TRANSPORTATION PLANNERS AND ENGINEERS

bunt & associates

Highmark Homes Ladner

Transportation Impact Assessment

Version 4

Prepared for

Highmark Homes Ltd.

Date

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04-22-0470

CORPORATE AUTHORIZATION

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EXECUTIVE SUMMARY

Highmark Homes Ltd. is proposing to develop 211 residential dwelling units, addressed at 5349, 5359, 5367 Ladner Trunk Road and 4843, 4844 53 Street in Delta, BC. The Opening Day of the development is planned to be 2024, and the project is currently going through the Rezoning process.

Two vehicular accesses to the site are proposed: a primary access located on 53 Street between 48A Avenue and Ladner Trunk Road, and a secondary access on 48A Avenue between 53 Street and 54 Street. The two driveways would provide access to the site's 223 parking spaces provided underground.

A review of the existing conditions indicated that site is well served by transit along Ladner Trunk Road, given its close proximity to Highway 17A. The closest bus stops are located fewer than 100m walking distance from the site frontage, directly adjacent to the site.

In terms of key pedestrian locations, in addition to Linden Drive Park, which is located within 400m from the site, there are several more popular destinations located within 800m from the site, such as Trenant Park Square, Ladner Centre, Ladner Lions Park, Maple Crescent Park, and Delta Christian School.

In general, there are currently limited cycling facilities in the vicinity of the site. The notable bike routes nearby include 53 Street (Collector Road) as a shared lane.

A review of the existing traffic operations indicated that all the study area intersections and movements are currently operating within acceptable intersection performance parameters during the study peak hour periods; therefore, no intersection improvements are required to accommodate existing traffic demands.

To estimate the trip generation associated with the development, trip rates from the Institute of Transportation Engineers' *Trip Generation Manual (11th Ed)* were used. The proposed development is anticipated to generate approximately 80 two-way vehicle trips during the study peak hour periods. This translates to about 4 added vehicles onto the surrounding road network every 3 minutes, on average.

The future traffic operations analysis indicated that all study area intersections and movements are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate future traffic demands for either Background (without proposed development) or Total (with proposed development) traffic conditions.

A sight distance assessment was undertaken at the site access & 53 Street to ensure that the proposed property line would be able to achieve adequate sight distance for vehicles. The sightline analysis indicated that the required sight triangles can be maintained, provided that the areas defined by these clear sight triangles are kept clear of any visual obstructions.

The proposed bicycle parking supply of 230 spaces for the development (220 secure spaces + 10 visitor spaces) meets the minimum bylaw requirement of 221 spaces (211 secure spaces + 10 visitor spaces).

The off-street vehicle parking requirements for the proposed development were reviewed based on the City of Delta's Zoning Bylaw. The required parking supply for the development would be 312 spaces (291 resident and 21 visitor) compared to a proposed supply of 223 spaces (202 resident and 21 visitor), representing an overall shortfall of 89 spaces (or a 29% variance). It is understood that the applicant is currently in separate discussions with the City of Delta regarding the proposed parking variance, and supporting rationale for the shortfall would be provided by the applicant under separate cover.

As requested by the City, an on-street parking review was conducted in the vicinity of the site. The busiest segment is located on the east side of 53 Street, north of 48A Avenue. Even though this segment was recorded as being fully occupied at the time of survey, it is one of the further parking locations which only provides space for about 2 parked vehicles on-street. Given that the overall on-street parking occupancy is about 13%, even if a user from the development chose to park on-street, it would not be anticipated to negatively impact the neighbouring on-street parking supply. The rest of the current on-street parking supply around the development site is sufficient and would potentially be able to meet the excessive parking demand of visitors. However, it is emphasized that the parking demand of the proposed development is anticipated to be accommodated entirely on-site. It is anticipated that on-street parking along the south side of 48A Avenue would generally not be impacted after the site is developed, with exception to the areas near the secondary driveway and loading zone.

On-site vehicle swept path circulation was reviewed using AutoTURN analysis software. The AutoTURN analysis indicated that generally, passenger vehicles would be able to pass each other concurrently within the site's parkade. Based on the swept path analysis at the first turn of the parkade, it is recommended to place a stop bar for southbound vehicles exiting the site, along with a convex mirror on the nearby column, to improve driver visibility at this turn so that there is less potential conflict with vehicles entering the site from 53 Street. Passenger vehicle circulation was generally found to be adequate throughout the rest of the parkade.

The City's Zoning Bylaw requires that 1 loading space per building with more than 80 dwelling units be provided. This translates to a requirement of 2 loading spaces for the development. The current site plan includes two loading spaces: one on the site's frontage along 53 Street and another along 48A Avenue. For the loading zones, adequate curb design and signage would be implemented to assist with the facilitation of safe and efficient delivery of goods and services to the site. Also, in line with Bylaw requirements, the loading zones would be surfaced with permanent hard surfaces, be well lit, and may include paint markings to designate the space in addition to signage. Based on discussions with the Design Team in consultation with the City of Delta, the loading zone in the northeast corner of the site would be timed/scheduled for garbage and recycling collection. To assist with this approach, a scheduling system would be implemented, with loading/waste collection management and communications protocol that would be prepared and adhered to.

1. INTRODUCTION

1.1 Background

Highmark Homes Ltd. is proposing to develop 211 residential dwelling units, addressed at 5349, 5359, 5367 Ladner Trunk Road and 4843, 4844 53 Street in Delta, BC. The Opening Day of the development is planned to be 2024, and the project is currently going through the Rezoning process.

As part of the approvals process, the City of Delta (City) requires that a Transportation Impact Assessment (TIA) study be conducted to analyze the impact of the development on the surrounding study area. In addition, the City has also requested a sight distance analysis be conducted related to a city-required property line corner cut at the northwest corner of the site.

In response to this request, Highmark Homes Ltd. retained Bunt & Associates Engineering Ltd. (Bunt) to conduct the required TIA. The scope of the study was developed in consultation with City of Delta staff and the agreed upon Terms of Reference (ToR) is included in **Appendix A**. Bunt's findings and recommendations are documented in the following report. Note that this version of the report has been updated to reflect City feedback and project design changes.

1.2 Organization of Report

The report sections of the study have been organized as follows:

- **Section 1** presents the study background, site location, and details of the proposed development.
- **Section 2** presents the existing conditions, including land use, road network, transit, cycling, and pedestrian facilities. In addition, the existing traffic conditions in the study area are analyzed.
- **Section 3** assesses the future traffic conditions, including estimating the site trip generation, and analyzes the traffic operations with and without these trips on study road network.
- **Section 4** includes a sight distance analysis related to the requested property line corner cut requested by the City of Delta at the southwest corner of the site.
- **Section 5** reviews the site design, including parking, bicycle parking, and loading supply, along with an overview of site servicing and vehicle circulation.
- **Section 6** provides the conclusions and recommendations of the study.

1.3 Proposed Development

1.3.1 Site Location

The site is located at 5349, 5359, 5367 Ladner Trunk Road and 4843, 4844 53 Street in the Ladner community in Delta, BC. The site is situated within the Ladner Village Core (as defined by the Ladner Official Community Plan), north of Ladner Trunk Road, and east of 53 Street. The site location is shown in **Exhibit 1.1**.

1.3.2 Proposed Form of Development

The proposed development would be comprised of 211 residential dwelling units, of which 124 units would be market and 87 units would be rental. To accommodate the new development, 2 single family homes currently occupying the site would be demolished prior to construction. A summary of the development plan based on the latest site statistics is included in **Table 1.1**.

Table 1.1: Development Plan

BUILDING NUMBER (# OF DWELLING UNITS)	FLOOR	QUANTITY (DWELLING UNITS)
Building 1 (Market)	First Floor	0
	Second Floor	16 (3 Adaptable)
	Third Floor	27 (5 Adaptable)
	Fourth Floor	27 (5 Adaptable)
	Fifth Floor	27 (5 Adaptable)
	Sixth Floor	27 (7 Adaptable)
	Total	**124 (25 Adaptable)**
Building 2 (Rental)	First Floor	0
	Second Floor	11 (3 Adaptable)
	Third Floor	19 (4 Adaptable)
	Fourth Floor	19 (4 Adaptable)
	Fifth Floor	19 (4 Adaptable)
	Sixth Floor	19 (2 Adaptable)
	Total	**87 (17 Adaptable)**
OVERALL		211 (42 ADAPTABLE)

The proposed site plan for the development is shown in **Exhibit 1.2**.

Two vehicular accesses to the site are proposed: a primary access located on 53 Street between 48A Avenue and Ladner Trunk Road, and a secondary access on 48A Avenue between 53 Street and 54 Street. The two driveways would provide access to the site's 223 parking spaces provided underground.

Based on discussions with the applicant and the City, it is understood that the existing laneway that runs through the site will be bought from the City. It is also understood that the neighbouring Delta Cable property east of the site would be accessed from 48a Avenue, per discussions with the City and applicant. The existing driveway accesses on Ladner Trunk Road would be closed upon development of the site.



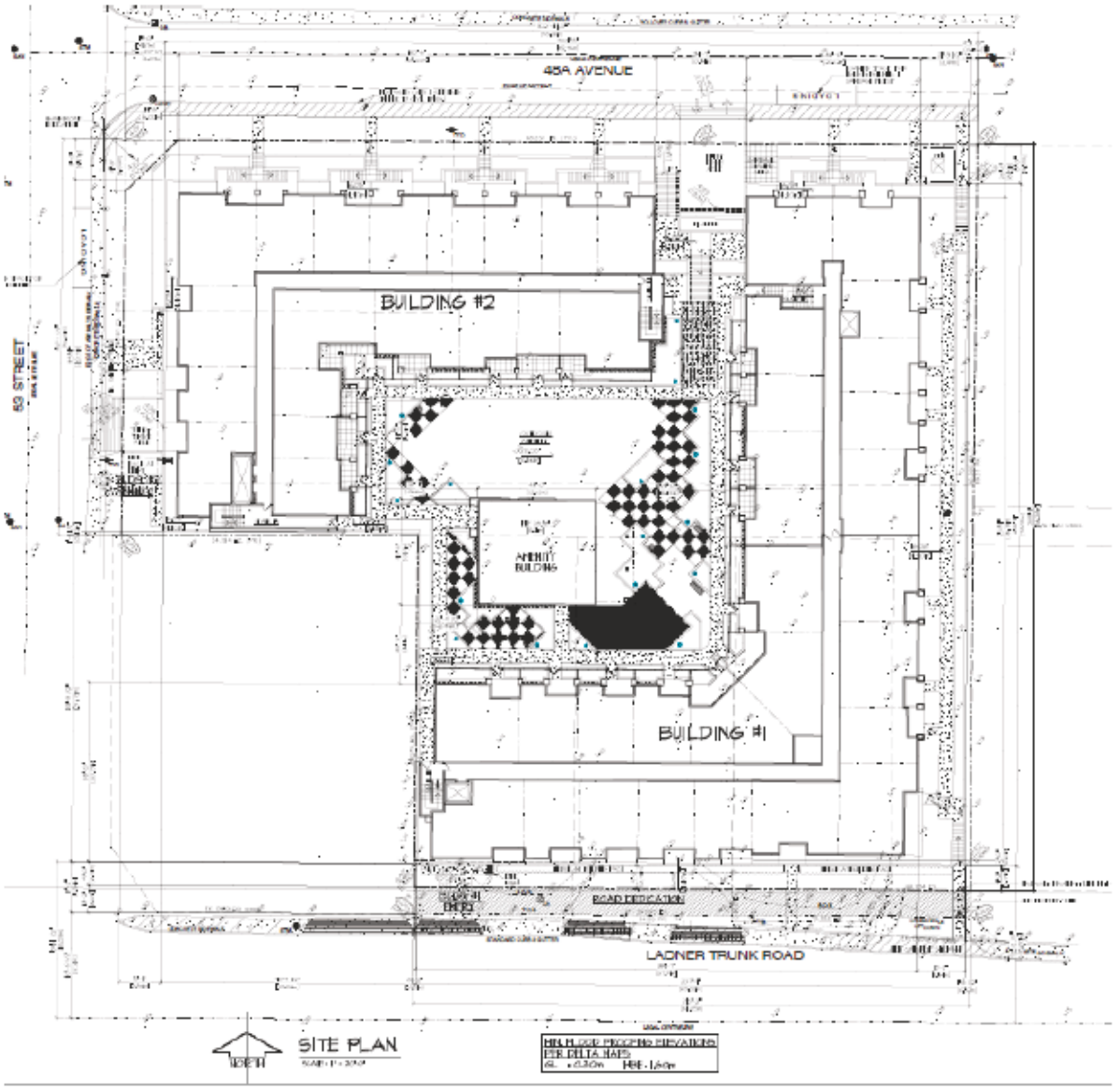
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Exhibit 1.1

Site Location & Surrounding Area

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Scale: NTS

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Exhibit 1.2

Site Plan

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2. EXISTING CONDITIONS

2.1 Existing Land Use

The existing site is occupied by 2 single family homes, which would be demolished prior to construction of the new development. The property is bordered by Ladner Trunk Road to the south, 53 Street to the west, neighboring residential developments to the north and retail development to the east.

2.2 Existing Transportation Network

2.2.1 Road Network

Table 2.1 summarizes the characteristics of the adjacent road network. **Exhibit 2.1** illustrates the existing road network and traffic control in the study area.

Table 2.1: Existing Street Characteristics

STREET	CLASSIFICATION	NUMBER OF TRAVEL LANES[1]	POSTED SPEED	TWO-WAY PEAK HOUR VEHICLE VOLUMES (VPH)	ON-STREET PARKING
Ladner Trunk Road	Arterial	4	50 km/h	AM: 1,000 Midday: 1,300 PM: 1,570	None
53 Street	Collector	2	50 km/h	AM: 230 Midday: 300 PM:340	Both sides
48A Avenue	Local	2	50 km/h	AM: 30 Midday: 40 PM:50	Both sides

1. Number of through travel lanes on the roadway in vicinity of the site.
2. Midday traffic volumes were obtained by applying a factor of 1.3 to AM traffic volumes at all intersections. The converting factor was estimated based on the City Link data.

2.2.2 Transit Network

The existing development is well served by transit along Ladner Trunk Road, given its close proximity to Highway 17A (approximately 1.3 km away). **Exhibit 2.2** shows the transit routes in the study network within 800m of the site and beyond, while **Table 2.2** provides a summary of nearby bus stop locations and amenities.

Table 2.2: Nearby Transit Routes and Stops

STOP LOCATION	DIRECTION	STOP #	AMENITY	ROUTES SERVICED	WALKING DISTANCE
EB Ladner Trunk Road FS 53 Street	EB	57392	Shelter and Bench	601, 616, 618	30m
WB Ladner Trunk Road FS 53 Street	WB	57401	Shelter and Bench	601, 618	80m
Central Ave @ 4900 Block	SB	57555	None	608, 618	560m
Central Ave @ 4900 Block	NB	57504	None	608, 618	480m
Central Ave @ Ladner Trunk Rd	SB	57556	None	606, 618	400m
Central Ave @ Ladner Trunk Rd	NB	57503	Bench	606, 618	400m

Note: FS = far-side.

The #616 and #618 bus routes provide east-west and north-south connections locally within Ladner, respectively. The #601 bus route connects South Delta, by way of Ladner, to Richmond's Bridgeport Station for connection to the Canada Line. The closest bus stops are located fewer than 100m walking distance from the site frontage, directly adjacent to the site.

Table 2.3 provides a summary of the transit service frequency of the routes directly serving the site.

Table 2.3: Existing Transit Service Frequency

ROUTE		WEEKDAY SERVICE SPAN		HEADWAY (MIN.)				
#	DIRECTION	START	END	AM	MID-DAY	PM	EVENING	WEEKEND
601	EB/WB	4:16 am	2:42 am	10	15	12	20	20
606	NB/SB	4:40 pm	7:00 pm	-	-	30	-	-
608	NB/SB	5:50 am	7:47 am	16	-	-	-	-
616	EB/WB	7:52 am	6:55 pm	20	30	20	-	30
618	EB/WB	8:10 am	7:27 pm	30	30	30	30	30

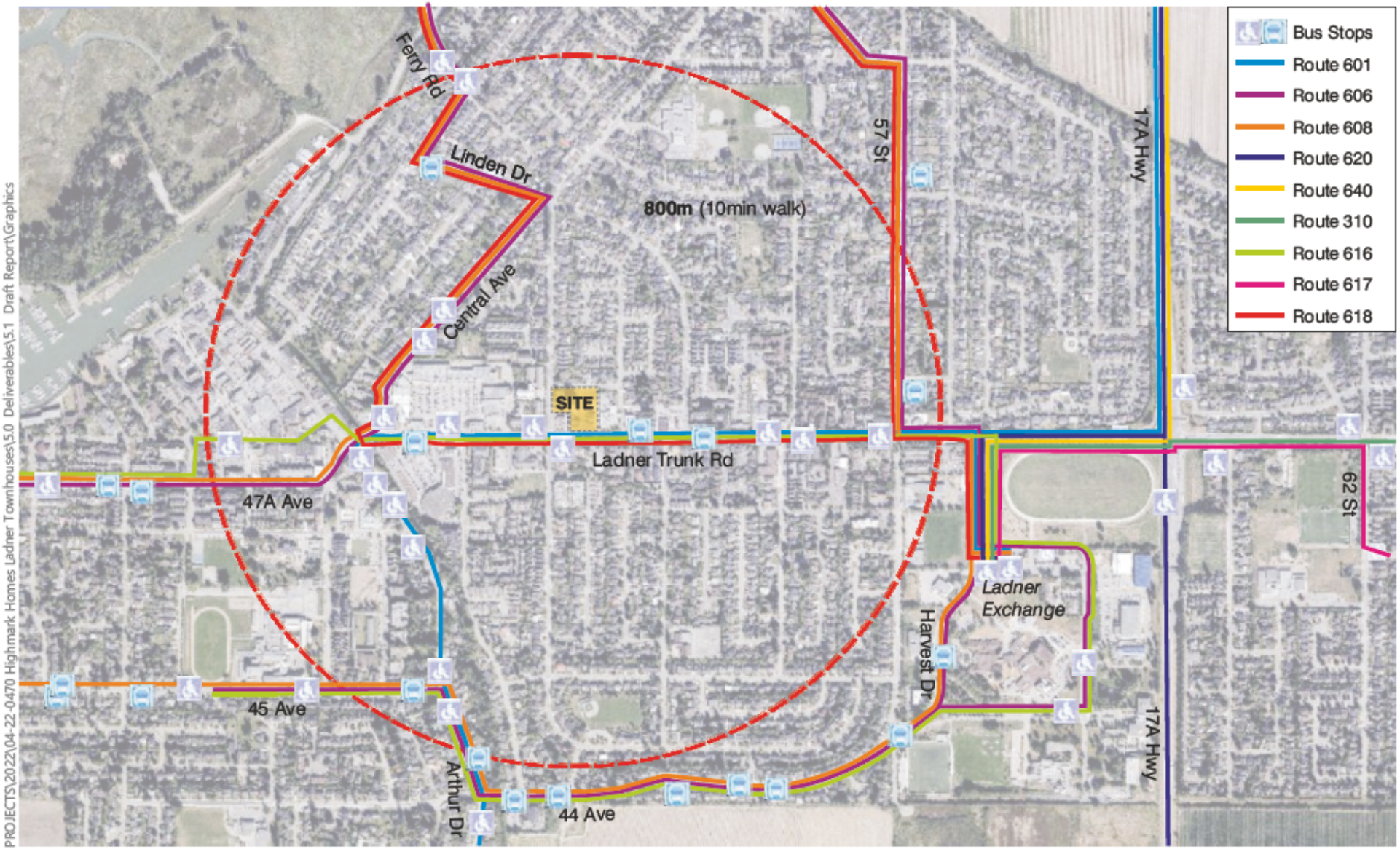
As shown above, the bus routes servicing the site run frequently with headways of less than 30 minutes, seven days a week, with the #601 route arriving every 10 to 12 minutes during the AM and PM peak periods. While the site is not located on TransLink's Frequent Transit Network (FTN), this level of frequency is generally consistent with that of an FTN route during these peak times (i.e., transit service every 15 minutes or better).



Exhibit 2.1
Existing Laning and Traffic Control

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Exhibit 2.2

Nearby Transit Routes & Stops

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2.2.3 Pedestrian & Cycling Networks

Pedestrian Network

Walking is an everyday activity whether as a single-purpose journey or linked with transit and driving. Typically, people are willing to walk up to 15-minutes for certain activities (i.e., work, school, recreational activities.) and 400 to 800m is the average distance for such trips.

The majority of streets in the vicinity of the site have sidewalks on at least one side of the roadway although some older local roadways with limited connections or limited residential units have no sidewalks. Along the site frontage, sidewalks exist on both sides of Ladner Trunk Road and 53 Street, and 48A Avenue only has one sidewalk along the north side. In addition, 53 Street & Ladner Trunk Road intersection is controlled by a pedestrian signal, enabling a protected crossing for pedestrians at this intersection.

In terms of key pedestrian locations, in addition to Linden Drive Park, which is located within 400m from the site, there are several more popular destinations located within 800m from the site, such as Trenant Park Square, Ladner Centre, Ladner Lions Park, Maple Crescent Park, and Delta Christian School. **Exhibit 2.3** displays the nearby pedestrian amenities.

According to Walk Score (https://www.walkscore.com/), the site has a Walk Score of 80 out of 100, which puts the site in the "Very Walkable" class. Walk Score is an online rating website that estimates the walking, transit, and cycling score of a location based on its proximity to local services such as schools, shopping, recreation, and other nearby amenities.

Cycling Network

Cyclists can generally travel 3 to 4 times the distance of pedestrian over a similar period of time, and therefore cycling 4 to 5 km from the site would be a reasonable distance for a resident or site user to travel. The average cycling speed for commuters is about 15 km/h, and the average distance per journey is approximately 5 km. This equates to about a 20-minute journey on average. Cycling is increasingly becoming a more popular travel mode for work and leisure.

In general, there are currently limited cycling facilities in the vicinity of the site. The notable bike routes nearby include 53 Street (Collector Road) as a shared lane.

Similar to the Walk Score, the site also has a Bike Score of 57 out of 100, which puts the site in the "bikeable" class, indicating that biking is convenient for some trips.

Exhibit 2.4 highlights the nearby cycling amenities.



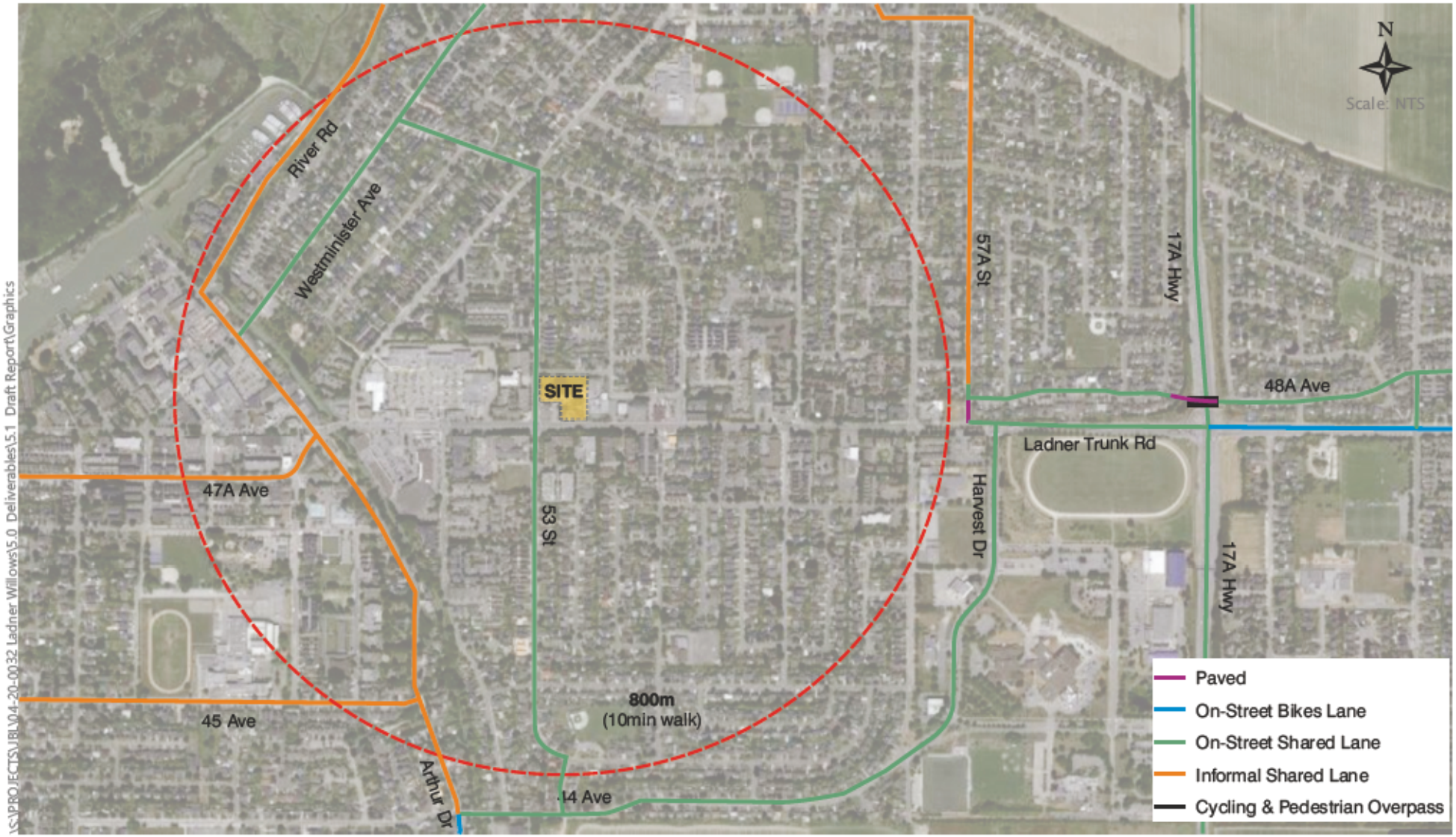
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Exhibit 2.3

Pedestrian Amenities

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Exhibit 2.4

Cycling Amenities

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2.3 Data Collection

2.3.1 Traffic Data Collection Program

Bunt conducted traffic counts on Wednesday, January 18, 2023, covering the weekday morning (7:00 am to 9:00 am) and afternoon (3:00 pm to 6:00 pm) peak traffic periods of the study area network. The volumes were reviewed across the network to determine the overall peak hour. A site visit was also conducted at this time. Note that these traffic counts were conducted after the effects of the pandemic. The City of Delta also provided link volumes on Ladner Trunk Road in the vicinity of the site, which were used as a reference point.

Table 2.4 provides a summary of the traffic count data of study intersections. Counted traffic volumes are also attached in **Appendix B**.

Table 2.4: Summary of Available and Counted Traffic Data

INTERSECTION	DATE OF COUNT	SOURCE	PEAK HOUR
53 Street & Ladner Trunk Road (Full Turning Movement Count)	Wednesday, January 18, 2023	Bunt	AM: 8:00-9:00 PM: 16:15-17:15
53 Street & 48A Avenue (Full Turning Movement Count)	Wednesday, January 18, 2023	Bunt	AM: 8:00-9:00 PM: 16:15-17:15
Ladner Trunk Road between 52A Street & 53 Street (Link Volumes)	Wednesday, December 4, 2019	City of Delta	Mid-day: 12:00-13:00
OVERALL STUDY AREA PEAK HOUR			AM: 8:00-9:00 MID-DAY: 12:00-13:00 PM: 16:15-17:15

Existing peak hour traffic volumes at the study area intersections are illustrated in **Exhibit 2.5**. It is noted that traffic volumes were balanced between the counted intersections where appropriate. Existing pedestrian and cyclist volumes were counted and applied at all study area intersections.

2.3.2 Data Adjustments

After Bunt collected firsthand traffic volume data in January 2023, the City requested that mid-day peak hour analysis be conducted for the study. The City also provided Bunt with Ladner Trunk Road link volumes collected near 53 Street in 2019 (including mid-day data). As such, Bunt reviewed the link volumes collected in 2019 against the AM and PM peak hour volumes Bunt counted in 2023. In general, the 2023 volumes were up to 20% higher than the 2019 volumes. Thus, no data adjustments were made to the AM and PM peak hour volumes Bunt counted in 2023.

To estimate 2023 mid-day peak hour volumes at the Ladner Trunk Road & 53 Street intersection, Bunt reviewed the 2019 traffic data daily volume profile in further detail. As the 2019 link volumes included

only eastbound and westbound flows, the average of both directions was used to determine an appropriate factor of adjustment.

Based on the 2019 traffic volume data, it was determined that the 2019 mid-day peak hour link volumes were approximately 30% higher than the 2019 AM peak hour link volumes, while the 2019 PM peak hour link volumes were approximately 7% higher than the 2019 mid-day peak hour link volumes. After reviewing these two estimation methods, it was determined that estimating mid-day peak hour link volumes based on PM peak hour link volumes would produce higher, more conservative forecasts for mid-day peak hour link volumes.

For consistency, Bunt applied this same methodology to forecast 2023 mid-day peak hour intersection volumes. Essentially, the 2023 mid-day peak hour intersection volumes were estimated by applying a 7% reduction to the 2023 PM peak hour intersection volumes as a conservative approach.

2.3.3 Existing Site Vehicle Trip Generation

Although two existing single-family homes would be demolished prior to construction of the development, they represent negligibly low peak hour trip generation. To be conservative, the existing site-generated trips were not removed from the network when establishing future traffic volumes with the proposed development in place. As such, for Existing and Background scenarios, northbound and southbound through trips on 53 Street at the site access were assumed to be the only movements at this intersection, and volumes were balanced as appropriate with the adjacent Ladner Trunk Road intersections at 53 Street, and 48A Avenue.



Exhibit 2.5
Existing Peak Hour Vehicle Traffic Volumes

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04-22-0470 March 2023

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2.4 Existing Traffic Operations

2.4.1 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 11 analysis software, as consistent with other recent studies in Delta. The traffic operations were assessed using the performance measures of Level of Service (LOS), volume-to-capacity (V/C) ratio, and 95th percentile queue lengths.

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 2.5 below summarizes the LOS thresholds for the six Levels of Service, for both signalized and unsignalized intersections.

Table 2.5: 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.

Typically, performance measure thresholds are established by municipalities. The City of Delta requires that each movement at study intersections be projected to operate at LOS D or better with a v/c ratio of 0.85 or less under all horizons considered. These thresholds are applied to all intersections regardless of the intersection location (urban or suburban), traffic control (signalized or stop-controlled), or intersecting road classifications (arterial, collector, or local); all of these elements somewhat influence driver expectations for intersection operations.

The 95th percentile queue is defined as the length that has only a 5-percent probability of being exceeded during the analysis time period. It is a useful parameter for determining the appropriate length of turning storage bays, but it is not typical of what an average driver would experience.

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: Consistent with other recent studies in Delta, HCM 2000 LOS, V/C and 95th percentile queue output is reported using an actuated uncoordinated signal, with modelling that very closely resembles the behaviour of the signal.
- For unsignalized one-way stop-controlled intersections: HCM 2000 LOS, V/C and 95th percentile queue output is reported just for individual lanes as the HCM methodology does not report overall performance.
- 95th percentile queue lengths reported have been rounded to the nearest 5m.

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

2.4.2 Existing Conditions Analysis Assumptions

Synchro Parameters

The analysis was completed utilizing Synchro defaults for the majority of parameters with a default saturation flow of 1,900 vehicles per hour. Pedestrian and cyclist volumes, and percentage of heavy vehicles were taken from existing traffic count observations.

The numbers of conflicting pedestrians and cyclists were assumed consistent through all horizons, which were obtained from the original traffic counts. As a conservative estimate, the numbers of conflicting pedestrians at site access and 53 Street intersection were assumed to be 10 for all directions, and mid-day conflicting pedestrian and cyclist numbers at all intersections were assumed to be the same as in the PM peak hour.

2.4.3 Existing Operational Analysis Results

A summary of the existing operations is presented below in **Table 2.6**.

Table 2.6: Existing Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	AM			MID-DAY			PM		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-	*A*	-	-
	WB	B	0.03	0	B	0.03	0	B	0.04	0
	NB	A	0.04	0	A	0.08	0	A	0.08	0
	SB	A	<0.01	0	A	<0.01	0	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.33*	-	*A*	*0.38*	-	*A*	*0.39*	-
	EBL	A	0.05	5	A	0.23	20	A	0.26	20
	EBTR	A	0.32	30	A	0.46	50	A	0.45	55
	WBL	A	0.18	15	A	0.12	10	A	0.14	10
	WBTR	A	0.33	30	A	0.37	40	A	0.37	45
	NBLT	B	0.20	10	B	0.22	15	B	0.23	15
	NBR	B	0.02	5	B	0.01	5	B	0.02	5
	SBLT	B	0.31	15	B	0.23	15	B	0.25	15
	SBR	B	0.04	5	B	0.08	10	B	0.09	10

The existing traffic analysis indicated that all study area intersections are currently operating within acceptable intersection performance parameters during the study peak hour periods; therefore, no intersection improvements are required to accommodate existing traffic demands.

3. FUTURE TRAFFIC CONDITIONS

3.1 Traffic Forecasts

3.1.1 Background Traffic Forecasts

Background traffic is traffic that would be present on the road network if the site did not redevelop. As agreed to in the Terms of Reference with the City of Delta, and consistent with previous Bunt studies in the City of Delta, a linear growth rate of 1% per year was applied to establish Background traffic volume estimates. The Opening Day 2024 Background traffic volumes are shown in **Exhibit 3.1**, and 2029 Background traffic volumes are shown in **Exhibit 3.2**.

3.1.2 Site-Generated Traffic

Trip Generation

To estimate the trip generation associated with the development, Bunt used rates published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Ed). Specifically, the manual's Multi-family Housing (Mid-rise) code 221 trip rate was used to determine the AM and PM trip generation for the site. Note that, to be conservative, the mid-day peak hour trip generation rate was assumed to be the same as the PM peak hour trip generation rate, and the mid-day distribution percentage of inbound and outbound trips was obtained by averaging AM and PM peak hour distribution percentages.

Table 3.1: Estimated Net New Peak Hour Trip Generation

LAND USE	SIZE	DESCRIPTION	AM PEAK HOUR			MID-DAY			PM PEAK HOUR		
			IN	OUT	TOTAL	IN	OUT	TOTAL	IN	OUT	TOTAL
Multi-family Housing (Mid-rise)	211 units	Trip Rate[1]	23%	77%	0.37	42%	58%	0.39	61%	39%	0.39
		Vehicle Trips	18	60	78	35	48	82	50	32	82

1. ITE (221), 10th Edition: Multi-Family Housing Mid-Rise rate

As shown above, the proposed development is anticipated to generate approximately 80 two-way vehicle trips during the study peak hour periods. This translates to about 5 added vehicles onto the surrounding road network every 4 minutes, on average. Note that the number of site trips was updated in this version of the report to reflect the latest development statistics. The previous version of the report indicated 75 trips would be generated by the development. It is Bunt's opinion that this change is nominal, and as such, the traffic operations analysis in this section was maintained based on the previous version.

The resulting site generated traffic volumes are illustrated in **Exhibit 3.3**.



Exhibit 3.1
Opening Day (2024) Background Traffic Forecasts

Highmark Homes Ladner Townhouses
04-22-0470 March 2023

bunt & associates



Exhibit 3.2
2029 Background Traffic Forecasts

Highmark Homes Ladner Townhouses
04-22-0470 March 2023

bunt & associates



Exhibit 3.3
Site Traffic Forecasts

Highmark Homes Ladner Townhouses
04-22-0470 March 2023

bunt & associates

All vehicular trips were distributed to the road network based on existing traffic patterns and using logical routing patterns given the site layout. Note that the traffic volume exhibits and corresponding analysis were maintained based on the previous site access layout to conservatively assess operations at the study intersections. For instance, the analysis conservatively assumed the 53 Street access would facilitate full movements for all site generated vehicle trips.

3.1.3 Total Traffic

The future Total traffic for 2024 horizon and 2029 horizon were calculated by adding the site traffic to the 2024 and 2029 Background traffic, respectively. Results were illustrated in **Exhibit 3.4** and **Exhibit 3.5**.



Exhibit 3.4
Opening Day (2024) Total Traffic Forecasts

Highmark Homes Ladner Townhouses
04-22-0470 March 2023

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Exhibit 3.5
2029 Total Traffic Forecasts

Highmark Homes Ladner Townhouses
04-22-0470 March 2023

bunt & associates

3.2 Future Traffic Operations

3.2.1 Future Conditions Analysis Assumptions

Similar to existing conditions, the future analysis was carried out using Synchro 11 and the HCM 2000 methodology. The same performance thresholds were also used to trigger consideration of roadway or traffic control improvements, as detailed in Section 2.4.

The Ladner Official Community Plan (OCP) indicates that Ladner Trunk Road, between 53 Street and 57 Street, may be widened to 5 lanes in the long-term future (5-10 years from Council adoption). However, given that this may be confirmed beyond the study horizon years, Ladner Trunk Road was conservatively assumed to remain as a 4-lane arterial road for the purposes of this analysis.

3.2.1 Opening Day Traffic Operations

Table 3.2, 3.3 and 3.4 summarize the capacity analysis results for the weekday AM, mid-day and PM peak hours for the future Opening Day (2024) Background and Total traffic scenarios. Traffic volumes were not considered significantly impacted by the newly proposed number of dwelling units, and thus the intersection capacity analysis remained unchanged as the previous version. The detailed Synchro outputs are included in Appendix C.

Table 3.2: Opening Day (2024) Traffic Operations – Weekday AM Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	A	0.03	0	B	0.03	0
	NB	A	0.04	0	A	0.04	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.08	0
	NB	-	-	-	A	0.04	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.34*	-	*A*	*0.36*	-
	EBL	A	0.05	5	A	0.08	5
	EBTR	A	0.33	30	A	0.36	30
	WBL	A	0.19	15	A	0.20	15
	WBTR	A	0.34	35	A	0.38	35
	NBLT	B	0.20	10	A	0.16	10
	NBR	B	0.02	5	A	0.02	5
	SBLT	B	0.32	15	B	0.33	20
	SBR	B	0.04	5	B	0.05	5

The Opening Day (2024) AM Peak Hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the future Background or Total traffic conditions.

Table 3.3: Opening Day (2024) Traffic Operations – Weekday Mid-day Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	B	0.03	0	B	0.03	0
	NB	A	0.08	0	A	0.08	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.08	0
	NB	-	-	-	A	0.10	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.39*	-	*A*	*0.40*	-
	EBL	A	0.24	20	A	0.30	20
	EBTR	A	0.46	55	A	0.51	55
	WBL	A	0.13	10	A	0.14	10
	WBTR	A	0.37	40	A	0.41	40
	NBLT	B	0.22	15	B	0.19	15
	NBR	B	0.02	5	B	0.02	5
	SBLT	B	0.23	15	B	0.25	15
	SBR	B	0.08	10	B	0.10	10

The Opening Day (2024) mid-day peak hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the Background or Total traffic conditions.

Table 3.4: Opening Day (2024) Traffic Operations – Weekday PM Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	B	0.04	0	B	0.04	0
	NB	A	0.08	0	A	0.08	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.05	0
	NB	-	-	-	A	0.12	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.39*	-	*A*	*0.40*	-
	EBL	A	0.26	20	A	0.36	25
	EBTR	A	0.46	55	A	0.49	55
	WBL	A	0.15	10	A	0.16	10
	WBTR	A	0.37	45	A	0.41	45
	NBLT	B	0.23	15	B	0.20	15
	NBR	B	0.02	5	B	0.02	5
	SBLT	B	0.25	15	B	0.25	20
	SBR	B	0.09	10	B	0.10	10

The Opening Day (2024) PM peak hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the Background or Total traffic conditions.

3.2.2 2029 Traffic Operations

Tables 3.5, 3.6 and 3.7 summarize the capacity analysis results for the weekday AM, Mid-day and PM peak hours for 2029 Background and Total traffic scenarios. The detailed Synchro outputs are included in Appendix C.

Table 3.5: 2029 Traffic Operations – Weekday AM Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	B	0.03	0	B	0.04	0
	NB	A	0.04	0	A	0.04	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.09	0
	NB	-	-	-	A	0.04	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.35*	-	*A*	*0.38*	-
	EBL	A	0.06	5	A	0.08	5
	EBTR	A	0.34	35	A	0.38	35
	WBL	A	0.20	15	A	0.22	15
	WBTR	A	0.35	35	A	0.40	35
	NBLT	B	0.21	10	A	0.17	10
	NBR	B	0.02	5	A	0.02	5
	SBLT	B	0.34	20	B	0.34	20
	SBR	B	0.04	5	B	0.06	5

The 2029 AM peak hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the future Background or Total traffic conditions.

Table 3.6: 2029 Traffic Operations – Weekday Mid-day Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	B	0.04	0	B	0.04	0
	NB	A	0.08	0	A	0.08	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.08	0
	NB	-	-	-	A	0.10	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.40*	-	*A*	*0.42*	-
	EBL	A	0.25	20	A	0.32	20
	EBTR	A	0.48	55	A	0.52	55
	WBL	A	0.14	10	A	0.16	10
	WBTR	A	0.38	45	A	0.43	45
	NBLT	B	0.24	14	B	0.20	15
	NBR	B	0.02	5	B	0.02	5
	SBLT	B	0.25	15	B	0.26	20
	SBR	B	0.09	10	B	0.10	10

The 2029 mid-day peak hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the Background or Total traffic conditions.

Table 3.7: 2029 Traffic Operations – Weekday PM Peak Hour

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	BACKGROUND			TOTAL		
		LOS	V/C	95TH Q (M)	LOS	V/C	95TH Q (M)
53 Street & 48A Avenue *(Unsignalized)*	*Overall*	*A*	-	-	*A*	-	-
	WB	B	0.04	0	B	0.04	0
	NB	A	0.09	0	A	0.09	0
	SB	A	<0.01	0	A	<0.01	0
53 Street & Site Access *(Unsignalized)*	*Overall*	-	-	-	*A*	-	-
	WB	-	-	-	B	0.05	0
	NB	-	-	-	A	0.12	0
	SB	-	-	-	A	<0.01	0
53 Street & Ladner Trunk Road *(Signalized)*	*Overall*	*A*	*0.40*	-	*A*	*0.42*	-
	EBL	A	0.31	20	A	0.39	25
	EBTR	A	0.51	60	A	0.51	60
	WBL	A	0.18	10	A	0.18	10
	WBTR	A	0.41	45	A	0.42	45
	NBLT	B	0.20	15	B	0.21	15
	NBR	B	0.02	5	B	0.02	5
	SBLT	B	0.22	15	B	0.26	20
	SBR	B	0.09	10	B	0.11	10

The 2029 PM peak hour traffic analysis indicates that all study area intersections are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate the traffic demands for either the Background or Total traffic conditions.

3.2.3 Summary of Future Traffic Operations Analysis

The future traffic operations analysis indicated that all study area intersections and movements are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate future traffic demands for either Background (without proposed development) or Total (with proposed development) traffic conditions.

4. SIGHT DISTANCE ANALYSIS

4.1 Background

The City of Delta has requested that a sight distance assessment be undertaken at the site access & 53 Street to ensure that the proposed property line would be able to achieve adequate sight distance for vehicles. From Bunt's understanding, a key reason for this requirement is to ensure that the City maintains the ability to control this portion of land to keep it clear of visual obstructions that would impact the sight distance between vehicles approaching from both directions and vehicles attempting to turn from the site access onto 53 Street. The findings of this assessment are discussed below.

4.2 Sight Distance Analysis

4.2.1 Stopping Sight Distance and Intersection Sight Distance

Sight distance is the length of roadway visible to a driver. Clear sight triangles are provided at intersections to allow drivers of stopped vehicles a sufficient view of the intersecting roadway to decide when to enter the intersection roadway or to cross it.

If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance (SSD) for the major road, then drivers have sufficient sight distance to anticipate and avoid collisions. However, in some cases, a major-road vehicle may need to stop or slow to accommodate the maneuver by a minor road vehicle. For vehicles approaching an intersection, SSD based on design speed is the minimum criterion.

To enhance traffic operations, intersection sight distance (ISD) that exceeds SSD is desirable along the major road. ISD is defined as the sight distance available from a point where vehicles are required to stop on the intersecting road, while drivers are looking left and right along the major roadway, before entering the intersection. The recommended dimensions of the clear sight triangle for desirable traffic operations are based on assumptions derived from field observations of driver gap-acceptance behavior. Note that while meeting ISD is recommended for operational purposes and is desirable, it is not required for safety purposes as is the case for SSD.

As stated in the Transportation Association of Canada's (TAC) *Geometric Design Guide*, it is calculated that for a 50 km/h road, the SSD of 65m should be used for design.

4.2.2 Clear Sight Triangles

The recommended decision point for measuring the clear sight triangle is 4.4 metres from the edge of the major roadway, which represents the typical position of the minor roadway driver's eye when a vehicle is stopped relatively close to the major road. However, this is an intersection of a road and an access driveway instead of a regular intersection of two roads. As such, based on typical driver behaviour, the merging vehicles from the access are more likely to wait for a gap in traffic closer to the intersection.

Therefore, the decision point for measuring the clear sight triangle is 2.4 metres from the sidewalk edge instead of 4.4 meters, assuming the front line of vehicles align with the edge of 53 Street. The clear sight triangles of SSD at the proposed site access point are shown in **Exhibits 4.1**. To enable the required sight distances, the areas defined by these clear sight triangles would need to be kept clear of any visual obstructions.

It is noted that SSD of 65 meters exceeds the nearest stop line of both adjacent intersections. At the intersection of Ladner Trunk Road and 53 Street, the turning speed of westbound right turning vehicles (from Ladner Trunk Road onto 53 Street) was assumed as 20 km/h, resulting a corresponding SSD of 20 meters based on *Table 2.5.2* of *TAC – Geometric Design Guide for Canadian Roads*.

Table 2.5.2: Stopping Sight Distance on level roadways for Automobiles[54]

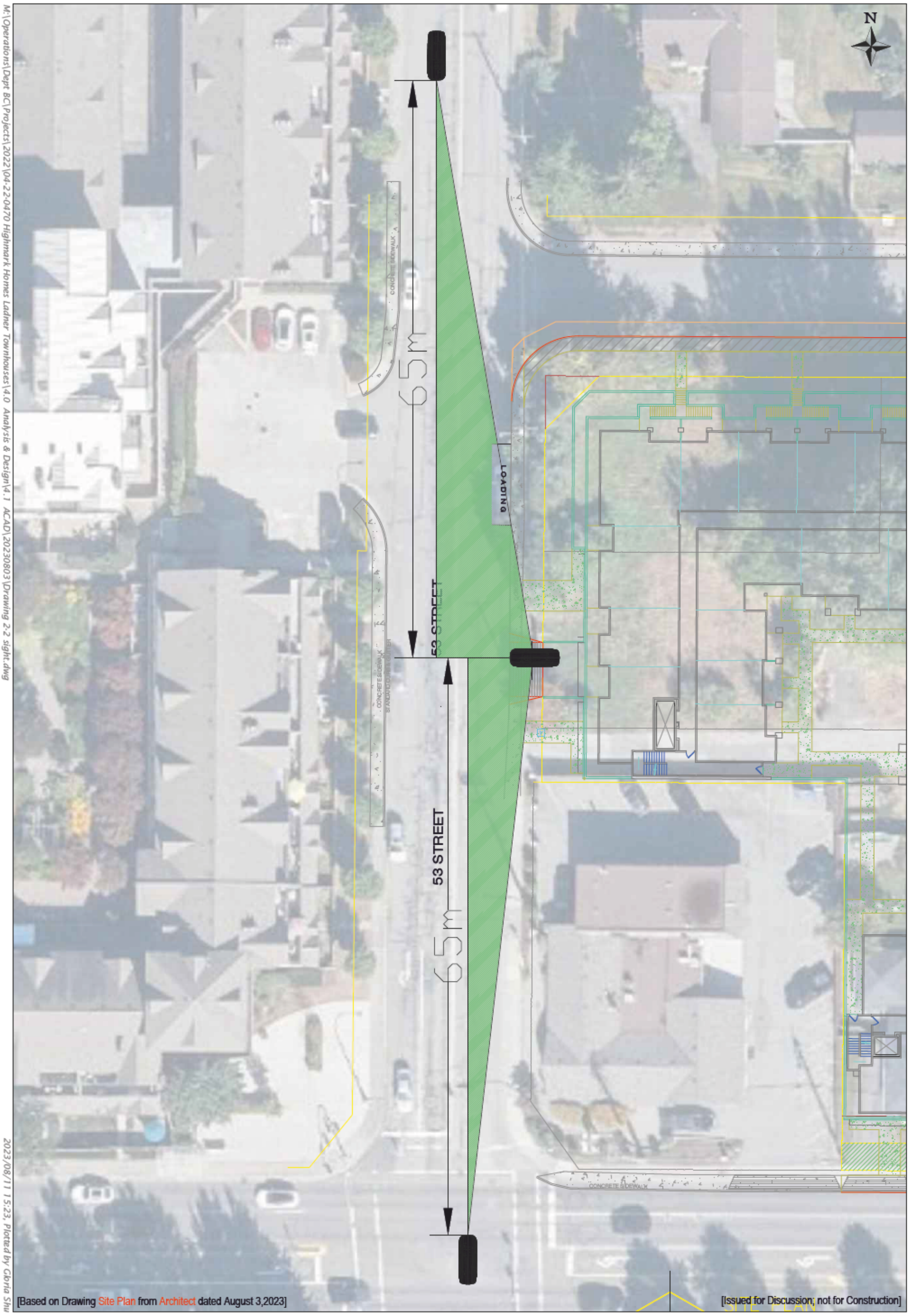
Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance	
			Calculated (m)	Design (m)
20	13.9	4.6	18.5	20
30	20.9	10.3	31.2	35
40	27.8	18.4	46.2	50
50	34.8	28.7	63.5	65
60	41.7	41.3	83.0	85
70	48.7	56.2	104.9	105
80	55.6	73.4	129.0	130
90	62.6	92.9	155.5	160
100	69.5	114.7	184.2	185
110	76.5	138.8	215.3	220
120	83.4	165.2	248.6	250
130	90.4	193.8	284.2	285

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s^2 used to determine calculated sight distance.

Similarly at the intersection of 48A Avenue and 53 Street, the turning speed of westbound left turning vehicles (from 48A Avenue onto 53 Street) was also assumed as 20 km/h, resulting the same SSD of 20 meters. SSD of turning vehicles in both directions would be within the range of clear sight triangles, as illustrated in **Exhibit 4.2**.

Also note that in this scenario, the relevant sight distance is between vehicles attempting to turn from the site access and vehicles approaching from either direction on 53 Street. As the exhibits indicate, the required SSD sight triangles are not negatively impacted by the proposed property line. The sightline analysis indicated that the required sight triangles can be maintained, provided that the areas defined by these clear sight triangles are kept clear of any visual obstructions.

Note that stopping sight distance sightlines were also reviewed from a practical standpoint anticipating that drivers exiting the site may continue to inch closer to 53 Street to improve visibility while waiting for a gap in traffic. **Exhibit 4.3** presents the adjusted sightline, which indicates that the sight triangles can be maintained. In this scenario, the proposed loading zone is not anticipated to overlap with the sight triangles.



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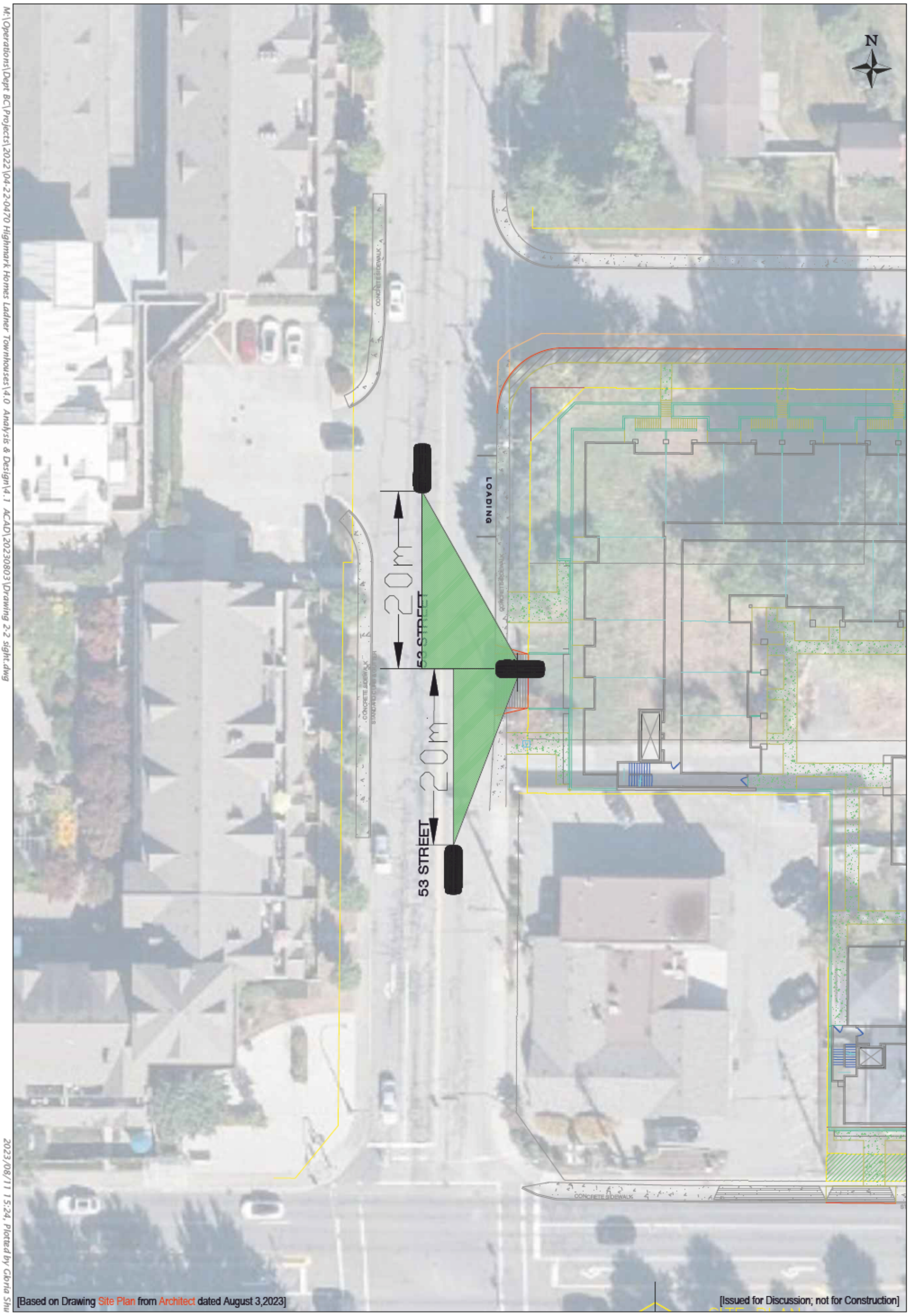
Exhibit 4.1

Stopping Sight Distance (SSD) Assessment

Highmark Homes Ladner Townhouses

04-22-0470 August 10, 2023 Scale Custom on Ledger Prepared by GS

bunt & associates



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Exhibit 4.2

Turning Vehicle SSD Assessment

Highmark Homes Ladner Townhouses

04-22-0470 August 10, 2023 Scale 1:400 on Ledger Prepared by GS

bunt & associates



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Exhibit 4.3

Stopping Sight Distance (SSD) Assessment (Adjusted)

Highmark Homes Ladner Townhouses

04-22-0470 August 10, 2023 Scale 1:400 on Ledger Prepared by GS

bunt & associates

5. SITE DESIGN REVIEW

5.1 Parking Supply

5.1.1 On-Site Vehicle Parking

Table 5.1 summarizes the proposed off-street parking supply for the development in comparison to the City of Delta's Zoning Bylaw minimum requirements.

Table 5.1: Minimum Vehicle Parking Supply Requirement & Provision

DESCRIPTION	QUANTITY (UNITS)	REQUIRED RATE* (SPACES / UNIT)	REQUIRED (SPACES)	PROPOSED RATE (SPACES / UNIT)	PROPOSED (SPACES)	SHORTFALL (SPACES)
Building 1 - Market (<2 bedrooms)	72	1.3	94	1.0	73	21 (22%)
Building 1 - Market (2 bedrooms and more)	52	1.5	78	1.0	52	26 (33%)
Building 1 – Market Visitor Parking	124	0.1	12	0.1	12	0 (0%)
Building 2 - Rental (<2 bedrooms)	60	1.3	78	0.9	53	25 (32%)
Building 2 - Rental (2 bedrooms and more)	27	1.5	41	0.9	24	17 (41%)
Building 2 – Rental Visitor Parking	87	0.1	9	0.1	9	0 (0%)
RESIDENT	211	-	291	0.96	202	89 (31%)
VISITOR		-	21	0.1	21	0 (0%)
TOTAL	211	-	312	1.06	223	89 (29%)

(*) As per Delta Zoning Bylaw #8024

The required parking supply for the development would be 312 spaces (291 resident and 21 visitor) compared to a proposed supply of 223 spaces (202 resident and 21 visitor), representing an overall shortfall of 89 spaces (or a 29% variance). Based on our understanding, the applicant is currently in separate discussions with the City of Delta regarding the proposed on-site parking variance, with rationale being provided by the applicant under separate cover.

Disability Spaces

Based on the City's Zoning Bylaw (8.5.5a), 21 disability spaces would be needed, based on the requirement for one disability space being provided for 50% of the required adaptable units. As 20% of all single-storey units are required to be adaptable, this translates to 42 required adaptable units and therefore, 21 required disability spaces.

The developer proposes to provide 15 spaces, which will consist of 14 resident disability spaces and 1 visitor disability space. In addition, to align with the Zoning Bylaw requirement for 50% of disability spaces to be van accessible, the developer also plans to make 9 of the 15 disability spaces van accessible. It is noted that the applicant is in ongoing discussions with the City of Delta regarding a parking variance, and further rationale would be provided by the applicant under separate cover.

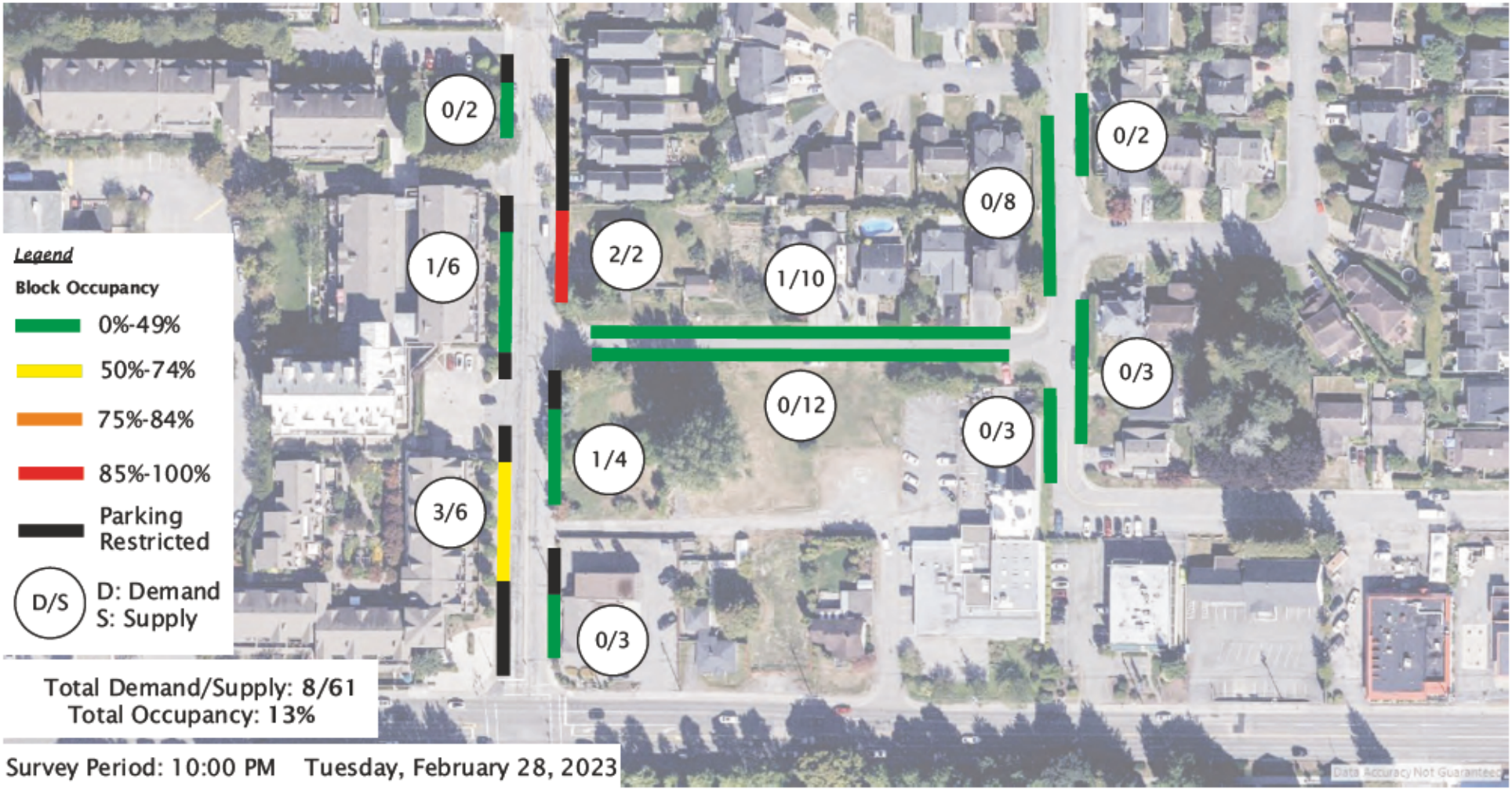
Small Car Spaces

The City's Zoning Bylaw (8.5.4) permits up to 25% of the required parking spaces to be provided as small car spaces, including up to 25% of the visitor parking. For the required 312 spaces, this translates to 78 small car spaces maximum. The site plan indicates that 55 small car spaces are proposed, which falls within the maximum allowed.

5.1.2 On-Street Vehicle Parking

As requested by the City, an on-street parking review was conducted in the vicinity of the site. **Exhibit 5.1** summarizes the existing parking occupancy of on-street parking around the site of the proposed development. Existing on-street parking conditions were observed at 10 pm on February 28, 2023.

As indicated in the exhibit, the busiest segment is marked red and located on the east side of 53 Street, north of 48A Avenue. Even though this segment was recorded as being fully occupied at the time of survey, it is one of the further parking locations which only provides space for about 2 parked vehicles on-street. Given that the overall on-street parking occupancy is about 13%, even if a user from the development chose to park on-street, it would not be expected to negatively impact the neighbouring parking supply. The rest of the current on-street parking supply around the development site is sufficient and would potentially be able to meet the excessive parking demand of visitors. However, it is emphasized that the parking demand of the proposed development is anticipated to be accommodated entirely on-site. It is anticipated that on-street parking along the south side of 48A Avenue would generally not be impacted after the site is developed, with exception to the areas near the secondary driveway and loading zone. **Exhibit 5.2** displays the anticipated post-development on-street parking supply surrounding the site.



M:\Operations\Dept BC\Projects\2022\04-22-0470 Highmark Homes Ladner Townhouses\5.0 Deliverables

Exhibit 5.1

Existing On-Street Parking Supply and Demand

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Exhibit 5.2

Post-Development On-Street Parking Supply

Highmark Homes Ladner

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5.1.3 Bicycle Parking

Table 5.2 summarizes the bicycle parking space supply requirement for the proposed development.

Table 5.2: Bicycle Parking Supply Requirement & Provision

LAND USE	QUANTITY	BYLAW RATE (SPACES / UNIT)	REQUIRED (SPACES)	PROPOSED (SPACES)
Apartment Building - Resident	211 units	1 space per dwelling unit for residents	211	220
Apartment Building - Visitor	2 buildings	5 spaces per apartment building for visitors	10	10
TOTAL	-	-	221	230

The proposed bicycle parking supply of 230 spaces for the development (220 secure spaces + 10 visitor spaces) meets the minimum bylaw requirement of 221 spaces (211 secure spaces + 10 visitor spaces). The additional long-term bicycle parking supply would also allow future residents to better utilize bicycles as their primary travel mode, hence reducing the reliance on vehicles.

5.2 Site Servicing

5.2.1 Two-way Circulation

The proposed site has 2 levels of underground parking. Vehicle swept path circulation was reviewed on both levels using AutoTURN analysis software. For the nearest corner to the access, the "P-TAC" passenger car design vehicle was used for circulation testing. The AutoTURN analysis indicated that generally, passenger vehicles would be able to pass each other concurrently within the site's parkade. Based on the swept path analysis at the first turn of the parkade, it is recommended to place a stop bar for southbound vehicles exiting the site, along with a convex mirror on the nearby column, to improve driver visibility at this turn so that there is less potential conflict with vehicles entering the site from 53 Street. Passenger vehicle circulation was generally found to be adequate throughout the rest of the parkade. The AutoTURN swept path analysis is illustrated in **Exhibits 5.3** to **5.5**.

5.2.2 Loading and Waste Collection

The City's Zoning Bylaw (9.2.1) requires that 1 loading space per building with more than 80 dwelling units be provided. This translates to a requirement of 2 loading spaces for the development. The current site plan includes two loading spaces: one on the site's frontage along 53 Street and another along 48A Avenue. For the loading zones, adequate curb design and signage would be implemented to assist with the facilitation of safe and efficient delivery of goods and services to the site. Also, in line with Bylaw requirements, the loading zones would be surfaced with permanent hard surfaces, be well lit, and may include paint markings to designate the space in addition to signage. **Figure 5.1** presents a typical example of a ***Loading Zone – No Parking*** sign that would be recommended for this location.

Based on discussions with the Design Team in consultation with the City of Delta, the loading zone in the northeast corner of the site would be timed/scheduled for garbage and recycling collection. To assist with this approach, a scheduling system would be implemented, with loading / waste collection management and communications protocol that would be prepared and adhered to.

Figure 5.1: Loading Zone – No Parking Signage



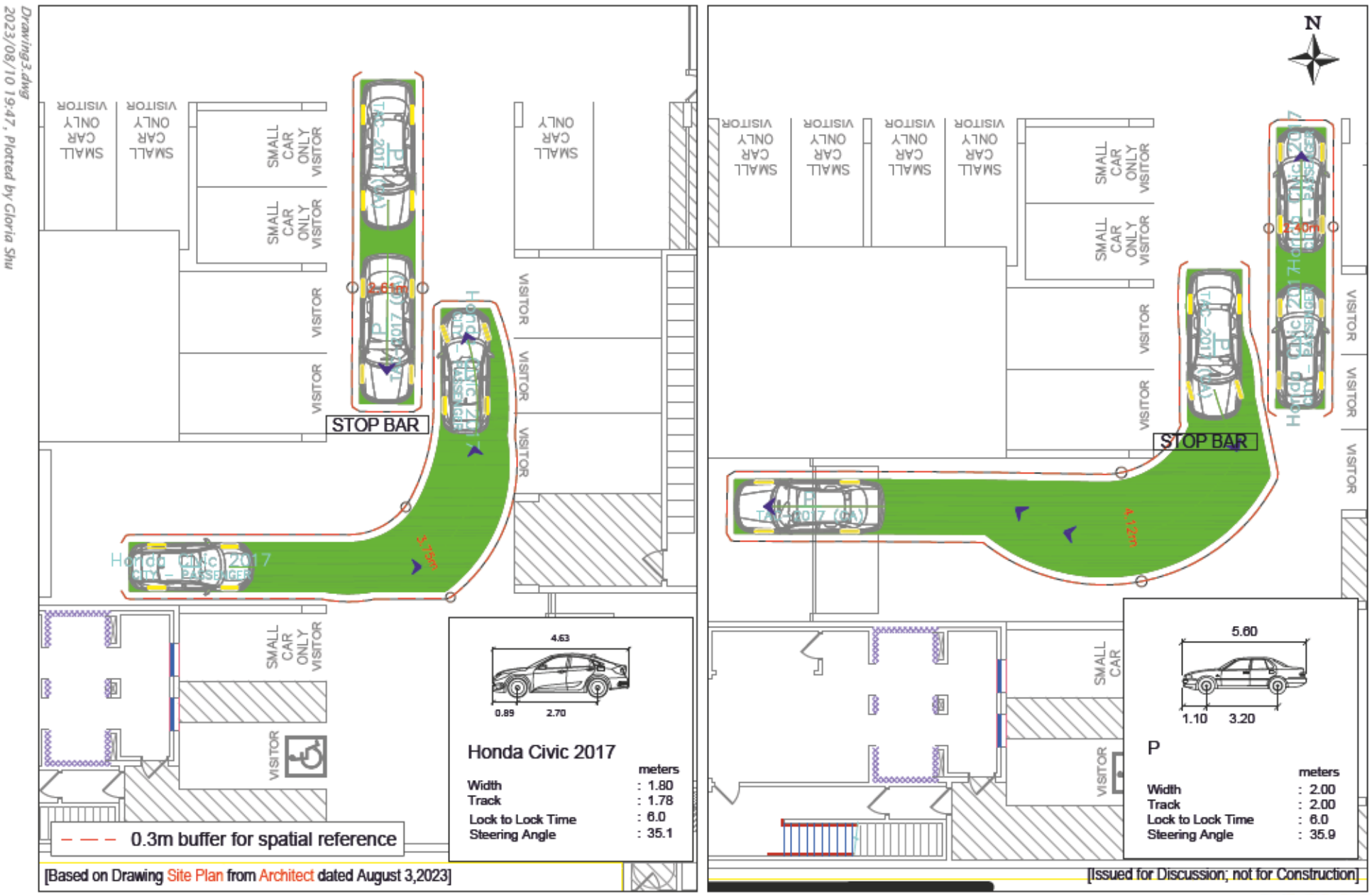


Exhibit 5.3

Passenger Vehicle Circulation Review - 53 Street Access

04-22-0470 August 10, 2023 Highmark Homes Ladner Townhouses Scale Custom on Letter Prepared by GS

bunt & associates

Drawing3.dwg
2023/08/10 19:46, Plotted by Gloria Shu

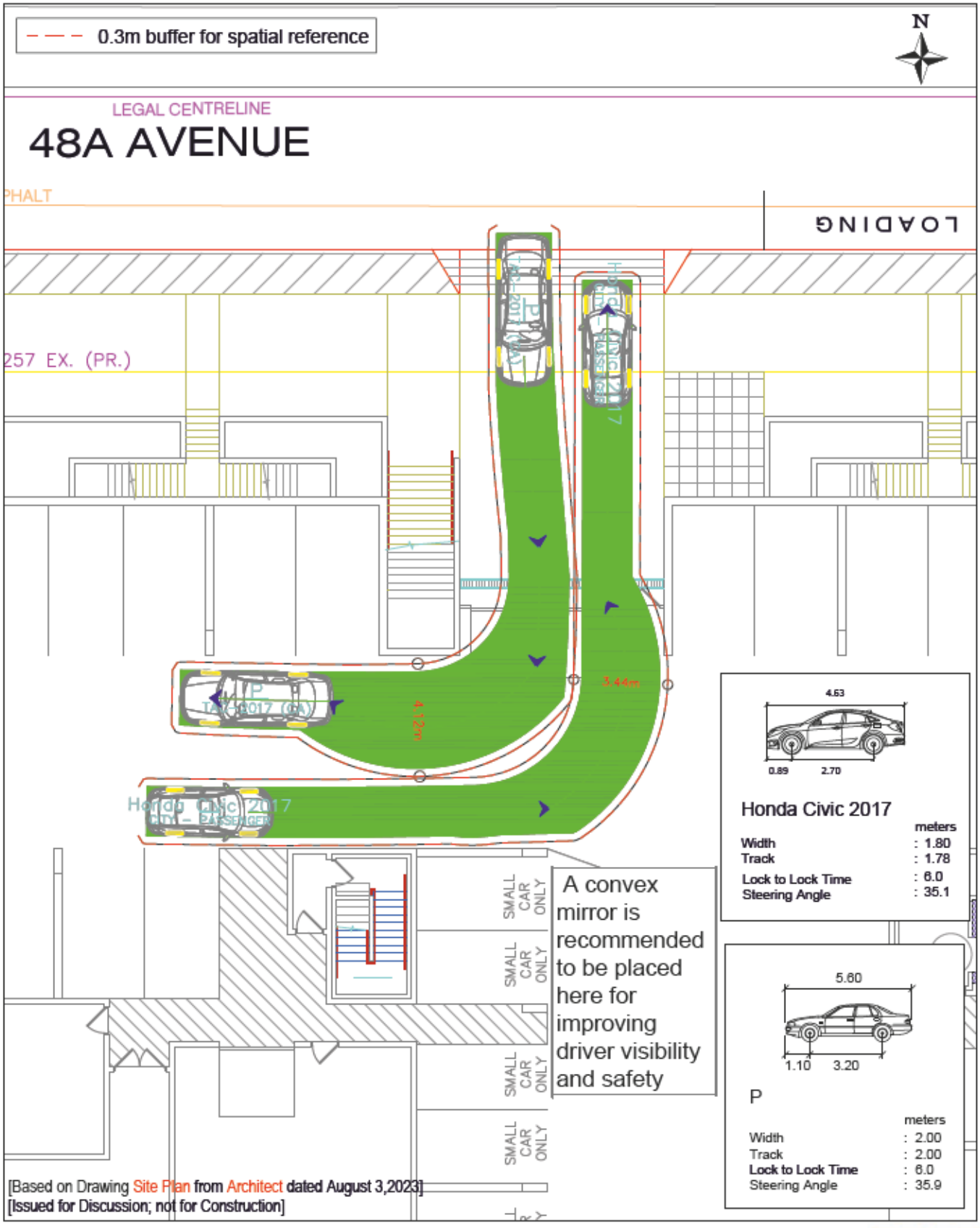


Exhibit 5.4

Passenger Vehicle Circulation Review - 48A Avenue Access

Highmark Homes Ladner Townhouses
04-22-0470 August 10, 2023 Scale Custom on Letter Prepared by GS

bunt & associates

Drawing3.dwg
2023/08/10 19:47, Plotted by Gloria Shu

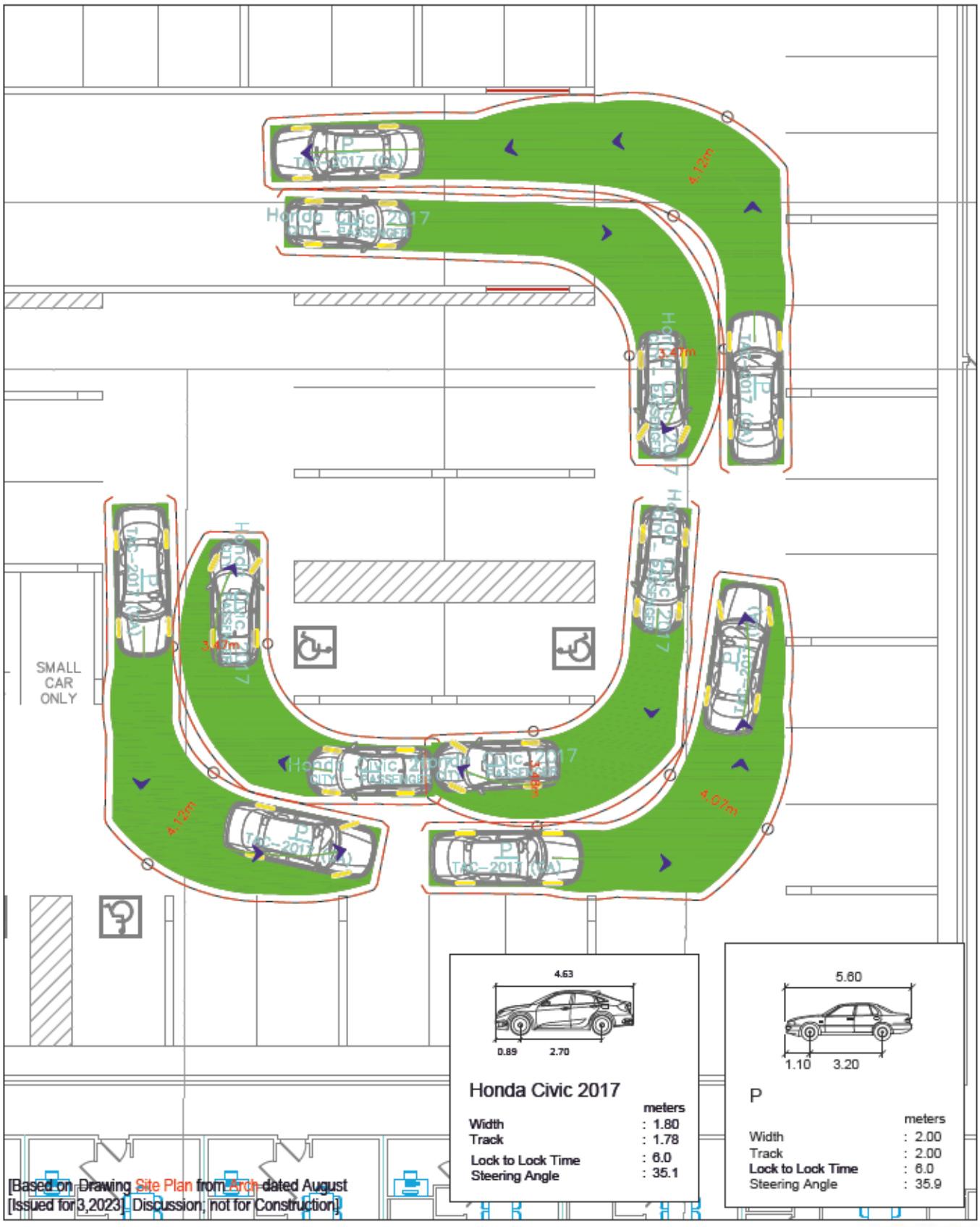


Exhibit 5.5

Passenger Vehicle Circulation Review - P2

Highmark Homes Ladner Townhouses
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6. CONCLUSIONS & RECOMMENDATIONS

Based on Bunt's review of the proposed development, a summary of the conclusions and recommendations of the study is provided below.

6.1 Conclusions

- Highmark Homes Ltd. is proposing to develop 211 residential dwelling units, addressed at 5349, 5359, 5367 Ladner Trunk Road and 4843, 4844 53 Street in Delta, BC. The Opening Day of the development is planned to be 2024, and the project is currently going through the Rezoning process. Two vehicular accesses to the site are proposed: a primary access located on 53 Street between 48A Avenue and Ladner Trunk Road, and a secondary access on 48A Avenue between 53 Street and 54 Street. The two driveways would provide access to the site's 223 parking spaces provided underground.

- The site is well served by transit along Ladner Trunk Road, given its close proximity to Highway 17A. The closest bus stops are located fewer than 100m walking distance from the site frontage, directly adjacent to the site. In terms of key pedestrian locations, in addition to Linden Drive Park, which is located within 400m from the site, there are several more popular destinations located within 800m from the site, such as Trenant Park Square, Ladner Centre, Ladner Lions Park, Maple Crescent Park, and Delta Christian School. In general, there are currently limited cycling facilities in the vicinity of the site. The notable bike routes nearby include 53 Street (Collector Road) as a shared lane.

- A review of the existing traffic operations analysis indicated that all study area intersections and movements are currently operating within acceptable intersection performance parameters during the study peak hour periods; therefore, no intersection improvements are required to accommodate existing traffic demands.

- The proposed development is anticipated to generate approximately 80 two-way vehicle trips during the study peak hour periods. This translates to about 4 added vehicles onto the surrounding road network every 3 minutes, on average.

- The future traffic operations analysis indicated that all study area intersections and movements are anticipated to operate within acceptable capacity parameters. As such, no intersection improvements are required to accommodate future traffic demands for either Background (without proposed development) or Total (with proposed development) traffic conditions.

- The City of Delta has requested that a sight distance assessment be undertaken at the site access & 53 Street to ensure that the proposed property line would be able to achieve adequate sight distance for vehicles. The sightline analysis indicated that the required sight triangles can be maintained, provided that the areas defined by these clear sight triangles are kept clear of any visual obstructions.

- The proposed bicycle parking supply of 230 spaces for the development (220 secure spaces + 10 visitor spaces) meets the minimum bylaw requirement of 221 spaces (211 secure spaces + 10 visitor spaces).

- The off-street vehicle parking requirements for the proposed development were reviewed based on the City of Delta's Zoning Bylaw. The required parking supply for the development would be 312 spaces (291 resident and 21 visitor) compared to a proposed supply of 223 spaces (202 resident and 21 visitor), representing an overall shortfall of 89 spaces (or a 29% variance). It is understood that the applicant is currently in separate discussions with the City of Delta regarding the proposed parking variance, and supporting rationale for the shortfall would be provided by the applicant under separate cover.

- As requested by the City, an on-street parking review was conducted in the vicinity of the site. The busiest segment is located on the east side of 53 Street, north of 48A Avenue. Even though this segment was recorded as being fully occupied at the time of survey, it is one of the further parking locations which only provides space for about 2 parked vehicles on-street. Given that the overall on-street parking occupancy is about 13%, even if a user from the development chose to park on-street, it would not be expected to negatively impact the neighbouring parking supply. The rest of the current on-street parking supply around the development site is sufficient and would potentially be able to meet the excessive parking demand of visitors. However, it is emphasized that the parking demand of the proposed development is anticipated to be accommodated entirely on-site. It is anticipated that on-street parking along the south side of 48A Avenue would generally not be impacted after the site is developed, with exception to the areas near the secondary driveway and loading zone.

- On-site vehicle swept path circulation was reviewed using AutoTURN analysis software. The AutoTURN analysis indicated that generally, passenger vehicles would be able to pass each other concurrently within the site's parkade. Based on the swept path analysis at the first turn of the parkade, it is recommended to place a stop bar for southbound vehicles exiting the site, along with a convex mirror on the nearby column, to improve driver visibility at this turn so that there is less potential conflict with vehicles entering the site from 53 Street. Passenger vehicle circulation was generally found to be adequate throughout the rest of the parkade.

- The City's Zoning Bylaw requires that 1 loading space per building with more than 80 dwelling units be provided. This translates to a requirement of 2 loading spaces for the development. The current site plan includes two loading spaces: one on the site's frontage along 53 Street and another along 48A Avenue. For the loading zones, adequate curb design and signage would be implemented to assist with the facilitation of safe and efficient delivery of goods and services to the site. Also, in line with Bylaw requirements, the loading zones would be surfaced with permanent hard surfaces, be well lit, and may include paint markings to designate the space in addition to signage. Based on discussions with the Design Team in consultation with the City of Delta, the loading zone in the northeast corner of the site would be timed/scheduled for garbage

and recycling collection. To assist with this approach, a scheduling system would be implemented, with loading / waste collection management and communications protocol that would be prepared and adhered to.

6.2 Recommendations

- That the City of Delta consider acceptance of the Transportation Impact Assessment study based on the analysis and findings presented herein.