	35
	SBR	A	0.04	0	A	0.06	5
Taylor Way & 100 Park Royal <i>Minor Leg Stop</i>	OVERALL	A			A		
	WBL/T	B	0.09	0	B	0.05	0
	NBT/R	A	0.25	0	A	0.30	0
	SBL	A	0.02	0	A	0.01	0
	SBT	A	0.24	0	A	0.30	0
Taylor Way & Lower Level Road <i>All Way Stop</i>	OVERALL	C			C		
	EBL/T/R	B	0.35		C	0.40	
	WBL	B	0.19		B	0.31	
	WBT/R	B	0.33		B	0.36	
	NBL	C	0.00		D	0.00	
	NBT/R	C	0.75		D	0.83	
	SBL	B	0.29		B	0.29	
SBT/R	B	0.31		B	0.52		

Table 4.10: Opening Day + 10 (2030) Total Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
North-South Road #1 & Marine Drive <i>Signalized</i>	OVERALL	D	0.73		D	0.75	
	EBL	C	0.61	30	C	0.57	30
	EBT	E	1.02	155	D	0.89	115
	EBR	C	0.22	20	C	0.20	20
	WBL	C	0.61	35	D	0.90	90
	WBT	C	0.76	95	C	0.59	75
	WBR	C	0.02	0	C	0.03	0
	NBL/T	C	0.46	65	C	0.44	60
	NBR	C	0.06	0	C	0.14	15
	SBL	E	0.74	55	F	0.83	60
	SBT	D	0.54	35	E	0.59	40
	SBR	D	0.07	10	D	0.05	0
North-South Road #2 & Marine Drive <i>Signalized</i>	OVERALL	B	0.42		B	0.40	
	EBT	B	0.67	95	B	0.62	85
	EBR	A	0.03	5	A	0.02	5
	WBT	B	0.51	65	B	0.52	70
	WBR	A	0.06	5	A	0.13	10
	NBR	B	0.01	0	B	0.03	5
	SBR	B	0.04	0	B	0.05	5
Taylor Way & Keith Road <i>Signalized</i>	OVERALL	B	0.75		B	0.66	
	EBL	C	0.50	30	D	0.56	25
	EBT	C	0.12	15	C	0.11	10
	EBR	C	0.11	15	C	0.03	5
	WBL/T	D	0.68	55	D	0.40	20
	WBR	C	0.04	5	C	0.02	0
	NBL	C	0.73	55	A	0.47	20
	NBT/R	B	0.52	95	A	0.65	125
	SBL	A	0.12	5	A	0.07	0
	SBT/R	B	0.70	130	B	0.71	135
Taylor Way & Clyde Road <i>Minor Leg Stop</i>	OVERALL	A			A		
	WBL	F	0.43	15	F	0.33	10
	WBR	B	0.26	10	B	0.15	5
	NBT	A	0.31	0	A	0.40	0
	NBR	A	0.09	0	A	0.06	0
	SBL	B	0.04	0	B	0.07	0
SBT	A	0.33	0	A	0.35	0	

Table 4.10: Opening Day + 10 (2030) Total Vehicle Operations (continued)

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	WEEKDAY PM PEAK HOUR			SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q	LOS	v/c	95th Q
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	E	0.94		E	1.02	
	EBL	D	0.64	40	D	0.80	70
	EBT	F	1.06	150	E	0.87	110
	EBR	D	0.07	0	D	0.05	0
	WBL	E	0.86	130	F	0.99	190
	WBT	C	0.46	80	D	0.53	105
	WBR	C	0.55	55	D	0.62	100
	NBL/T	E	0.75	55	F	1.07	105
	NBR	D	0.16	25	E	0.15	25
	SBL	E	0.91	175	E	0.91	185
	SBT/R	D	0.86	115	E	0.91	160
Taylor Way & Park Royal South Road <i>Minor Leg Stop</i>	OVERALL	A			A		
	EBL	E	0.68	35	E	0.69	35
	EBT/R	B	0.09	0	B	0.12	5
	WBL/T/R	B	0.05	0	C	0.07	0
	NBL/T/R	A	0.13	0	A	0.15	0
	SBL/T	A	0.03	0	A	0.01	0
	SBR	A	0.15	0	A	0.21	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.39		A	0.48	
	EBL/T/R	B	0.44	10	B	0.41	10
	WBL/T/R	B	0.01	0	B	0.01	0
	NBL/T/R	A	0.19	10	A	0.25	15
	SBL/T	A	0.32	25	A	0.42	35
	SBR	A	0.04	0	A	0.06	5
Taylor Way & 100 Park Royal <i>Minor Leg Stop</i>	OVERALL	A			A		
	WBL/T	B	0.09	0	B	0.05	0
	NBT/R	A	0.25	0	A	0.30	0
	SBL	A	0.02	0	A	0.01	0
	SBT	A	0.24	0	A	0.30	0
Taylor Way & Lower Level Road <i>All Way Stop</i>	OVERALL	C			C		
	EBL/T/R	B	0.35		C	0.40	
	WBL	B	0.19		B	0.31	
	WBT/R	B	0.33		B	0.36	
	NBL	C	0.00		D	0.00	
	NBT/R	C	0.75		D	0.83	
	SBL	B	0.29		B	0.29	
SBT/R	B	0.31		B	0.52		

4.2.1 Taylor Way & Park Royal South Road Intersection

The District requested that Bunt review the operations of the Taylor Way & Park Royal South Road intersection to address concerns from some residents of West Royal Towers which has its primary vehicle access on the east side of the intersection. These concerns relate primarily to vehicles blocking the intersection as they queue northbound for clearance through the nearby Marine Drive traffic signal. To reduce the chance of vehicles blocking this intersection, the west leg of the intersection could be limited to right-turn movements only with the affected left-turn traffic having to redistribute to other access points connecting to Park Royal South. The resulting vehicle flow impacts are shown in **Exhibit 4.6**.

Bunt assessed the traffic operational impacts of implementing these turn restrictions for the 2030 Total Traffic Saturday PM Peak hour. As shown in **Table 4.11**, the turn restrictions will reduce the northbound queues at the Taylor Way & Marine Drive intersection by approximately 30% which would reduce the frequency of vehicles blocking the Taylor Way & Park Royal South Road intersection. In exchange for reducing the northbound queues at the Taylor Way & Marine Drive intersection, the eastbound queues would increase marginally to accommodate the redirected vehicle traffic.

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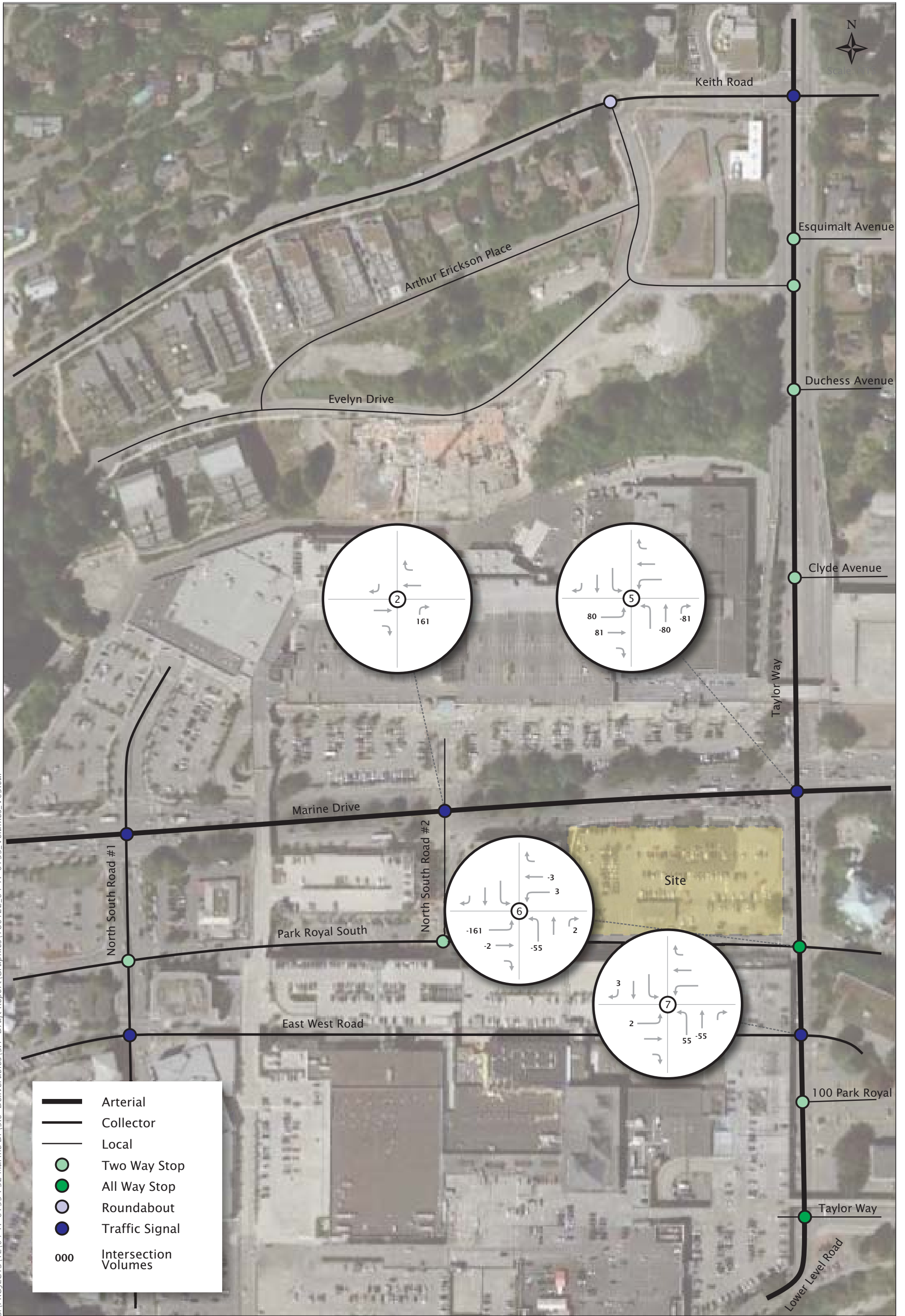


Exhibit 4.6
Park Royal South Road Turn Restrictions: Saturday Total 2030 Traffic Impacts

04-17-0159

752 Marine Drive
 January 2018



Table 4.11: Opening Day + 10 (2030) Total Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	SATURDAY PM PEAK HOUR		
		LOS	v/c	95th Q (m)
Taylor Way & Marine Drive <i>Signalized</i>	OVERALL	E	1.02	
	EBL	E	0.90	115
	EBT	E	0.93	130
	EBR	D	0.05	0
	WBL	F	1.00	190
	WBT	D	0.57	105
	WBR	D	0.66	105
	NBL/T	F	0.87	75
	NBR	E	0.10	10
	SBL	E	0.91	185
SBT/R	E	0.91	160	
Taylor Way & Park Royal South Road <i>Signalized</i>	OVERALL	A		
	EBR	B	0.11	5
	WBL/R	B	0.05	0
	NBT/R	A	0.15	0
	SBL/T	A	0.01	0
	SBR	A	0.21	0
Taylor Way & East-West Road <i>Signalized</i>	OVERALL	A	0.48	
	EBL/T/R	B	0.41	10
	WBL/T/R	B	0.01	0
	NBL/T/R	A	0.28	15
	SBL/T	A	0.43	35
	SBR	A	0.07	5

4.2.2 Summary of Traffic Impacts & Recommended Mitigations

- No road capacity improvements required to accommodate the net additional 1-2 vehicles per minute during peak traffic periods.
- Westbound Marine Drive left-turn to southbound Taylor Way movement already operates today with queues that regularly exceed the available left-turn bay storage during peak traffic periods. This condition is in part due to occasional blockage of this left-turn movement by vehicles queued through the intersection at the end of the southbound Taylor Way to eastbound Marine Drive left-turn movement when Lions Gate Bridge traffic is backed up.
- Recommend that the order of the northbound and southbound split signal phases at the Marine/Taylor intersection be reversed from the existing operation to reduce the occurrence of the intersection blockage so that the westbound to southbound left-turn movement can operate more efficiently.

- For the future Year 2030 Saturday PM peak period, northbound vehicle queues on Taylor Way extending back from Marine Drive are predicted to extend back through the intersection providing access to Park Royal South and as well to the West Royal Towers residential development, regardless of whether traffic is backed up from the Lions Gate Bridge. To minimize vehicle queue blockage of this intersection, additional pavement marking, signage and enforcement is recommended to improve driver behaviour.
- As a further step, consideration should be given to restricting access to the Park Royal South west leg of the intersection to right-turn in/out traffic only. The affected left-turn traffic entering (northbound to westbound) and departing (eastbound to northbound) the shopping centre would be displaced to the East West Road and Marine Drive.
- As a result, the predicted northbound queues on the section of Taylor Way extending back from Marine Drive would be reduced by up to 30% and lower the occurrence of intersection blockage to West Royal Tower residences.
- There is sufficient surplus capacity at the other Park Royal access driveways to accommodate the left-turn traffic displaced away from the subject intersection.

5. SITE PLAN DESIGN REVIEW

5.1 Site Access Design

The planned access driveway to the proposed development connects directly to the Park Royal South internal road system. This internal east-west carries the lowest amount of vehicles out of the three streets which border the site (the other two being Taylor Way and Marine Drive), thus making it the preferred street for the vehicle access.

The District has raised concerns of the access being located on SFN land since Park Royal only leases this land from the SFN and does not own the land in perpetuity. Park Royal's lease of SFN land ends in 2053; therefore the possibility of losing vehicle access will not be issue for the next 35 years and likely for many years beyond as lease renewal is a reasonable assumption given the extent of investment in place on the Park Royal shopping centre site.

In the unlikely event that the lease is not renewed in 35 years time and the proposed development loses it access to Park Royal South Road, a vehicle access will be created onto Taylor Way. The development's has been designed such that a vehicle ramp connection direct to Taylor way can be provided for. Given the higher vehicle volumes and close proximity to the Taylor Way & Marine Drive intersection, the access would likely be limited to right-in and right-out vehicle movements only. This would cause all vehicles accessing the site to drive southbound on Taylor Way from Marine Drive and all vehicles leaving the site to drive southbound on Taylor Way. This is not anticipated to have substantial traffic operation impacts.

5.2 Cycling Facilities

The development plan for 752 Marine Drive includes a north/south off-street bike lane near the western edge of the site connecting Park Royal South Road to Marine Drive. This off-street bike lane will assist people cycling to/from the development site and the Park Royal South site in general.

Well managed, secure, accessible and covered bicycle parking will be provided as part of the development plan. The development will supply at least 265 secure spaces. The secure parking spaces will be located in a convenient location on the first level of underground parking. 232 spaces will be for residents (1.25 spaces per unit) and 33 spaces will be for employees working in the commercial and childcare areas. Two change rooms will be provided for employees to use and will be located adjacent to the bicycle parking area. Short term bicycle parking will be provided outdoors near building entrances.

5.3 Vehicle Parking Supply

5.3.1 Existing Parking Supply

The development will be located on the former White Spot property which was recently demolished. Prior to demolition, the property had 151 parking stalls. Following demolition, Park Royal temporarily increased the stall count to 182 while the design for 752 Marine Drive was finalized.

5.3.2 Development Parking Strategy

The proposed 752 Marine Drive development will provide a total of 237 parking stalls. The majority of the stalls will be located on three underground parking levels beneath the new buildings and 22 stalls will be located at surface level on the western side of the property. 185 stalls will be reserved for the 185 residential units and the remaining 52 stalls will be for the commercial and daycare uses and for residential visitor use.

5.3.3 Resident Parking

For multi-family residential developments, the District of West Vancouver Zoning Bylaw requires the greater of (i) 1 space per unit or (ii) 1 space per 84 square metres (904 square feet) of residential floor area. The residential floor area for the development is 183,336 square feet which yields a minimum parking supply requirement of 203 stalls for the 201 dwelling units (1.01 per unit). This minimum parking supply is for residents and their visitors.

The proposed 752 Marine Drive development will provide 185 stalls will be reserved for the residents of the 185 dwelling units (1.0 stall per dwelling unit). Visitor parking will be provided in the shared parking area for residential visitors as well as commercial and childcare land uses, taking advantage of the reduced parking demand in the evening period for these uses when visitor parking is most in demand.

5.3.4 Shared Commercial, Childcare and Residential Visitor Parking

The District of West Vancouver Zoning Bylaw minimum parking supply requirement for commercial floor space is 1 space per 200 square feet which would require 169 spaces for the proposed 33,789 square feet of commercial and childcare space. The development will be supplying 53 parking stalls for commercial and residential visitor use.

The Saturday parking demand forecast for the parking study area (see Exhibit 2.3 for study area) is summarized in **Table 5.1**. The existing peak parking demand in the study area on October 28, 2017 was 863 vehicles. Out of these 863 vehicles, an estimated 8 vehicles were generated by the TD Bank¹ which will be removed as part of the proposed development. Based on the ITE Parking Generation Manual 4th Edition the new commercial space at 752 Marine Drive is anticipated to generate a parking demand of 86 vehicles during the Saturday peak hour outside of December. The childcare space was assumed to generate zero parking on Saturdays.

Bunt's database information and the Metro Vancouver Apartment Parking Study indicates that residential visitor parking typically does not exceed 0.05 parking stalls per dwelling unit and that a supply of 0.1 parking stalls per unit is sufficient. For the planned 201 residential units at 752 Marine Drive, the residential visitor parking demand is therefore estimated to rarely exceed 10 stalls.

¹ A parking rate of 3.47 per 1,000 square feet (ITE Parking Generation, 4th Edition, Land Use 912) applied to the existing 2,400 square foot TD Bank.

Table 5.1: Commercial Parking Demand Analysis – Saturday

PARKING DEMAND	SATURDAY PARKING DEMAND
Existing	863
TD Bank	(8)
Existing Demand to be Retained	855
New Commercial Space at 752 Marine	95
New Childcare Space at 752 Marine	0
Residential Visitors	10
TOTAL	960

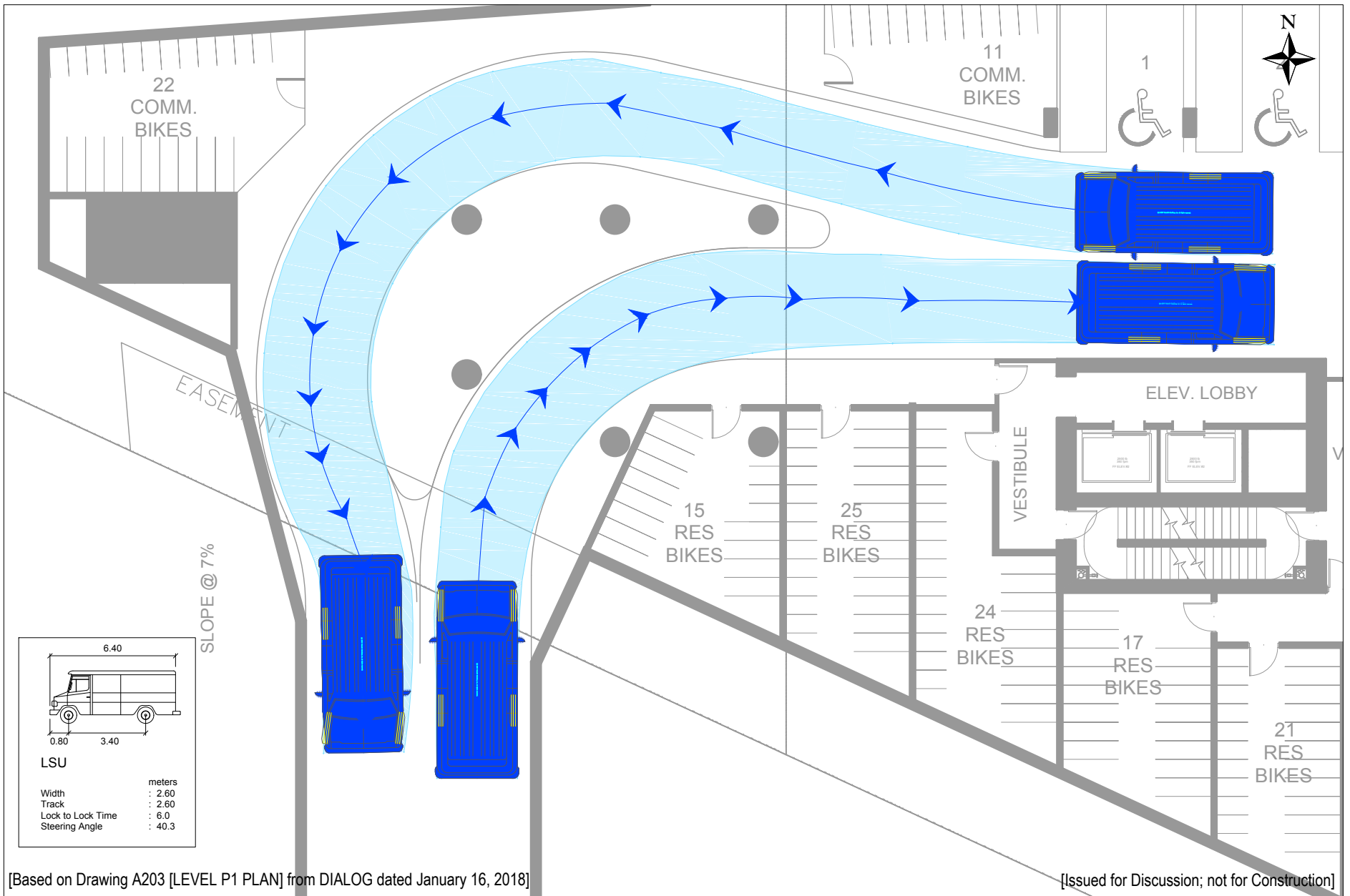
Following development, there will be 1,132 parking stalls available in the Park Royal parking study area for commercial users, resulting in a peak parking occupancy of 84% outside of the peak Christmas season shopping period in December. Additional parking will be available in the immediate area, either as surface parking in and around the new East Village retail precinct or in the expanded parkade facilities.

5.4 Service Vehicle Operations

Goods delivery to the residential buildings and the commercial and childcare uses on the 752 Marine Drive site will be served by four loading stalls; one curbside space on Park Royal South near Taylor Way and three underground loading stalls. As shown in **Exhibits 5.1 to 5.3**, a TAC LSU design vehicle (6.4 metres length, 2.6 metres width) is the largest delivery vehicle able access the underground loading stalls. Larger delivery vehicles will be directed to use the on-street loading stall adjacent to the site on Park Royal South Road.

Waste and recycling will be collected by privately contracted services using low height collection vehicles with access to garbage/recycle rooms located within the underground parking area. The turn path of a Ford F550 vehicle collecting the garbage compactor is shown in **Exhibits 5.4 to 5.6**.

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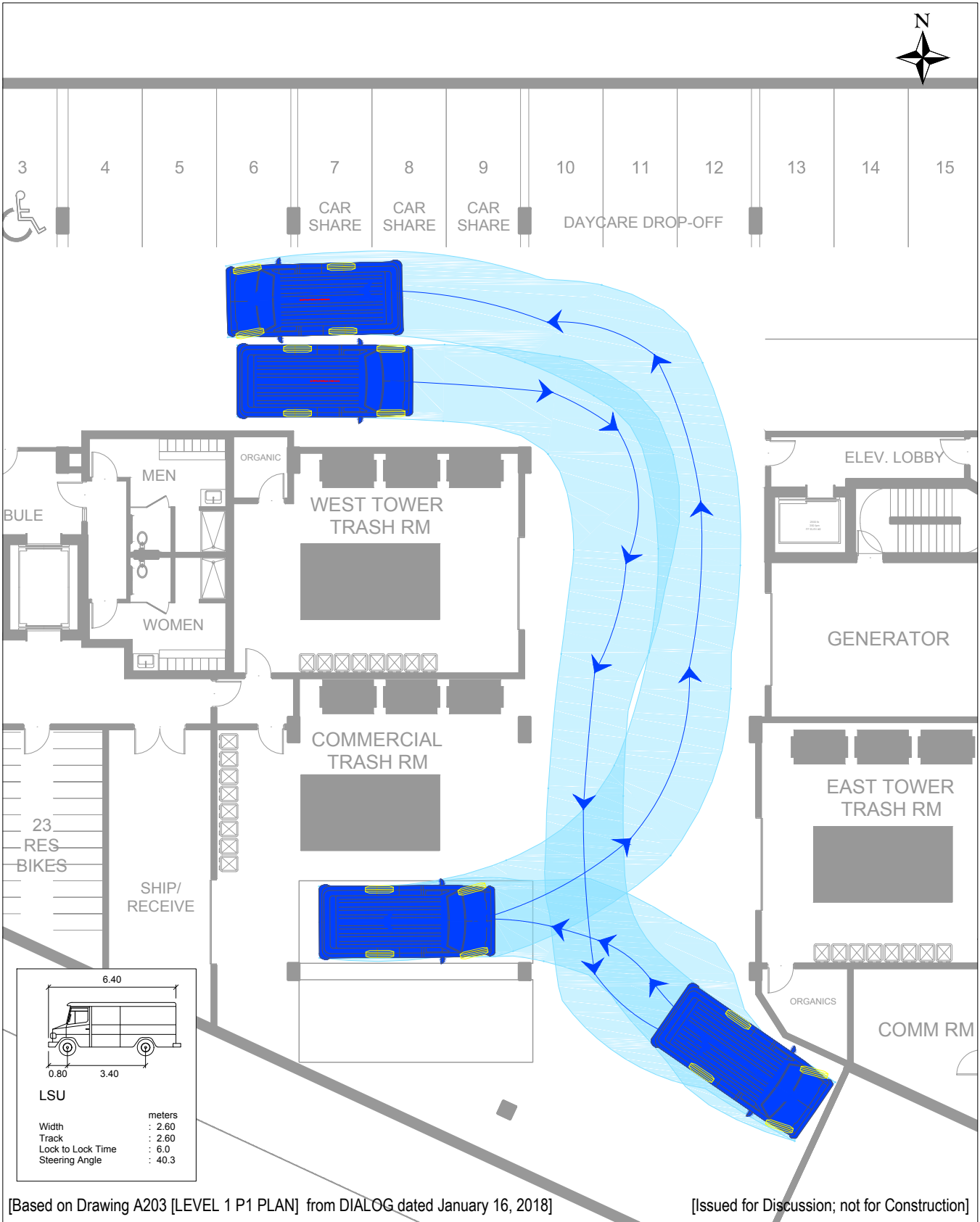


[Based on Drawing A203 [LEVEL P1 PLAN] from DIALOG dated January 16, 2018]

[Issued for Discussion; not for Construction]

Exhibit 5.1 Parkade Access - Loading Vehicle Swept-Path

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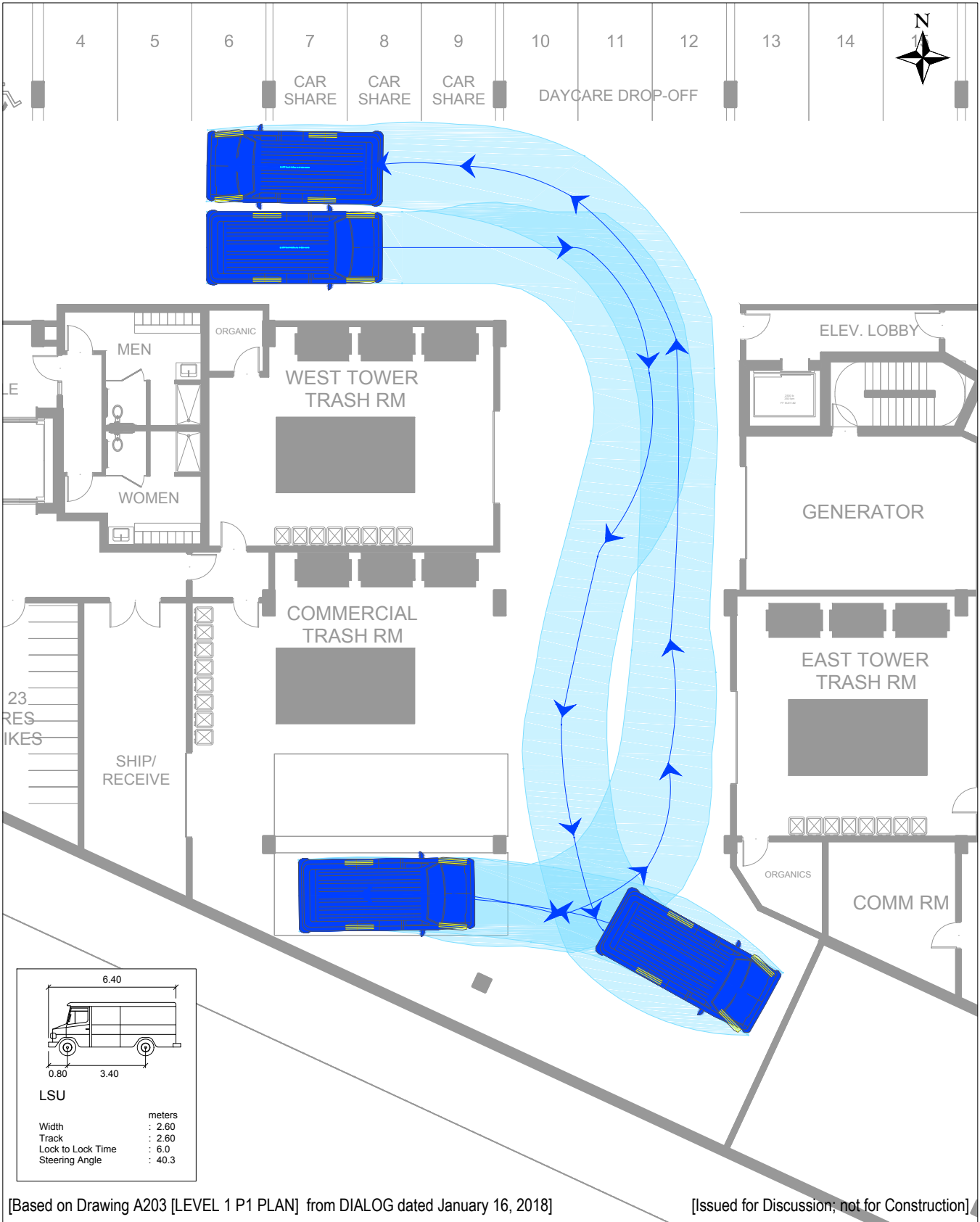
[Based on Drawing A203 [LEVEL 1 P1 PLAN] from DIALOG dated January 16, 2018]

[Issued for Discussion; not for Construction]

Exhibit 5.2 Loading Space #1 Swept-Path



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[Based on Drawing A203 [LEVEL 1 P1 PLAN] from DIALOG dated January 16, 2018]

[Issued for Discussion; not for Construction]

Exhibit 5.3 Loading Space #2 Swept-Path



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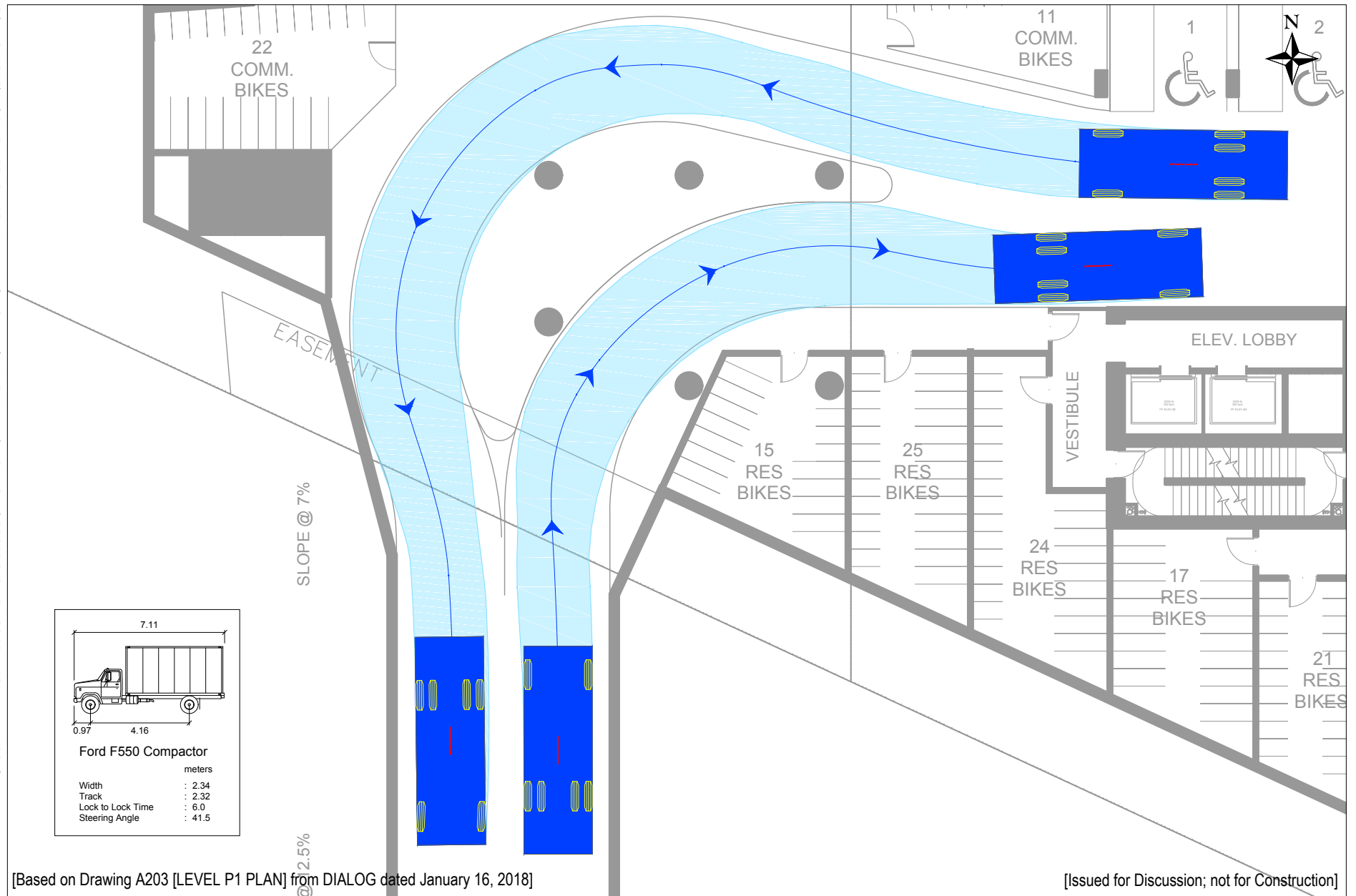


Exhibit 5.4 Parakde Access - Garbage Truck Swept-Path

04-17-0159

January 2018

Scale Custom on Letter

752 Marine Drive
 Prepared by SB



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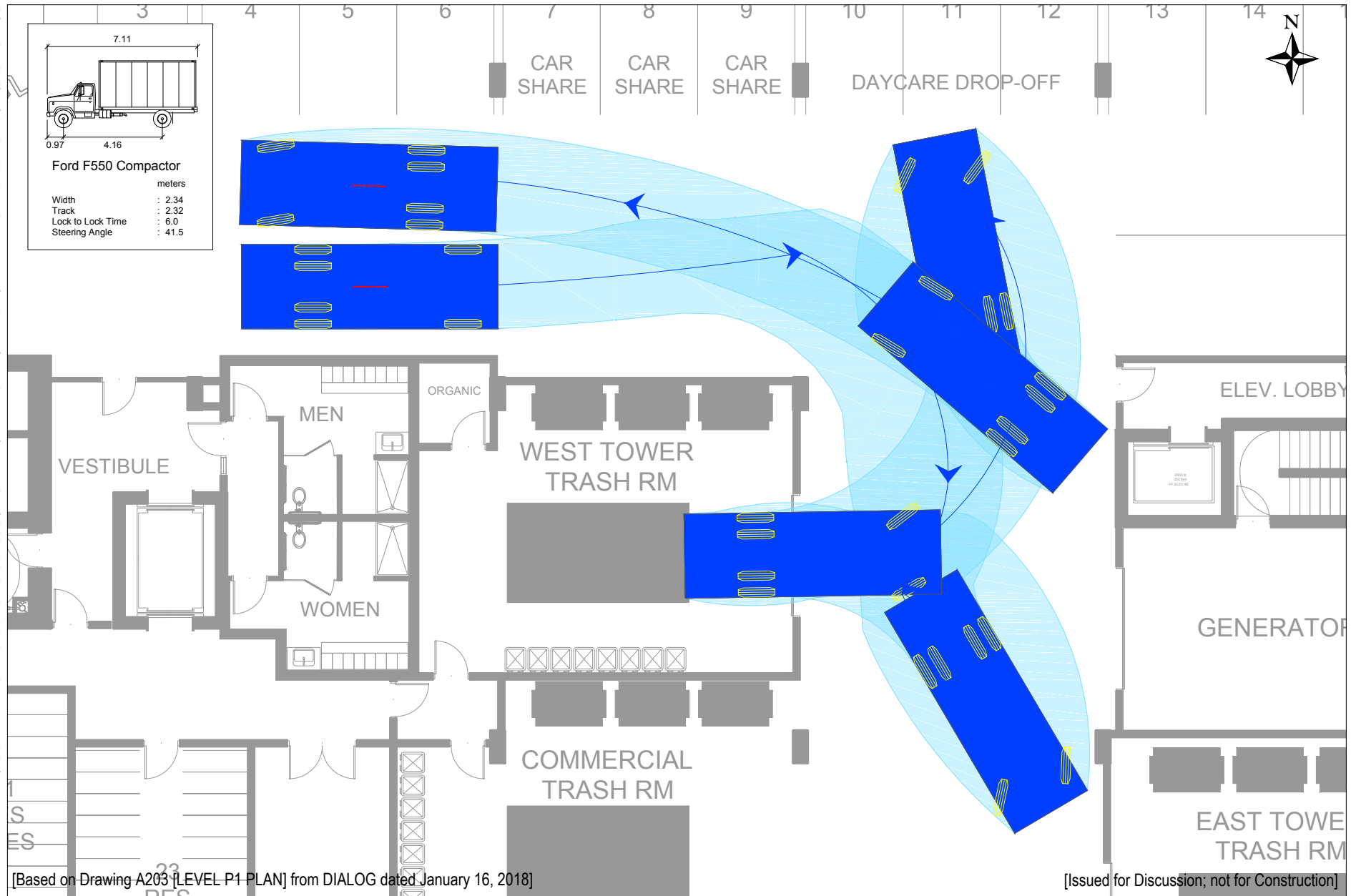


Exhibit 5.5 West Tower Garbage Compactor Swept-Path

04-17-0159 January 2018 Scale 1:150 on Letter

752 Marine Drive
Prepared by SB



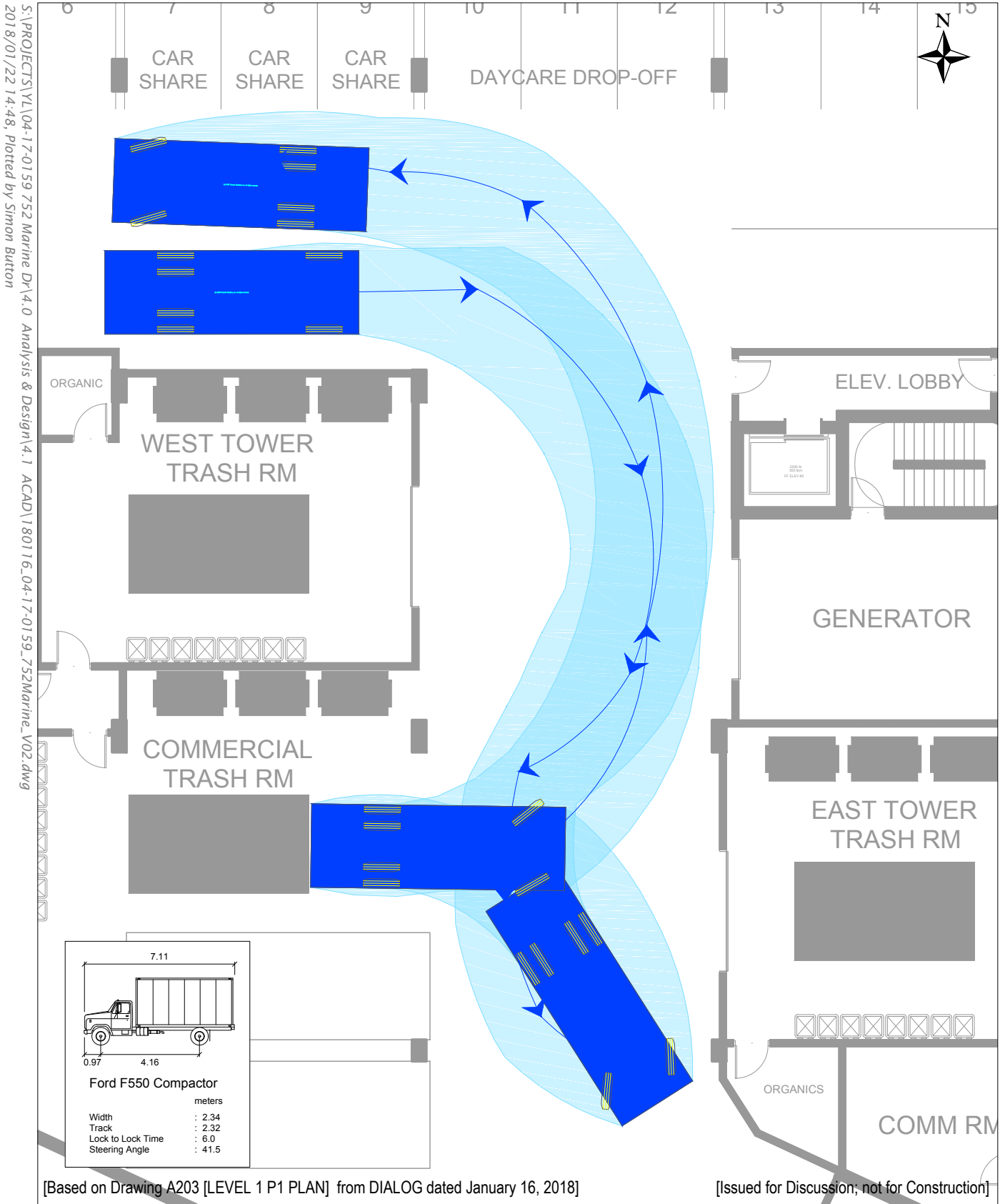
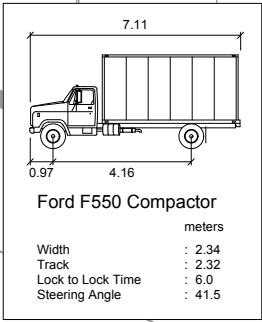
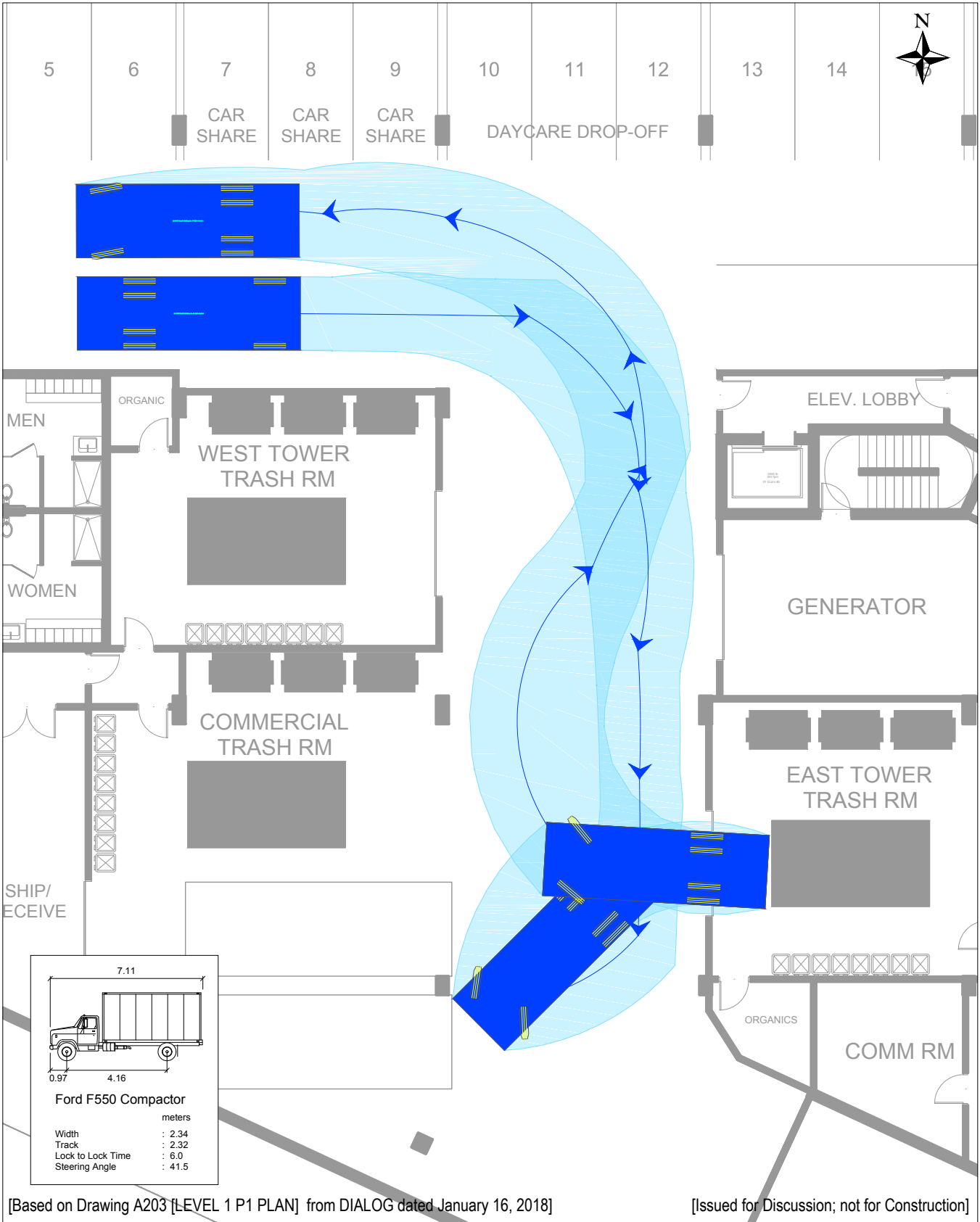


Exhibit 5.6 Commercial Garbage Compactor Swept-Path



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 2018/01/22 14:48, Plotted by Simon Butten



[Based on Drawing A203 [LEVEL 1 P1 PLAN] from DIALOG dated January 16, 2018]

[Issued for Discussion; not for Construction]

Exhibit 5.7 East Tower Garbage Compactor Swept-Path



6. TRANSPORTATION DEMAND MANAGEMENT

A fundamental planning principle for the 752 Marine Drive development is a commitment to sustainable transportation best practices. The addition of a residential component to the Park Royal Neighbourhood, locating residents within walking and cycling distance of shops and services and adjacent to a very well serviced public transit corridor will reduce the vehicle traffic generated by the development.

6.1 Definition

Transportation Demand Management (TDM) is defined as the “application of strategies and policies to reduce travel demand (specifically that of single-occupancy private vehicles), or to redistribute this demand in space or in time”². A successful TDM program can influence travel behaviour away from Single Occupant Vehicle (SOV) travel during peak periods towards more sustainable modes such as High Occupancy Vehicle (HOV) travel, transit, cycling or walking. The responsibility for implementation of TDM measures can range across many groups, including regional and municipal governments, transit agencies, private developers, residents/resident associations or employers.

6.2 TDM Strategy

The proposed TDM Strategy for the 752 Marine Drive development features several key elements to reinforce the sustainable transportation vision for the Park Royal Neighbourhood:

Car Share Vehicles

Two car share vehicles will be purchased by the developer and based in two designated car share vehicle parking spaces located on the site. In addition, first time purchasers of the residential units will be provided with membership to the car share organization operating the vehicles. Depending on the uptake for the first two vehicles, a third vehicle will potentially be purchased and added to the mix. The car share vehicles will be available to the residents of the proposed development and to area residents as well.

Bicycle Parking

A total of 265 secured bicycle parking spaces will be provided for the residents and employees in designated rooms in the underground parking area. Two change rooms will be provided for employees to use and will be located adjacent to the bicycle parking area.

² <http://ops.fhwa.dot.gov/tdm/index.htm> FHWA Travel Demand Management home page

Bike Valet Service

A bike valet service is also planned as part of the ground floor commercial/community serving uses on the 752 Marine Drive site to provide additional travel choice to area residents and shopping centre customers choosing to bike to the Park Royal Neighbourhood and seeking convenient and secure bike storage while visiting the area.

Pedestrian and Bicycle Infrastructure Upgrades

Discussions are presently underway between Park Royal and District of West Vancouver staff to achieve an improved east-west pedestrian and bicycle connection between Park Royal and a new shared use pedestrian and bicycle trail along the west side of the Capilano River between Marine Drive and Spirit Trail network along the south side of the Park Royal property. The new east-west connection is planned to intersect Taylor Way at the new traffic signal intersection planned for the east end of Road B.

7. SUMMARY & RECOMMENDATIONS

7.1 Summary

1. A total of 201 residential dwelling units are planned, plus approximately 30,000 square feet of commercial retail space and 3,000 square feet for childcare.
2. The traffic congestion that regularly develops at the Taylor Way & Marine Drive intersection and at times extends up Taylor Way through the Keith Road intersection is a function of traffic operations on the Lions Gate Bridge.
3. The former White Sport restaurant that was recently removed from the site used to generate approximately 84 vehicle trips during the weekday PM peak hour period. Conversely, the proposed development is anticipated to generate approximately 140 vehicle trips during peak hours; a net addition of 1 to 2 vehicles per minute during peak periods. The traffic operations at the study intersections are anticipated to have minimal changes from the background conditions.
4. Larco is committed to TDM. As such the development will provide 285 secure bicycle stalls, two car share vehicles and a number of active transportation infrastructure upgrades.
5. The vehicle parking supply and demand was assessed at, and surrounding the development site. The parking study area included 1,262 of approximately 5,300 parking stalls at Park Royal. From 1pm to 4pm on a Saturday the parking occupancy ranged from 65% to 68%.
6. The development will provide 254 vehicle stalls, which with the existing parking supply at Park Royal South, is anticipated to accommodate the parking demand from the proposed development.

7.2 Recommendations

1. The order of the northbound and southbound split signal phases at the Marine Drive & Taylor Way intersection should be reversed from the existing operation to reduce the occurrence of the intersection blockage so that the westbound left-turn movement can operate more efficiently.
2. Northbound vehicle queues on Taylor Way are forecasted to extend back from Marine Drive through the intersection providing access to Park Royal South and as well to the West Royal Towers residential development, regardless of whether traffic is backed up from the Lions Gate Bridge. To minimize vehicle queue blockage of this intersection, additional pavement marking, signage and enforcement is recommended to improve driver behaviour.
3. As a further step, consideration should be given to restricting access to the Park Royal South west leg of the intersection to right-turn in/out traffic only. The affected left-turn traffic entering (northbound to westbound) and departing (eastbound to northbound) the shopping centre would be displaced to the East West Road and Marine Drive.

APPENDIX A

Synchro Reports

