

A light gray background map of North Vancouver, showing a dense network of streets and a few circular features representing parks or roundabouts.

CITY OF NORTH VANCOUVER

**NORTH SHORE NEIGHBOURHOOD HOUSE
(NSNH)TRANSPORTATION STUDY | OCTOBER 2021**

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1.0 INTRODUCTION

The North Shore Neighbourhood House (NSNH) site is City-owned land located at St Georges Avenue between East 1st and East 2nd Street. The site currently includes an aging NSNH facility, Derek Inman Park, Lower Lonsdale Community Gardens, Charros Gardens, and a Heritage B building. The site is located in the vicinity of amenities including a variety of local businesses, nearby parks, access to Lonsdale Avenue and the Shipyard, as well as rapid transit and SeaBus. The current NSNH provide childcare, child development support programs, youth programs, senior programs, health, arts, and recreation programs, food bank and food security programs.

The City is looking to redevelop the NSNH site to provide the following resource and benefits to the Lower Lonsdale community.

- New NSNH Facility
- Adult day and overnight respite program
- Affordable (below-market) rental housing
- Newly envisioned Derek Inman Park

The project is expected to be in partnership with NSNH, Catalyst Community Developments, The Health & Home Care Society of BC (Care BC), Hollyburn Family Services Society (Hollyburn).

1.1 PROJECT OVERVIEW

The future of NSNH site is a unique opportunity to bring together community-oriented organizations into a vibrant and integrated hub at the heart of Lower Lonsdale. The project includes the following three key elements.

1. **Northwest building** – 6 storeys with 18 overnight respite beds and 25 adult day program spaces at ground level and 89 below-market rental units on upper floors
2. **Southwest building** – Up to 18 storeys with approximately 33,000 sq ft of NSNH services on first 3 floors and 180 below-market rental units on upper floors
3. **Derek Inman Park** – Redesign of existing park with no net loss to dedicated park space

In order to allow for this development, the site requires Official Community Plan (OCP) amendment, Zoning Bylaw Amendment, and Park Boundary Adjustment. The purpose of this transportation study is to conduct a review of traffic conditions, active transportation infrastructure, parking and loading requirements and provide recommendations to support the proposed developments. The terms of reference (ToR) provided by the City for this study is provided in **Appendix A**.

1.2 TRANSPORTATION NETWORK

The subject site is bounded by E 2nd Street to the north, E 1st Street to the south, St Georges Avenue to the east, and residential and commercial building to the west. A laneway is also present between the E 1st Street and E 2nd Street that provides east-west connection between St Georges Avenue and St Andrews Avenue while also providing parking.

St. Georges Ave is a two-way roadway classified as a minor arterial road, which runs in the north-south direction and provides connection to the Esplanade Avenue to the south. Parking is allowed on both sides of the street with time restrictions. Passenger loading zone is also provided at few locations that allows loading activity for as long as is necessary to take on or discharge passengers, to a maximum of five minutes (Street and Traffic Bylaw No. 8768, 2020). Sidewalks are located on both sides of the roadway.

E 3rd Street is a two-way roadway classified as a minor arterial road, which runs in the east-west direction and provides connection to Marine Drive to the west and Main Street to the east. Parking is allowed on both sides of the street with time restrictions. This road also serves as an east-west transit route and

E 1st Street and E 2nd Street are both two-way roadways classified as local roads, which run in the east-west direction. Parking is generally allowed on both sides of the roadways with few segments marked for resident exempt parking and loading zones. Continuous sidewalks are provided on both roadways.

The existing transportation infrastructure within the study area is shown in **Figure 1-1**. The sidewalk connections are very comprehensive within the study area. Designated bike lanes are within short distance from the site.

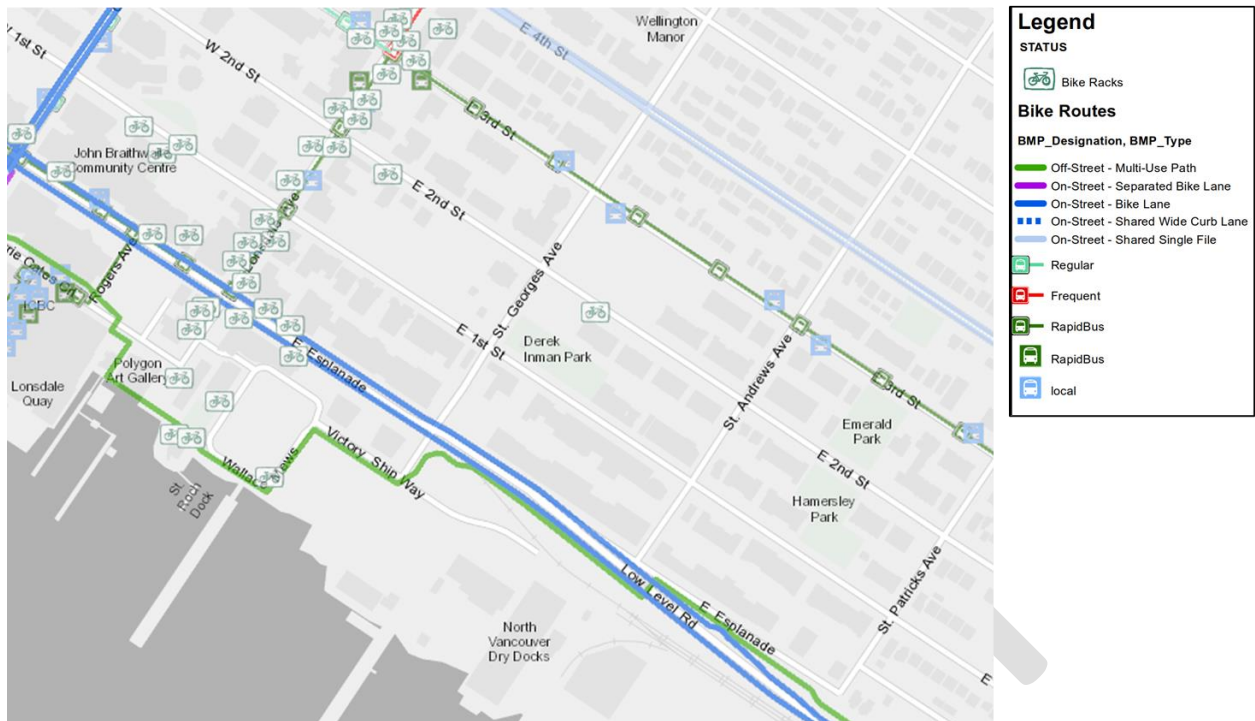


Figure 1-1: Existing Transportation Infrastructure

1.3 SITE ACCESSIBILITY

Figure 1-2 and Figure 1-3 show the 10 minutes walking and cycling coverage from the existing site while Figure 1-4 shows 20 minutes transit coverage from the existing site. The figures indicate that the location is currently easily accessible by walking, cycling, or transit.

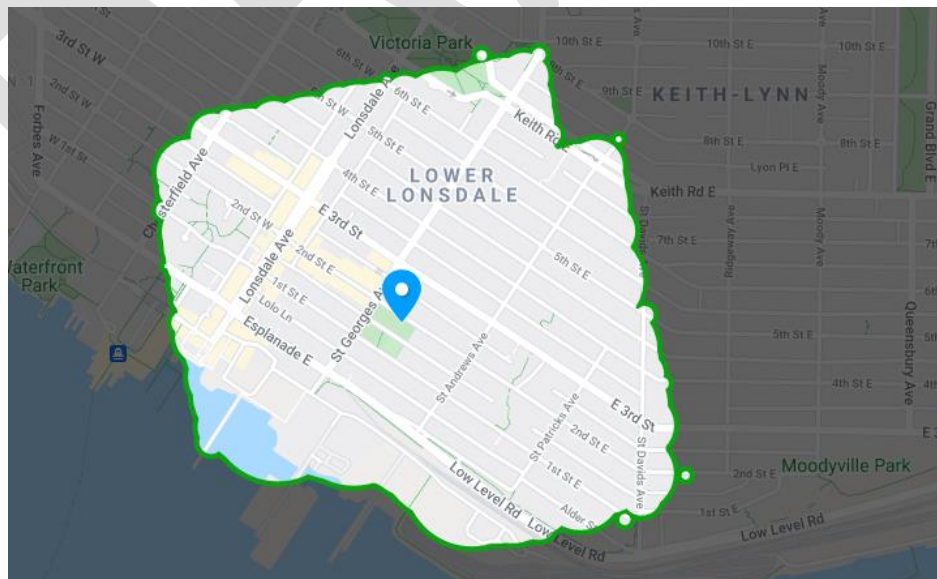


Figure 1-2: 10 minutes walking coverage from the site



1.4 EXISTING TRAVEL CHARACTERISTICS

Based on the results of TransLink's 2011 *Metro Vancouver Regional Trip Diary Survey*, the mode split for Lonsdale Town Centre is listed below.

- Auto (Driver) -48%, Auto (Passenger) – 13%
- Transit – 23%
- Walk – 13%
- Bike – 1%
- Other - 1%

Based on the information provided by NSNH, majority of the staff and volunteers currently drive to the facility. Amongst the visitors, the following travel pattern was reported.

- Child Care Program – Pick-up and drop-off pre and post other programs
- Youth/Adult Fitness and Activity Programs – Majority currently drive
- Senior Programs – HandyDart or pick-up and drop-off

2.0 EXISTING ACTIVE TRANSPORTATION INFRASTRUCTURE

The existing sidewalk network within the study area is generally made up of concrete sidewalks with and without boulevards. Curb bulges are currently not present at any nearby intersections including the ones with pedestrian crossings. The cycling infrastructure in the vicinity include on-street bike lanes along Esplanade Ave and shared facility along E 4th Street. Both of these routes run in the east-west direction and connect with the north-south on-street bike lanes along Chesterfield Avenue.

The site is also well served by transit with bus stops located along E 3rd Street and Lonsdale Avenue. Lonsdale Avenue is part of the Frequent Transit Network (FTN) with service at least every 15 minutes throughout the day and into the evening, seven days a week. Lonsdale Quay Seabus terminal is also located within 15 minutes of walking. The existing transit routes servicing the existing site include 228, 230, 242, and recently introduced R-2 (Marine Drive) RapidBus. RapidBus is a high-capacity express bus service that provides an efficient and dependable connection from Park Royal to Phibbs Exchange in 10 stops. It operates between 6am – 1am, 7 days a week, and runs every 8 minutes during peak times. The existing transit service map is shown in **Figure 2-1** and the existing frequency is provided in **Table 2-1**.

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Figure 2-1: Transit Routes in North Vancouver

Table 2-1: Transit Routes and Frequency

Route	AM Peak	Midday	PM Peak	Evening	Saturday	Sunday
228 (EB)	15	30	15	30	30	30-60
228 (WB)	15	30	15	30	30	30-60
229 (NB)	30	30	11-15	15-30	20-30	20-30
229 (SB)	12-20	30	15-20	12-30	20-30	20-30
230 (NB)	15	30	15	30	30	30
230 (SB)	15	30	5-15	30-60	30	30
242 (NB)	-	-	-	-	1 AM Trip	4 AM Trips
242 (SB)	-	-	-	-	1 AM Trip	4 AM Trips
R2 (EB)	10	12	10	10-13	12	12
R2 (WB)	12	12	12	12	12	12
N24 (NB)	-	-	-	20	20	20-30
N24 (SB)	-	-	-	2 Trips	2 Trips	30-40

The bus stops located within 10 minutes walking distance are shown in **Figure 2-2** and the summary of bus stop amenities is provided in **Table 2-2**.

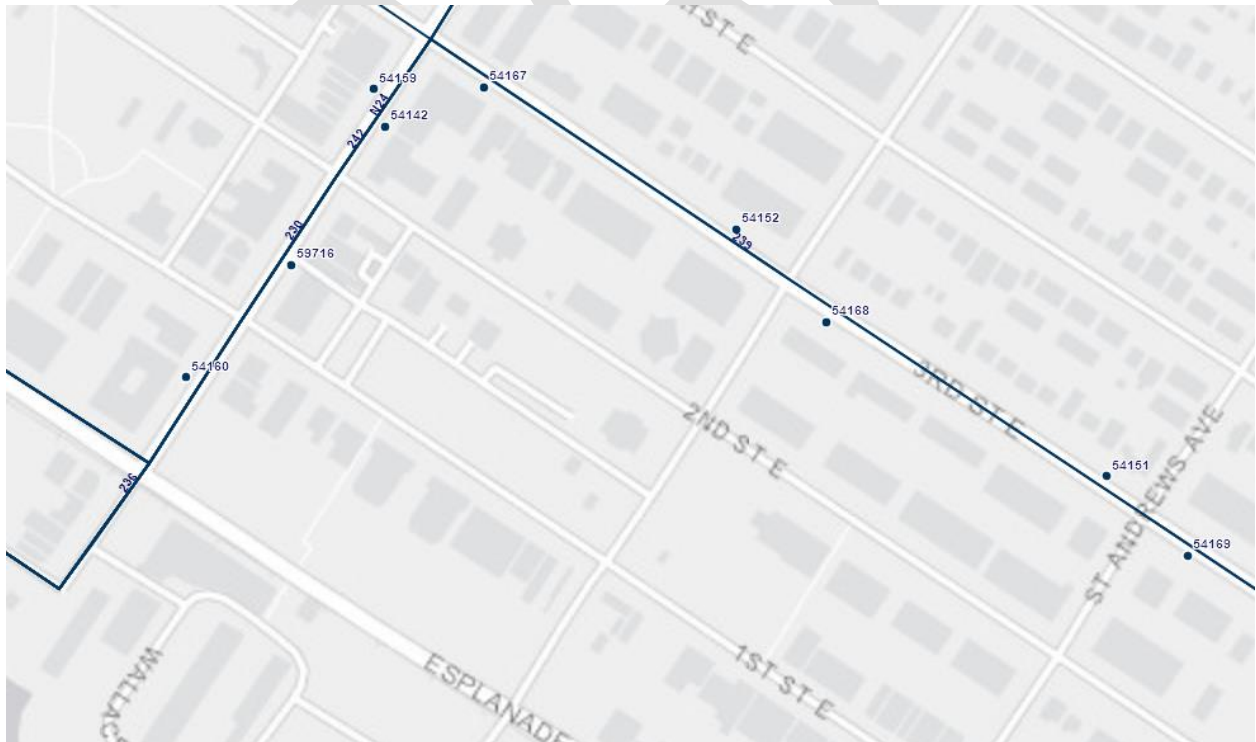
**Figure 2-2: Bus stops within 10 minutes walking distance from the site**

Table 2-2: Summary of Bus Stop Amenities

Bus Stop (Routes)	Direction	Location	Bench	Shelter	Trash Can
54151 (228)	Westbound	3 rd Street E	Yes	Yes	Yes
54152 (228)	Westbound	3 rd Street E	Yes	Yes	No
54159 (228, 229, 230, N24)	Southbound	Lonsdale Ave	Yes	Yes	No
54160 (228, 229, 230, N24)	Southbound	Lonsdale Ave	Yes	No	Yes
59716 (228, 229, 230, N24)	Northbound	Lonsdale Ave	Yes	Yes	No
54142 (229, 230, N24)	Northbound	Lonsdale Ave	Yes	Yes	No
54167 (228, R2)	Eastbound	3 rd Street E	Yes	Yes	Yes
54168 (228)	Eastbound	3 rd Street E	Yes	Yes	Yes
54169 (228)	Eastbound	3 rd Street E	Yes	No	Yes

The existing transit ridership at these bus stops based on TransLink's 2019 data are provided in **Table 2-3**. The existing transit ridership numbers are modest along both routes; however, these are expected to increase significantly with transit service and infrastructure improvements expected along Lonsdale Avenue and RapidBus service along E 3rd Street.

Table 2-3: Transit Ridership Data (Source: TransLink Transit Service Performance Review, Fall 2019)

Bus Stop	Mon-Fri Boarding	Mon-Fri Alighting	Sat Boarding	Sat Alighting	Sun/Hol Boarding	Sun/Hol Alighting
54169 - EB E 3 rd St at St. Andrews Ave	79	146	47	132	29	78
54151 - WB E 3 rd St at St. Andrews Ave	152	64	118	28	82	37
54168 - EB E 3 rd St at St. Georges Ave	90	148	39	92	34	82
54152 - WB E 3 rd St at St. Georges Ave	114	81	50	50	54	36
Total on 3rd St	435	439	254	302	199	233
54159 - SB Lonsdale Ave at W 3 rd St	175	547	126	389	69	239
54142 - NB Lonsdale Ave at E 2 nd St	257	44	199	29	148	13
59716 - NB Lonsdale Ave at E 1 st St	415	49	351	51	225	31
54160 - SB Lonsdale Ave at W 1 st St	40	346	29	300	14	175
Total on Lonsdale Ave	887	986	705	769	456	458

3.0 EXISTING TRAFFIC CONDITION

The existing traffic volumes were sourced from TransLink's Regional Transportation Model (RTM v3.4). **Figure 3-1** shows the 2017 AM and PM peak hour traffic volumes. There are currently traffic signals located at the intersections of St Georges Ave/Esplenade Ave and St Georges Ave/E 3rd Street. Based on the traffic volumes and existing intersection configurations, the intersections are expected to have minimal delays and capacity available for additional traffic demand.

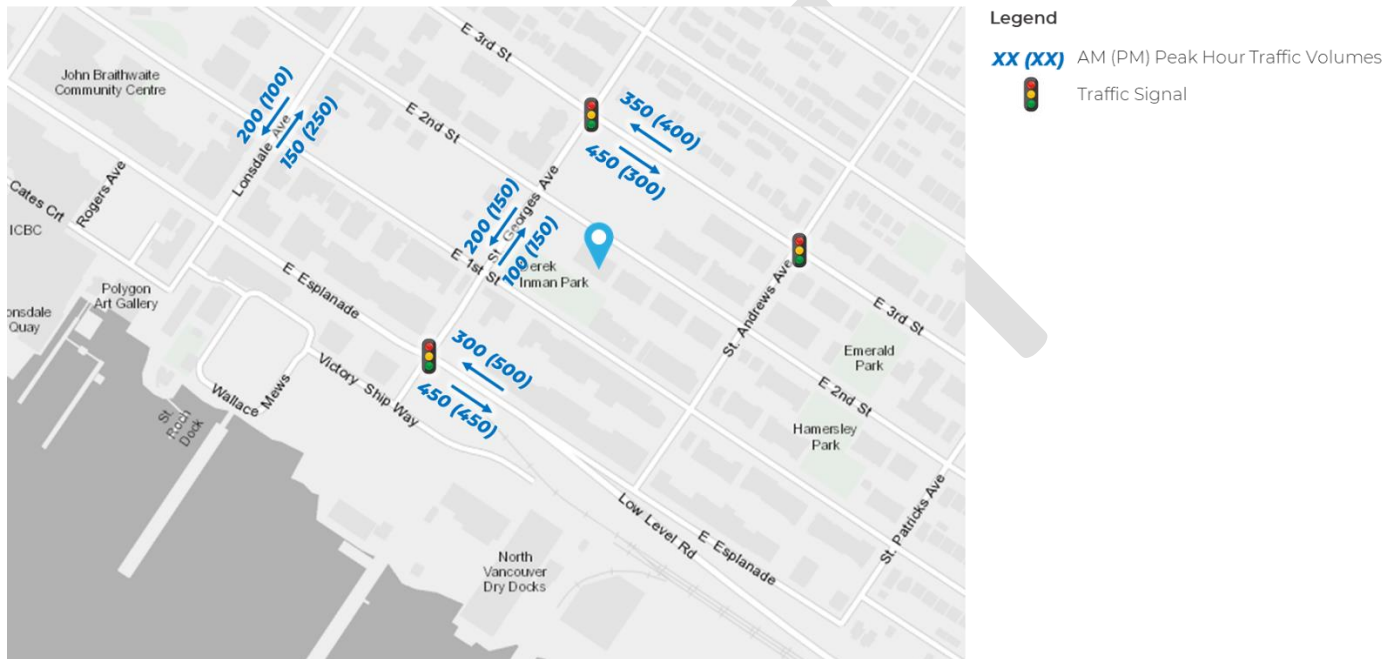


Figure 3-1: 2017 AM and PM Peak Hour Traffic Volumes

4.0 EXISTING PARKING CONDITION

On-street parking data was collected within the study area during a weekday (April 15, 2021) and off-street parking data was provided by the City. **Figure 4-1** shows the location where on-street parking counts were conducted and **Figure 4-2** shows highlights locations with greater than 85% utilization. The results indicate that the on-street parking is well utilized by the surrounding uses and the existing parking supply (16 spaces - 9 visitors and 7 staff) at NSNH exceeds the current demand at the site.

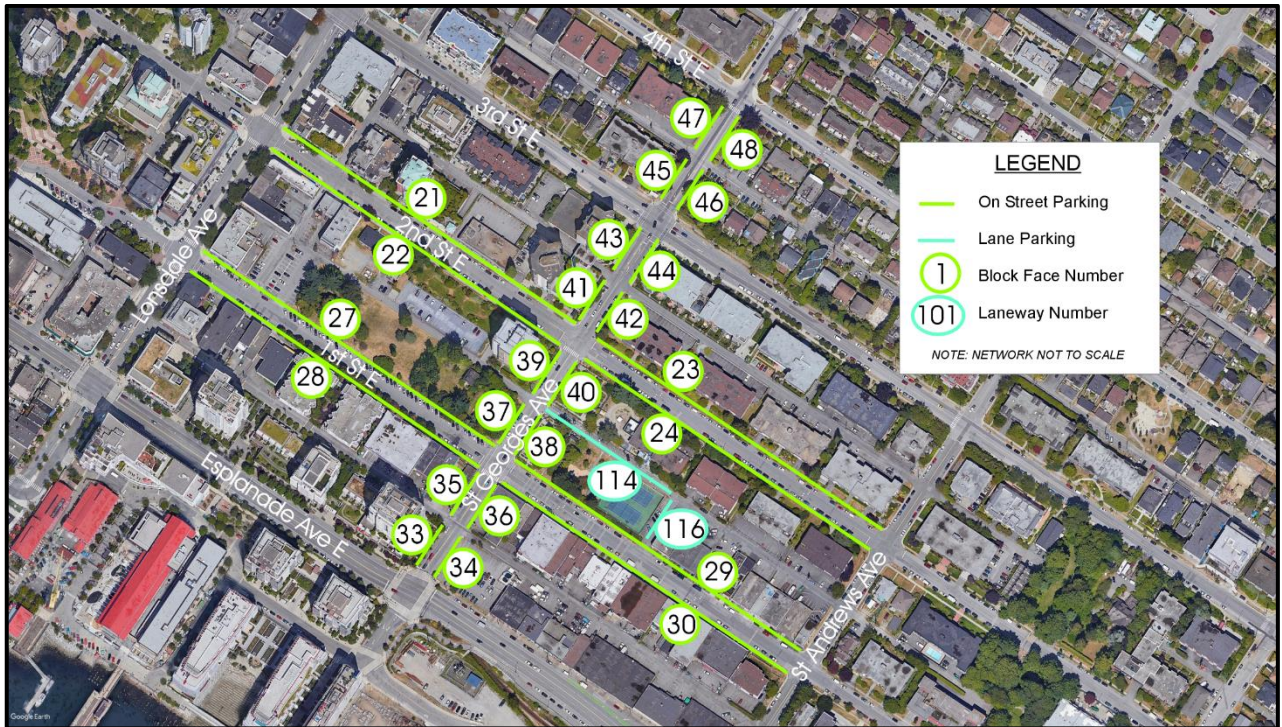


Figure 4-1: On-Street Parking Count Location

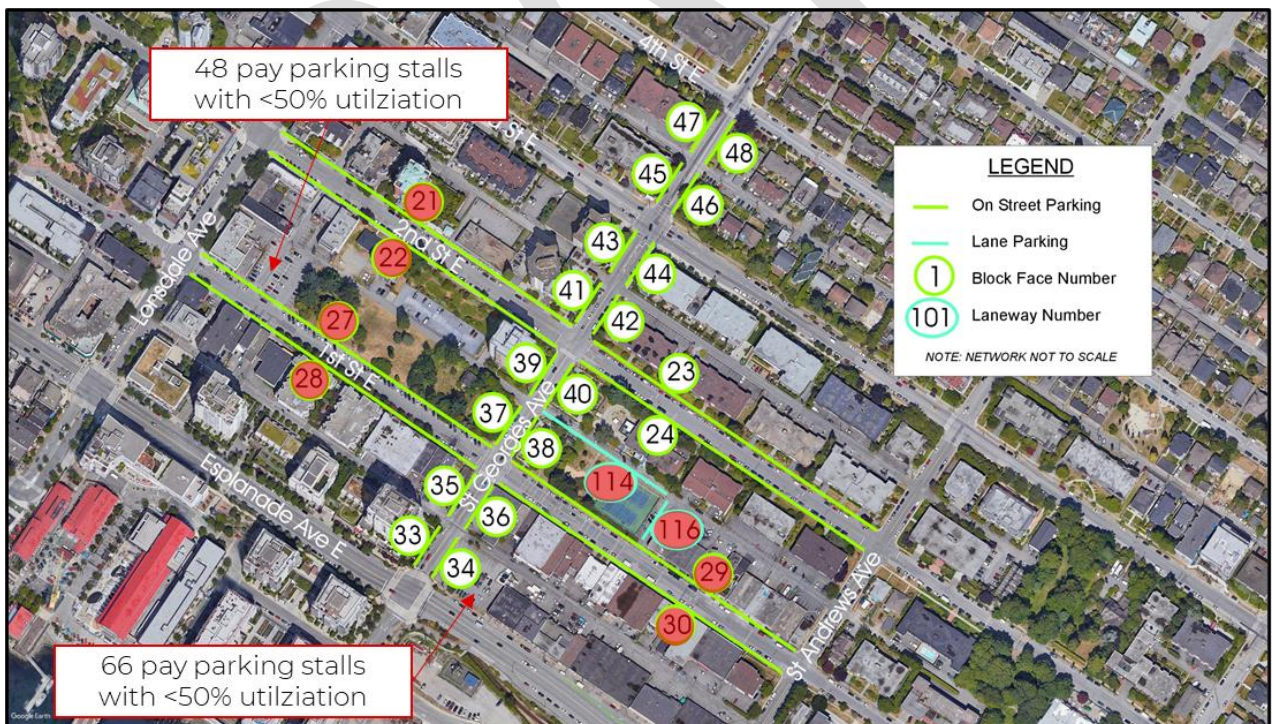


Figure 4-2: Existing Parking Utilization higher than 85%

Table 4-1: On-Street Parking Utilization

Location ID	Inventory*	Max Util.	Max Obs.	Max AM Util.	Max AM Observed	6:00 AM	6:30 AM	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM	9:30 AM	10:00 AM
21	26	85%	22	54%	14	7	8	8	9	9	12	9	10	14
22	27	115%	31	63%	17	8	9	12	13	16	16	13	17	15
23	32	72%	23	72%	23	12	13	17	17	19	16	20	23	21
24	31	74%	23	74%	23	19	20	23	23	21	23	19	23	21
27	52	92%	48	85%	44	24	23	20	22	23	27	32	31	44
28	33	100%	33	61%	20	15	14	14	12	11	12	16	15	20
29	27	96%	26	81%	22	14	9	12	13	19	19	21	22	22
30	34	88%	30	74%	25	7	8	11	15	22	20	20	23	25
33	5	0%	0	0%	0	0	0	0	0	0	0	0	0	0
34	5	40%	2	40%	2	0	2	0	0	0	0	0	0	0
35	3	100%	3	67%	2	2	2	0	2	2	1	1	2	2
36	2	100%	2	100%	2	0	0	2	0	0	0	0	0	0
37	5	80%	4	20%	1	0	0	1	0	0	1	1	1	1
38	5	80%	4	40%	2	2	2	0	1	1	1	2	1	1
39	0		3		3	1	1	3	3	2	1	1	1	2
40	0		4		4	0	0	1	3	3	3	4	3	3
41	0		4		4	1	1	0	0	2	3	4	4	1
42	0		4		4	1	2	3	3	4	4	4	4	4
43	0		3		1	0	0	0	0	0	0	0	1	0
44	0		1		0	0	0	0	0	0	0	0	0	0
45	4	0%	0	0%	0	0	0	0	0	0	0	0	0	0
46	4	0%	0	0%	0	0	0	0	0	0	0	0	0	0
47	5	0%	0	0%	0	0	0	0	0	0	0	0	0	0
48	4	0%	0	0%	0	0	0	0	0	0	0	0	0	0
114	16	100%	16	100%	16	4	6	8	11	14	16	16	16	16
116	8	88%	7	75%	6	1	1	1	5	6	6	6	6	6
Total	304		293		235	118	121	136	152	174	181	189	203	218

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Max PM Util.	Max PM Obs.	2:00 PM	2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM	10:00 PM	10:30 PM	11:00 PM
85%	22	16	17	17	17	17	22	18	17	14	22	19	21	18	18	9	10	9	9
115%	31	28	27	26	23	31	29	26	30	24	30	29	28	26	31	24	20	17	14
69%	22	20	20	22	20	19	20	19	17	13	10	9	13	10	10	11	12	13	13
71%	22	22	20	20	16	18	18	18	19	17	18	18	17	19	17	16	16	15	17
92%	48	44	45	45	42	48	47	45	46	46	48	46	45	47	42	35	24	29	28
100%	33	33	20	26	23	31	33	29	32	33	30	29	28	28	22	21	18	13	13
96%	26	24	23	22	26	26	22	22	20	19	18	17	16	14	13	10	10	10	10
88%	30	28	23	27	27	27	30	21	24	23	22	22	19	18	16	12	11	11	10
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100%	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80%	4	2	3	4	0	2	3	3	3	3	4	4	4	3	1	1	1	1	1
80%	4	4	1	2	1	3	3	4	4	4	3	4	4	3	3	3	2	2	2
	3	1	2	1	1	3	3	2	1	2	3	2	1	0	1	0	0	0	0
	2	2	2	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1
	4	1	1	1	1	3	4	3	1	2	2	2	3	3	2	3	2	2	2
	3	3	0	0	1	2	0	0	0	0	3	3	3	3	2	0	0	1	1
	3	1	0	0	1	3	0	0	0	0	0	0	1	1	0	2	0	0	0
	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100%	16	16	16	16	16	16	16	14	7	7	3	3	3	3	3	3	3	3	3
88%	7	5	6	7	5	5	6	4	2	2	2	1	1	2	2	2	2	2	2
	284	253	229	240	224	259	261	233	228	214	223	213	212	203	187	156	135	132	129

Due to the COVID-19 pandemic, NSNH were not able to provide full program at the facility while this study was being conducted. As such, the parking demand of the facility were assessed by reviewing the program provided during the fall of 2019. A snapshot of the program, daily staff and visitors counts, and typical travel patterns are summarized in Figure 4-3.

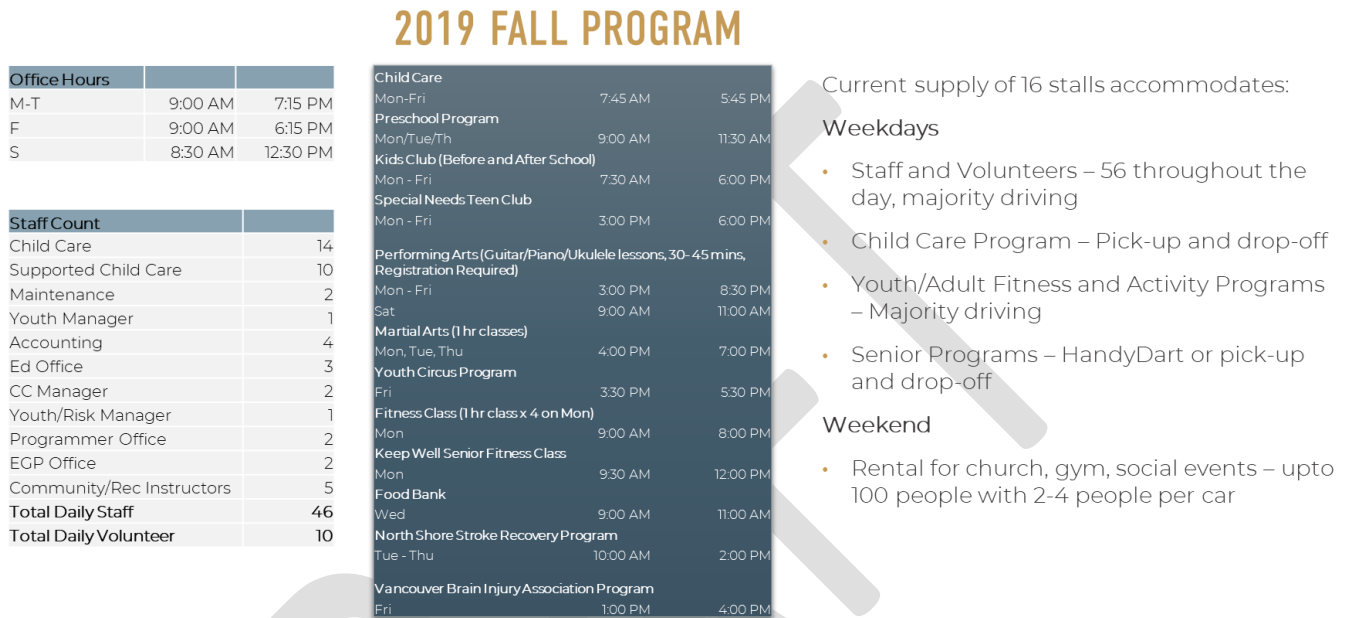


Figure 4-3: Parking Supply and Demand at NSNH

5.0 TRIP GENERATION

The land use data including the type of use and intensity used for the trip generated is provided below.

- **North Building** – 18 overnight respite beds and 25 adult day program spaces, 89 below-market rental units on upper floors
- **South Building** – 33,000 sq ft of NSNH services, 180 below-market rental units on upper floors

The trip generation review took into consideration both the existing and future NSNH program. Since the existing facility include approximately 18,000 sq ft, the trip generation included the traffic generated by additional 15,000 sq ft.

The following ITE Land use codes were used to estimate the trips for the new uses.

- Land Use 221: Multifamily Housing (Mid-Rise)
- Land Use 254: Assisted Living
- Land Use 495: Recreational Community Center

The baseline auto mode split for all uses were assumed to be 95% according to the data provided in the ITE Trip Generation Handbook (3rd Edition). Based on the mode split of the Lonsdale Town Centre, trip generation were adjusted to reflect auto mode split of 60%.

A summary of the trip generation for both the AM and PM peak periods is provided in **Table 5-1** below. Based on the results of trip generation, the development is expected to generate approximately 71 vehicles in the AM peak hour and 89 vehicles in the PM peak hour. Based on the existing volumes on the adjacent road network, this additional traffic is expected to have minimal impact.

Table 5-1: Trip Generation Summary

Use	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
North – Residential	5	13	18	14	9	23
South - Residential	9	26	35	26	16	42
North – Care BC	2	2	4	2	2	4
South - NSNH	9	5	14	9	11	20
Total	25	46	71	51	38	89

6.0 FUTURE TRAFFIC CONDITIONS

The site traffic volumes were superimposed onto the base future horizon volumes, estimated using the volumes from the City's 2018 Base Synchro model and 2050 volumes from the RTM. The resultant intersection volumes are shown in **Figure 6-1**. It is expected that the volumes shown in this figure are conservative in nature and the forecast volumes are likely lower than estimated.

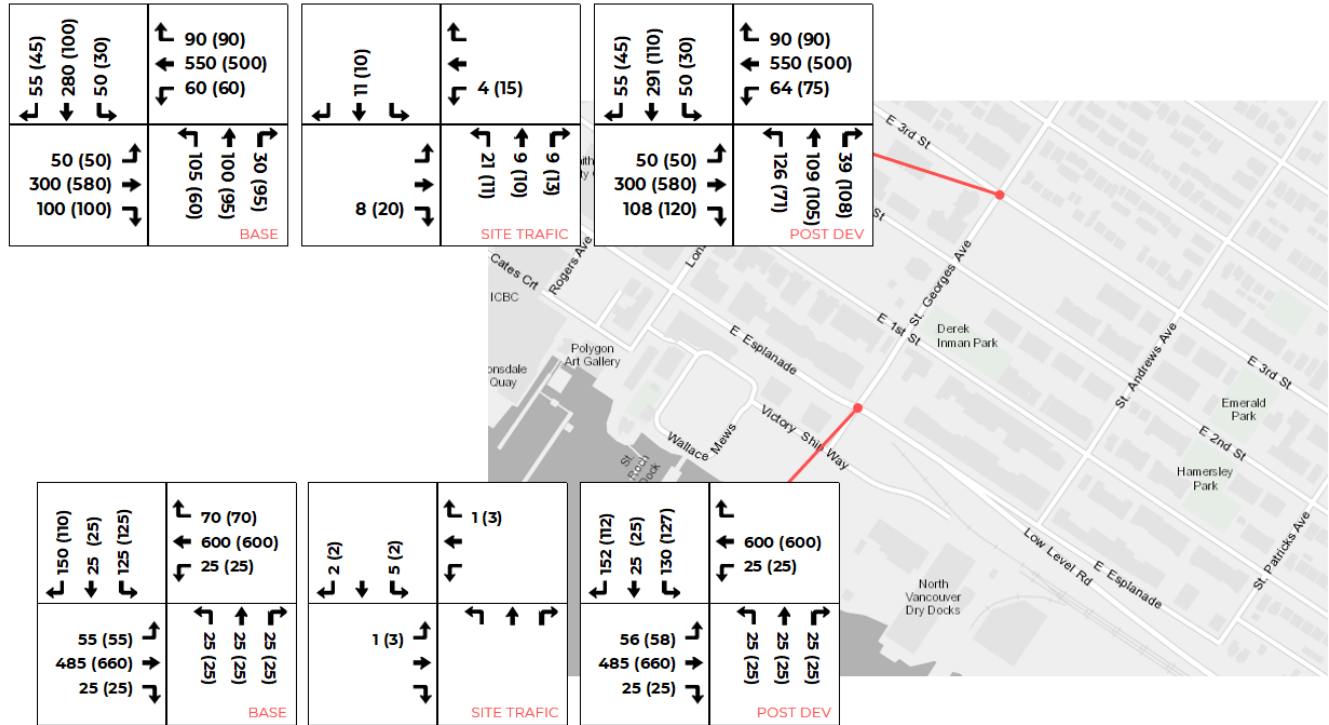


Figure 6-1: Background, Site, and Post Development Traffic Volumes

The overall performance of intersections is typically measured by the delays experienced by vehicles as they travel through it, also referred to as Level of Service (LOS). The LOS can range between LOS A and F, with A representing the best operating conditions and F the worst. For planning purposes, LOS D or better is considered to be operating at reasonable delays. LOS E or worse is operating at or beyond capacity and likely to experience recurring delays and congestion at intersections. **Table 6-1** summarizes the AM and PM peak period service levels for St. Georges Avenue/Esplanade Ave and St Georges Ave/E 3rd Street intersections. The results indicated that both intersections are expected to operate at acceptable capacity threshold and no further intersection improvements are required due to the NSNH development traffic. The detailed Synchro output summary is provided in Appendix B.

Table 6-1: Post Development Intersection Capacity Analysis Summary

Approach	V/C Ratio	Total Delay (s)	LOS	95% Queue Length (m)
St Georges Ave/3rd Street E				
Intersection LOS: C (B)				
EB Left	0.19 (0.11)	9 (6)	A (A)	8 (8)
EB Thru	0.43 (0.65)	18 (20)	B (B)	53 (143)
EB Right	0.18 (0.17)	3 (4)	A (A)	8 (10)
WB Left	0.15 (0.19)	9 (7)	A (A)	9 (11)
WB Thru	0.73 (0.53)	25 (16)	C (B)	114 (105)
WB Right	0.14 (0.12)	2 (2)	A (A)	5 (6)
NB Left	0.67 (0.38)	45 (33)	D (C)	53 (22)
NB Thru, Right	0.30 (0.69)	21 (33)	C (C)	35 (45)
SB Left	0.16 (0.21)	24 (29)	C (C)	16 (11)
SB Thru, Right	0.69 (0.52)	33 (30)	C (C)	104 (37)
St Georges Ave/Esplanade Ave				
Intersection LOS: B (A)				
EB Left, Thru	0.43 (0.41)	12 (7)	B (A)	40 (44)
EB Thru, Right	0.43 (0.41)	12 (7)	B (A)	40 (44)
WB Left, Thru	0.47 (0.37)	12 (6)	B (A)	48 (39)
WB Thru, Right	0.47 (0.37)	12 (6)	B (A)	48 (39)
NB Left, Thru	0.11 (0.24)	18 (27)	B (c)	13 (15)
NB Right	0.05 (0.09)	4 (8)	A (A)	3 (5)
SB Left, Thru	0.36 (0.54)	11 (19)	B (B)	19 (21)
SB Thru, Right	0.36 (0.54)	11 (19)	B (B)	19 (21)

7.0 FUTURE PARKING REQUIREMENTS

7.1 VEHICULAR PARKING

The parking requirements for the uses within the two buildings based on the City of North Vancouver Zoning Bylaw are summarized in **Table 7-1**.

Table 7-1: Summary of Bylaw Parking Requirement

Use	Density	By-Law Ratio	Parking Requirement
North Building			
Below Market Rental	89 units	0.60 per unit 0.1 visitor per unit	54 stalls (9 visitor stalls)
Care BC	1,796 sq m	1 per 115 sq m	16 stalls
Total			54 stalls (9 visitor stalls) 16 Care BC stalls
South Building			
Below Market Rental	179 units	0.60 per unit 0.1 visitor per unit	108 stalls (18 visitor stalls)
NSNH	3,096 sq m	1 per 115 sq m	28 stalls
Total			108 stalls (18 visitor stalls) 27 NSNH stalls

7.2 REDUCTION TO PARKING REQUIREMENTS

The current design indicates that the future parking supply is expected to be lower than the bylaw requirements for all uses except NSNH. **Table 7-2** provides the summary of proposed supply and expected parking variance required for the current design.

Table 7-2: Parking Variance Summary

Use	Density	By-Law Parking Requirement	Proposed Supply	Variance
North Building				
Below Market Rental	89 units	54 stalls (9 visitor stalls)	36 stalls (4 visitor stalls)	-33%
Care BC	1,796 sq m	16 stalls	8 stalls	-50%
South Building				
Below Market Rental	179 units	108 stalls (18 visitor stalls)	72 stalls (9 visitor stalls)	-33%
NSNH	3,096 sq m	27 stalls	27 stalls	0%

The City's bylaw only states parking requirement for market rental units. Several studies have indicated the affordable below-market housing experience considerably lower vehicle ownership rates resulting in lower parking demands. Rates as low as 0.3 stalls per bedroom have been supported by ITE's Parking Generation Manual (3rd Edition).

In addition, studies have shown that accessibility to transit also reduces auto ownership. The findings from 2018 Regional Parking Study have confirmed that apartments within 800 metres of Metro Vancouver's FTN have lower auto ownership levels than those outside of convenient walking distance to transit services. **Figure 7-1** shows that parking utilization is lower at locations with higher transit ridership numbers.

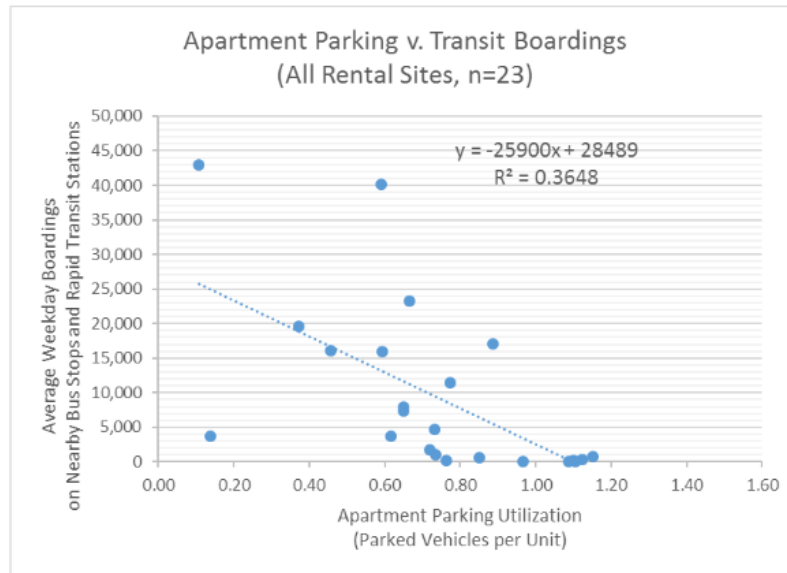


Figure 7-1: Relationship between Transit Ridership and Parking Utilization

In terms of the Care BC use, ITE's Parking Generation Manual indicated the following average parking demands for similar use:

- Assisted Living - 0.4 spaces / bed
- Day Care Centre – 0.24 spaces / resident

Based on these parking rates, the proposed 8 stalls are expected to accommodate the future demand of the program, which has also been confirmed by Care BC. Passenger pick-up and drop-off zone along 1st Street is important in order to support the lower parking supply.

A review of current parking utilization also supports shared parking arrangement between the visitor parking stalls and NSNH in the south building. This allows for more efficient use of parking supply at this site during different peak periods.

Based on these factors, the proposed supply for the residential and Care BC uses are considered adequate and therefore parking variance should be supported for the development.

7.3 BICYCLE PARKING

The bicycle parking requirements and proposed supply for the uses within the two buildings based on the City of North Vancouver Zoning Bylaw are summarized in **Table 7-3** below. As shown in the table below, the proposed bicycle parking supply is expected to meet the City's bylaw requirement.

Table 7-3: Summary of Bicycle Bylaw Parking Requirement and Proposed Supply

Use	Density	By-Law Ratio	Parking Requirement	Parking Supply
North Building				
Below Market Rental	89 units	Short Term: 6 spaces per every 60 units or part thereof Secure: 1.5 spaces per unit	Short Term: 12 stalls Secure: 134 stalls	Short Term: 12 stalls Secure: 134 stalls
Care BC	1,796 sq m	Short Term: 6 spaces per 1,000 sq m GFA Secure: 1 space per 250 sq m GFA	Short Term: 11 stalls Secure: 8 stalls	Short Term: 11 stalls Secure: 8 stalls
Total			Short Term: 23 stalls Secure: 142 stalls	Short Term: 23 stalls Secure: 142 stalls
South Building				
Below Market Rental	179 units	Short Term: 6 spaces per every 60 units or part thereof Secure: 1.5 spaces per unit	Short Term: 18 stalls Secure: 270 stalls	Short Term: 18 stalls Secure: 270 stalls
NSNH	3,096 sq m	Short Term: 6 spaces per 1,000 sq m GFA Secure: 1 space per 250 sq m GFA	Short Term: 4 stalls Secure: 12 stalls	Short Term: 4 stalls Secure: 12 stalls
Total			Short Term: 22 stalls Secure: 282 stalls	Short Term: 22 stalls Secure: 282 stalls

7.4 PICK-UP/DROP-OFF REQUIREMENTS

The Child Care use within NSNH facility is expected to generate demands for pick-up/drop-off spaces. Although these activities are generally expected to occur outside of the peak hour, an assessment was completed to determine the approximate number of these spaces. The program is expected to accommodate approximately 60 children. Based on the peak hour traffic generation rates sourced from the ITE Trip Generation Handbook, approximately 14 inbound vehicles (60 students, 0.81 trips per student, 47% inbound) are expected during PM peak hour. The expected demand was calculated using the M/M/s queueing theory that require the arrival rate, service rate, and number of servers. Assuming the duration of stay to be 10 minutes, the queueing analysis resulted in a parking demand of 7 spaces based on a 99th percentile parking demand outcome.

The results of the queueing analysis are summarized in **Table 7-4**.

Table 7-4: Queueing Analysis for Child Care Pick-Up/Drop-Off

Number of vehicles in the system	Probability of this many in the system	Probability of this many vehicles in system or less (%)	Probability of this many vehicles in system or more (%)
0	9.7%	9.7%	100.0%
1	22.6%	32.3%	90.3%
2	26.4%	58.7%	67.7%
3	20.5%	79.2%	41.3%
4	12.0%	91.2%	20.8%
5	5.6%	96.7%	8.8%
6	2.2%	98.9%	3.3%
7	0.7%	99.6%	1.1%

Based on the results of the queueing analysis, the available on-street space adjacent to the future building are in excess of 7 stalls and is expected to meet the pick-up/drop-off demand of the childcare use if parking spaces are occupied within the parkade. The demand for Care BC facility is expected to be significantly lower and as such the on-street spaces on 2nd Street should be adequate for the pick-up/drop-off activities. The desired as well as required locations for passenger loading zone are shown in **Figure 7-2**.

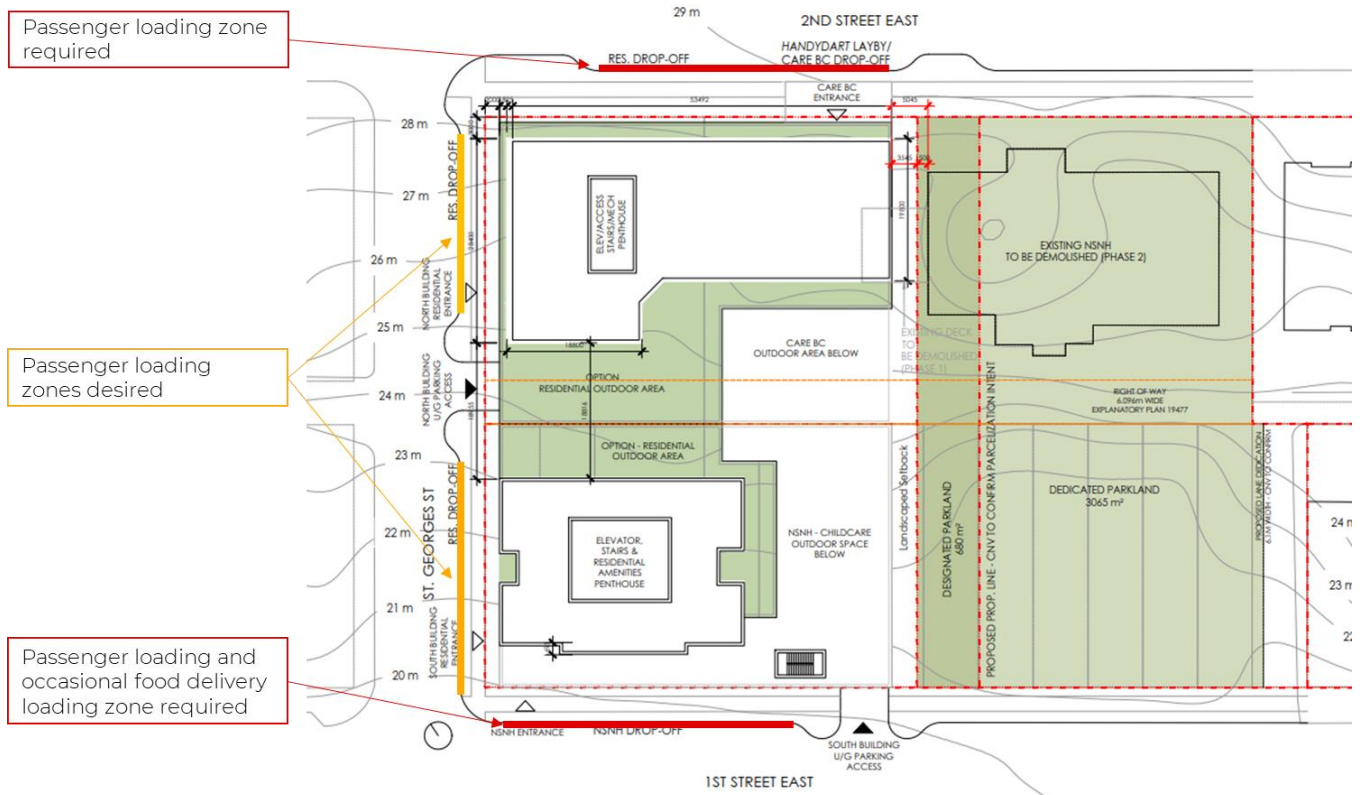


Figure 7-2: Passenger loading zone locations

8.0 FUTURE LOADING REQUIREMENTS

The City of North Vancouver's bylaw stipulates that a minimum of one loading space per building or one loading space per 15,000 square feet of Gross Floor Area is required for civic/commercial/industrial use. As such, the loading requirement for both buildings are summarized in **Table 8-1**.

Table 8-1: Summary of Loading Requirement and Proposed Supply

Use	Density	Ratio	Loading Space Requirement	Spaces provided by Development
North Building				
Civic/Commercial/Industrial	19,335 sq ft	1 per building or 1 per 15,000 sq ft GFA	2	2
South Building				
Civic/Commercial/Industrial	33,325 sq ft	1 per building or 1 per 15,000 sq ft GFA	3	2

Based on the projected loading needs, a large loading space (9m x 3m) and a small loading space (5.5m x 2.5m) have been provided at each building. The larger loading space is designed to accommodate garbage/recycling trucks and MSU (Medium Single Unit Truck). Meanwhile, the smaller loading space is designed to accommodate LSU (Light Single Unit Truck). The height clearance at the loading area in the north building is expected to be approximately 7 metres. Similarly, the height clearance at the loading area in the south building is expected to be 6.5 metres. The height clearance required for typical garbage collection truck is reported as 6.5m – 7.5m in the City of Vancouver's Garbage and Recycling Storage Amenity Supplement (May 2011). As such, the current design of the loading areas is expected to accommodate the garbage collection on-site.

Backing out of the loading space is expected of the delivery vehicles to exit the site and therefore parkade ramps are expected to be utilized to complete this manoeuvre. Since this is expected to occur infrequently, disruption to the traffic entering and exiting the parkade is expected to be minimal.

NSNH program have been noted to require occasional food delivery that are made in larger food delivery trucks. A loading area accommodating such large vehicle on-site was not feasible and therefore these trucks are expected to use the curbside space on 1st Street for

loading purposes. A design vehicle of WB-15 was utilized to assess the swept path at this location.

The loading vehicle manoeuvres for all proposed loading spaces are provided in **Appendix C**.

Based on the proposed programs on each building, **Table 8-2** show the potential frequency and type of vehicle expected to be servicing the site.

Table 8-2: Summary of Loading Frequency and Delivery Vehicles

Delivery/Movement	Frequency	Duration	Type of Vehicle
North Building			
Supply & Service Vehicles	4/day	1-2 hours	MSU or smaller
Maintenance Services	2/day	1-2 hours	LSU or smaller
Garbage/Recycling Pickup	4/week	.25 hours	Garbage Truck
South Building			
Supply & Service Vehicles	4/day	1-2 hours	MSU or smaller
Maintenance Services	4/day	1-2 hours	LSU or smaller
Garbage/Recycling Pickup	4/week	.25 hours	Garbage Truck
Food Bank Delivery	1/month	1 hour	WB-15

9.0 ACCESS CONFIGURATION

The proposed access for the north building is located along St Georges Avenue between 1st Street and 2nd Street. Based on the geometric and traffic volumes review, the access can feasibly be configured to accommodate turning movements from and to all directions.

The proposed location for the south building is located along E 1st Street without any major geometric concerns and therefore should also be configured to accommodate movements from all directions.

10.0 SITE CONNECTIVITY

As discussed previously, the proposed site is well connected to transit with bus stops located along E 3rd Street and Lonsdale Avenue. Sidewalks are present along both sides of St Georges Avenue to connect the future residents, visitors, and employees to bus stops along E 3rd Street. Similarly, sidewalks are present along both sides of 2nd Street and south side of 1st Street to connect to the bus stops along Lonsdale Avenue. The width and quality of the sidewalk vary depending on whether adjacent parcel was redeveloped. For example, the sidewalk on the east side of St Georges Avenue south of E 3rd Street was upgraded from a 1.3 metres width without boulevard to 2.0 metres width with 1.2 metres boulevard as part of the redevelopment of 221 E 3rd Street.

As part of the redevelopment, the sidewalks adjacent to this development are being upgraded from the 1.3 metres without boulevard to 2 metres with 1.5 metres boulevard. Based on British Columbia Active Transportation (BCAT) Design Guide, the increase in width allows sufficient clearance for a pedestrian to pass someone with a service animal or another pedestrian holding a child's hand. As redevelopments occur in the area, the sidewalks should be improved to a minimum of 1.8 metres width with boulevard in addition to traffic calming measures such as curb bulges where possible. The north side of E 1st Street between St Georges Avenue and the surface parking lot at 180 E 1st Street is currently unpaved and narrow, becoming a potential location for improvement.

Since there are no cycling facilities directly connecting to the proposed site, cyclists would be encouraged to connect to the dedicated cycling facilities on Esplanade via St. Georges Avenue ultimately connecting to the City's bike network.

11.0 TRANSPORTATION DEMAND MANAGEMENT (TDM) MEASURES

The City of North Vancouver aims to promote sustainable and alternate modes of transportation. The study area is located in highly walkable location with close proximity to transit. As such, improvements to pedestrian, cycling, and transit facilities would serve as primary Transportation Demand Management (TDM) measures. In addition, the following TDM measures are currently being proposed for the future site.

Table 11-1: Potential TDM Measures

TDM Strategy	Measure	Affected Party
Active Transportation Infrastructure Improvements	Invest in improving walking and cycling infrastructure (bicycle parking, curb bulges, improved crossings, amenities)	Residents, Care BC/NSNH Employees and Visitors
	Create multi-modal access guide, which includes maps and other information on how to reach a particular distance with different modes	Residents, Care BC/NSNH Employees and Visitors
	Address security concerns of cyclists	Residents, Care BC/NSNH Employees and Visitors
	Provide a common maintenance area for bicycle repairs on-site	Residents, Care BC/NSNH Employees and Visitors
	Provide short term bicycle parking at all building entrances	Residents, Care BC/NSNH Employees and Visitors
Transit	Provide subsidized transit passes	Residents, Care BC/NSNH Employees
	Display transit schedule and routing information in common areas	Residents, Care BC/NSNH Employees
Parking Management	Unbundle parking costs	Residents
	Implement pay parking	Care BC/NSNH Employees and Visitors
	Implement parking restrictions or on-street pay parking to discourage visitors from parking off-site to avoid parking fees	Care BC/NSNH Employees and Visitors
	Introduce passenger loading zones to accommodate pick-up and drop-off activities off-site	Care BC/NSNH Visitors

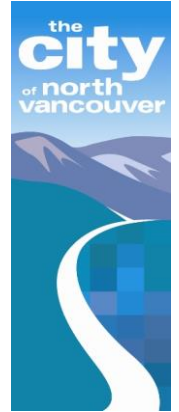
	Share residential visitor stalls and NSNH stalls to maximize the use of total parking supply	Residents and NSNH visitors
Incentive Programs	Provide commuting/sustainable travel allowance	Care BC/NSNH Employees
	Provide alternative/flexible work arrangements	Care BC/NSNH Employees
	Provide incentives visitors for using alternative modes	NSNH Visitors
Education, Information, and Marketing	Prepare marketing materials to attract residents and visitors who want a car-free lifestyle including car share information	Residents
	Participate in Bike to Work Week and other community and regional promotions/events for sustainable transportation	Residents, Care BC/NSNH Employees and Visitors
	Hire a TDM coordinator or establish a volunteer position responsible for developing and maintaining TDM program	Residents, Care BC/NSNH Employees

APPENDIX A

TERMS OF REFERENCE

Guidelines for the Submission of a Transportation Study - Level 1

For Site Development Applications in the City of North Vancouver



Transportation Group,
City of North Vancouver Engineering, Parks & Environment Department

This document was updated on **4th March 2021** by CNV Engineering staff and applies to the proposed development at:
225 East 2nd.

Guidelines for the Submission of a Level 1 Transportation Study – Site Specific Requirements from City Staff

Above and beyond the guidelines contained within this document, City of North Vancouver staff may have requirements or exemptions for individual developments, as transportation conditions are unique from site-to-site. This page generally provides (where applicable) staff requirements related to a specific development proposal.

Development Name and Address: 225 East 2nd

Date: 4th Mar 2021

CNV Engineering (Transportation) Staff Contact: Daniel Watson, dwatson@cnv.org

This Terms of reference updates the previous terms of reference dated 8th Dec 2020

Staff requirements regarding preparation of Level 1 TS for this development proposal:

1/. Complete the study as per this terms of reference.

2/. Study Intersections:

- St. Georges and East Esplanade (provide trip assignment and distribution – no capacity analysis required)
- St. Georges and East 3rd (Consider integration with planned RapidBus lane)

3/. Trip Generation:

- A survey of existing trip generation should be carried out at the Neighbourhood house. This would be more accurate and likely produce a lower volume of car trips. This survey should be adjusted/worked to adjust for Covid-19 impacts.

4/. Mode Split:

- For the Neighbourhood house (including Staff and Patrons) complete a survey on mode choice.
- For residential and care use the Lonsdale Town Centre resident specific data from the 2011 trip diary:
 - Auto Driver – 48%
 - Auto Passenger – 13%
 - Transit – 23%
 - Walk - 13%
 - Bike – 1%
 - Other – 1%

5/. Parking Review:

- Assess number, size and maneuverability of loading spaces. Loading demand for the existing Neighbourhood House should be surveyed and reviewed.
- Review and provide comment on the number of parking spaces allocated to non-residential uses.
- Parking appears to be deficient. Proposes TDM plan to respond to this.

- Review on-street parking on the following blocks:
 - **St. Georges Ave – Esplanade Ave to 4th Street E**
 - **1st Street E – Lonsdale Ave to St. Andrews Ave**
 - **2nd Street E – Lonsdale Ave to St. Andrews Ave**

This should include existing regulations and occupancy in the morning, afternoon and evening periods.

- Review all off-street publicly available parking within 5min walk of the site. This should include a summary of price and occupancy levels.
 - **Occupancy data of the lots will be provided by the City.**
- Provide details on the child care pick up and drop off operations, and comment on if the pick up drop off area is sufficient.
- Provide rationale for vehicular parking rate for the care BC facility.

6/. Loading Review:

- Review proposed loading (including any garbage or recycling staging areas). The review should include commentary on the accessibility and functionality of the loading spaces and the paths to access them (including height constraints where applicable). The review should comment on the provided loading in comparison to both the zoning bylaw and the predicted loading needs of the uses proposed for the site.

7/. TDM:

- Provide a terms of reference for a TDM plan to be developed by the applicant following a rezoning. The plan should provide information for:
 - Residents
 - Neighbourhood House and CareBC staff
 - Neighbourhood House patrons
 - CareBC patrons and their families.

8/. Access to Transit (New)

- Provide a review of the site's access to Transit. This should include the pedestrian access to all stops (are sidewalks and ramps provided etc). This should be conducted for the nearest local bus stops and nearest RapidBus stops.

General:























- The Study should assume that Covid-19 is not a factor

APPENDIX B

SYNCHRO OUTPUT SUMMARY

Lanes, Volumes, Timings
3: St Georges Ave & E 3rd ST













2050 Post Development
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	300	108	64	550	90	126	109	39	50	291	55
Future Volume (vph)	50	300	108	64	550	90	126	109	39	50	291	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		30.0	40.0		30.0	30.0		0.0	30.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Satd. Flow (prot)	1770	1810	1583	1770	1810	1583	1770	1678	0	1770	1728	0
Flt Permitted	0.221			0.457			0.374			0.656		
Satd. Flow (perm)	401	1810	1351	798	1810	1351	662	1678	0	1113	1728	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			125		21			11	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		177.5			222.3			91.8			102.5	
Travel Time (s)		12.8			16.0			6.6			7.4	
Confl. Peds. (#/hr)	50		50	50		50	50		50	50		50
Confl. Bikes (#/hr)			25			25			25			25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	5%	2%	2%	5%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	326	117	70	598	98	137	160	0	54	376	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	10.3	24.9	24.9	10.3	24.9	24.9	24.9	24.9		24.9	24.9	
Total Split (s)	11.0	42.0	42.0	11.0	42.0	42.0	27.0	27.0		27.0	27.0	
Total Split (%)	13.8%	52.5%	52.5%	13.8%	52.5%	52.5%	33.8%	33.8%		33.8%	33.8%	
Maximum Green (s)	5.7	36.7	36.7	5.7	36.7	36.7	20.1	20.1		20.1	20.1	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	4.9	4.9		4.9	4.9	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.3	5.3	5.3	5.3	5.3	5.3	6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0	11.0		11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		60	60		60	60	15	15		15	15	
Act Effct Green (s)	38.5	33.8	33.8	39.6	36.2	36.2	25.0	25.0		25.0	25.0	
Actuated g/C Ratio	0.48	0.42	0.42	0.50	0.45	0.45	0.31	0.31		0.31	0.31	
v/c Ratio	0.19	0.43	0.18	0.15	0.73	0.14	0.67	0.30		0.16	0.69	
Control Delay	9.4	18.3	3.1	8.9	24.6	2.1	45.3	21.4		23.7	33.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	9.4	18.3	3.1	8.9	24.6	2.1	45.3	21.4		23.7	33.3	
LOS	A	B	A	A	C	A	D	C		C	C	
Approach Delay		13.8			20.3			32.4			32.1	
Approach LOS		B			C			C			C	
Queue Length 50th (m)	3.7	36.4	0.0	4.9	81.8	0.0	19.2	16.9		6.3	51.7	
Queue Length 95th (m)	7.7	53.1	7.7	9.3	113.9	5.3	#52.7	35.2		16.4	#104.0	

Lanes, Volumes, Timings

3: St Georges Ave & E 3rd ST

2050 Post Development
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	153.5			198.3			67.8			78.5		
Turn Bay Length (m)	40.0		30.0	40.0		30.0	30.0			30.0		
Base Capacity (vph)	291	840	694	466	841	694	206	539		347	547	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.19	0.39	0.17	0.15	0.71	0.14	0.67	0.30		0.16	0.69	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 41 (51%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 23.0

Intersection LOS: C

Intersection Capacity Utilization 81.1%







ICU Level of Service D

Analysis Period (min) 15

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


















Queue shown is maximum after two cycles.

Splits and Phases: 3: St Georges Ave & E 3rd ST

 Ø2	 Ø3	 Ø4 (R)
27 s	11 s	42 s
 Ø6	 Ø7	 Ø8 (R)
27 s	11 s	42 s













Lanes, Volumes, Timings
8: E Esplanade & St Georges Ave

2050 Post Development
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	485	25	25	600	71	25	25	25	130	25	152
Future Volume (vph)	56	485	25	25	600	71	25	25	25	130	25	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3411	0	0	3345	0	0	1818	1583	0	3068	0
Flt Permitted		0.810			0.919			0.781			0.807	
Satd. Flow (perm)	0	2768	0	0	3081	0	0	1455	1583	0	2467	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			24				44			163
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		131.4			151.8			66.6			88.6	
Travel Time (s)		9.5			10.9			4.8			6.4	
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						25						25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	615	0	0	756	0	0	54	27	0	333	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		25.0	25.0	25.0	25.0	25.0	
Total Split (s)	45.0	45.0		45.0	45.0		30.0	30.0	30.0	30.0	30.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Maximum Green (s)	39.0	39.0		39.0	39.0		24.7	24.7	24.7	24.7	24.7	
Yellow Time (s)	4.0	4.0		4.0	4.0		3.3	3.3	3.3	3.3	3.3	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		6.0			6.0			5.3	5.3		5.3	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	20	20		20	20		20	20	20	20	20	
Act Effct Green (s)		39.0			39.0			24.7	24.7		24.7	
Actuated g/C Ratio		0.52			0.52			0.33	0.33		0.33	
v/c Ratio		0.43			0.47			0.11	0.05		0.36	
Control Delay		12.1			12.2			18.4	3.6		10.7	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		12.1			12.2			18.4	3.6		10.7	
LOS		B			B			B	A		B	
Approach Delay		12.1			12.2			13.5			10.7	
Approach LOS		B			B			B			B	
Queue Length 50th (m)		27.2			33.8			5.5	0.0		9.4	
Queue Length 95th (m)		39.5			47.6			13.4	3.3		19.4	
Internal Link Dist (m)		107.4			127.8			42.6			64.6	
Turn Bay Length (m)												
Base Capacity (vph)		1443			1613			479	550		921	

Lanes, Volumes, Timings
8: E Esplanade & St Georges Ave

2050 Post Development
AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.43			0.47			0.11	0.05		0.36	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 23 (31%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 11.9

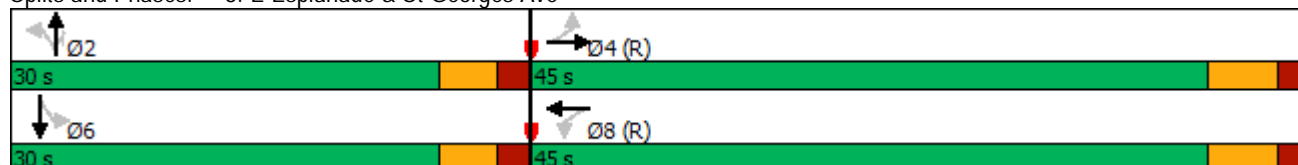
Intersection LOS: B

Intersection Capacity Utilization 73.8%

ICU Level of Service D























Analysis Period (min) 15

Splits and Phases: 8: E Esplanade & St Georges Ave















Lanes, Volumes, Timings
3: St Georges Ave & E 3rd ST

2050 Post Development
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	580	120	75	500	90	71	105	108	30	110	45
Future Volume (vph)	50	580	120	75	500	90	71	105	108	30	110	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	40.0		30.0	40.0		30.0	30.0		0.0	30.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Satd. Flow (prot)	1770	1810	1583	1770	1810	1583	1770	1558	0	1770	1664	0
Flt Permitted	0.364			0.264			0.650			0.500		
Satd. Flow (perm)	657	1810	1349	492	1810	1349	1104	1558	0	860	1664	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			125		62			25	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		177.5			222.3			91.8			102.5	
Travel Time (s)		12.8			16.0			6.6			7.4	
Confl. Peds. (#/hr)	50		50	50		50	50		50	50		50
Confl. Bikes (#/hr)			25			25			25			25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	5%	2%	2%	5%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	630	130	82	543	98	77	231	0	33	169	0
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Detector Phase	7	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	12.3	25.3	25.3	12.3	25.3	25.3	24.9	24.9		24.9	24.9	
Total Split (s)	13.0	40.0	40.0	13.0	40.0	40.0	27.0	27.0		27.0	27.0	
Total Split (%)	16.3%	50.0%	50.0%	16.3%	50.0%	50.0%	33.8%	33.8%		33.8%	33.8%	
Maximum Green (s)	7.7	34.7	34.7	7.7	34.7	34.7	20.1	20.1		20.1	20.1	
Yellow Time (s)	3.3	3.3	3.3	3.3	3.3	3.3	4.9	4.9		4.9	4.9	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.3	5.3	5.3	5.3	5.3	5.3	6.9	6.9		6.9	6.9	
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	C-Min	C-Min	None	C-Min	C-Min	None	None		None	None	
Walk Time (s)		7.0	7.0		7.0	7.0	7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		11.0	11.0		11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)		60	60		60	60	15	15		15	15	
Act Effct Green (s)	48.9	43.2	43.2	50.2	45.7	45.7	14.6	14.6		14.6	14.6	
Actuated g/C Ratio	0.61	0.54	0.54	0.63	0.57	0.57	0.18	0.18		0.18	0.18	
v/c Ratio	0.11	0.65	0.17	0.19	0.53	0.12	0.38	0.69		0.21	0.52	
Control Delay	6.4	19.6	3.5	7.0	15.6	2.1	33.1	32.8		29.3	30.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.4	19.6	3.5	7.0	15.6	2.1	33.1	32.8		29.3	30.2	
LOS	A	B	A	A	B	A	C	C		C	C	
Approach Delay		16.2			12.8			32.8			30.0	
Approach LOS		B			B			C			C	
Queue Length 50th (m)	2.5	70.5	0.4	3.9	56.7	0.0	11.0	25.4		4.6	20.9	
Queue Length 95th (m)	7.7	#143.1	10.0	10.6	104.6	5.6	21.9	45.2		11.4	36.5	

Lanes, Volumes, Timings
3: St Georges Ave & E 3rd ST

2050 Post Development
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Internal Link Dist (m)	153.5			198.3			67.8			78.5		
Turn Bay Length (m)	40.0		30.0	40.0		30.0	30.0			30.0		
Base Capacity (vph)	512	976	785	432	1034	824	277	437		216	436	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Reduced v/c Ratio	0.11	0.65	0.17	0.19	0.53	0.12	0.28	0.53		0.15	0.39	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Offset: 50 (63%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.69

Intersection Signal Delay: 18.9

Intersection LOS: B

Intersection Capacity Utilization 79.9%







ICU Level of Service D

Analysis Period (min) 15

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


















Queue shown is maximum after two cycles.

Splits and Phases: 3: St Georges Ave & E 3rd ST

 Ø2	 Ø3	 Ø4 (R)
27 s	13 s	40 s
 Ø6	 Ø7	 Ø8 (R)
27 s	13 s	40 s













Lanes, Volumes, Timings
8: E Esplanade & St Georges Ave

2050 Post Development
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	660	25	25	600	73	25	25	25	127	25	112
Future Volume (vph)	58	660	25	25	600	73	25	25	25	127	25	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Satd. Flow (prot)	0	3418	0	0	3341	0	0	1818	1583	0	3119	0
Flt Permitted		0.837			0.911			0.718			0.803	
Satd. Flow (perm)	0	2865	0	0	3050	0	0	1337	1583	0	2496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		7			25				33		122	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		131.4			151.8			66.6			88.6	
Travel Time (s)		9.5			10.9			4.8			6.4	
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						25						25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	807	0	0	758	0	0	54	27	0	287	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		8	8		2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		7.0	7.0	7.0	7.0	7.0	
Minimum Split (s)	45.0	45.0		45.0	45.0		30.0	30.0	30.0	30.0	30.0	
Total Split (s)	45.0	45.0		45.0	45.0		30.0	30.0	30.0	30.0	30.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%	40.0%	40.0%	40.0%	
Maximum Green (s)	39.7	39.7		39.7	39.7		24.0	24.0	24.0	24.0	24.0	
Yellow Time (s)	3.3	3.3		3.3	3.3		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0	0.0		0.0	
Total Lost Time (s)		5.3			5.3			6.0	6.0		6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Min	C-Min		C-Min	C-Min		Min	Min	Min	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		12.0	12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	20	20		20	20		20	20	20	20	20	
Act Effct Green (s)		50.9			50.9			12.8	12.8		12.8	
Actuated g/C Ratio		0.68			0.68			0.17	0.17		0.17	
v/c Ratio		0.41			0.37			0.24	0.09		0.54	
Control Delay		7.0			6.4			27.0	8.0		18.9	
Queue Delay		0.0			0.0			0.0	0.0		0.0	
Total Delay		7.0			6.4			27.0	8.0		18.9	
LOS		A			A			C	A		B	
Approach Delay		7.0			6.4			20.6			18.9	
Approach LOS		A			A			C			B	
Queue Length 50th (m)		20.7			17.9			7.3	0.0		12.0	
Queue Length 95th (m)		44.4			38.8			15.2	5.0		20.9	
Internal Link Dist (m)		107.4			127.8			42.6			64.6	
Turn Bay Length (m)												
Base Capacity (vph)		1945			2076			427	529		881	

Lanes, Volumes, Timings
8: E Esplanade & St Georges Ave

2050 Post Development
PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0			0			0	0		0	
Spillback Cap Reductn		0			0			0	0		0	
Storage Cap Reductn		0			0			0	0		0	
Reduced v/c Ratio		0.41			0.37			0.13	0.05		0.33	

Intersection Summary

Area Type: Other

Cycle Length: 75

Actuated Cycle Length: 75

Offset: 18 (24%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 9.1

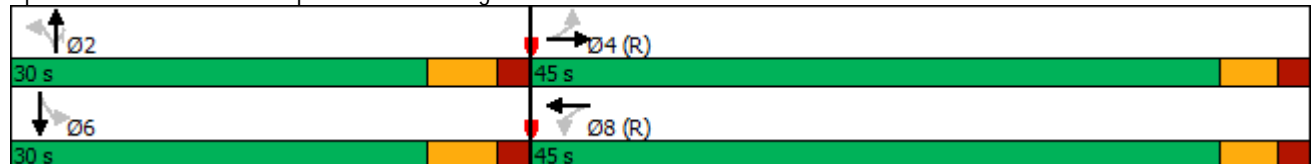
Intersection LOS: A

Intersection Capacity Utilization 78.2%

ICU Level of Service D

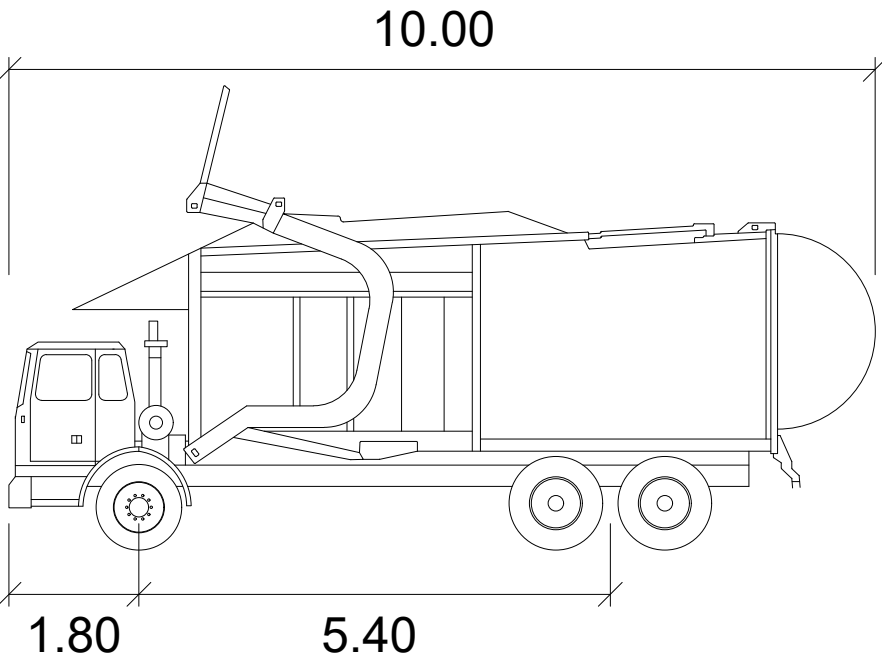
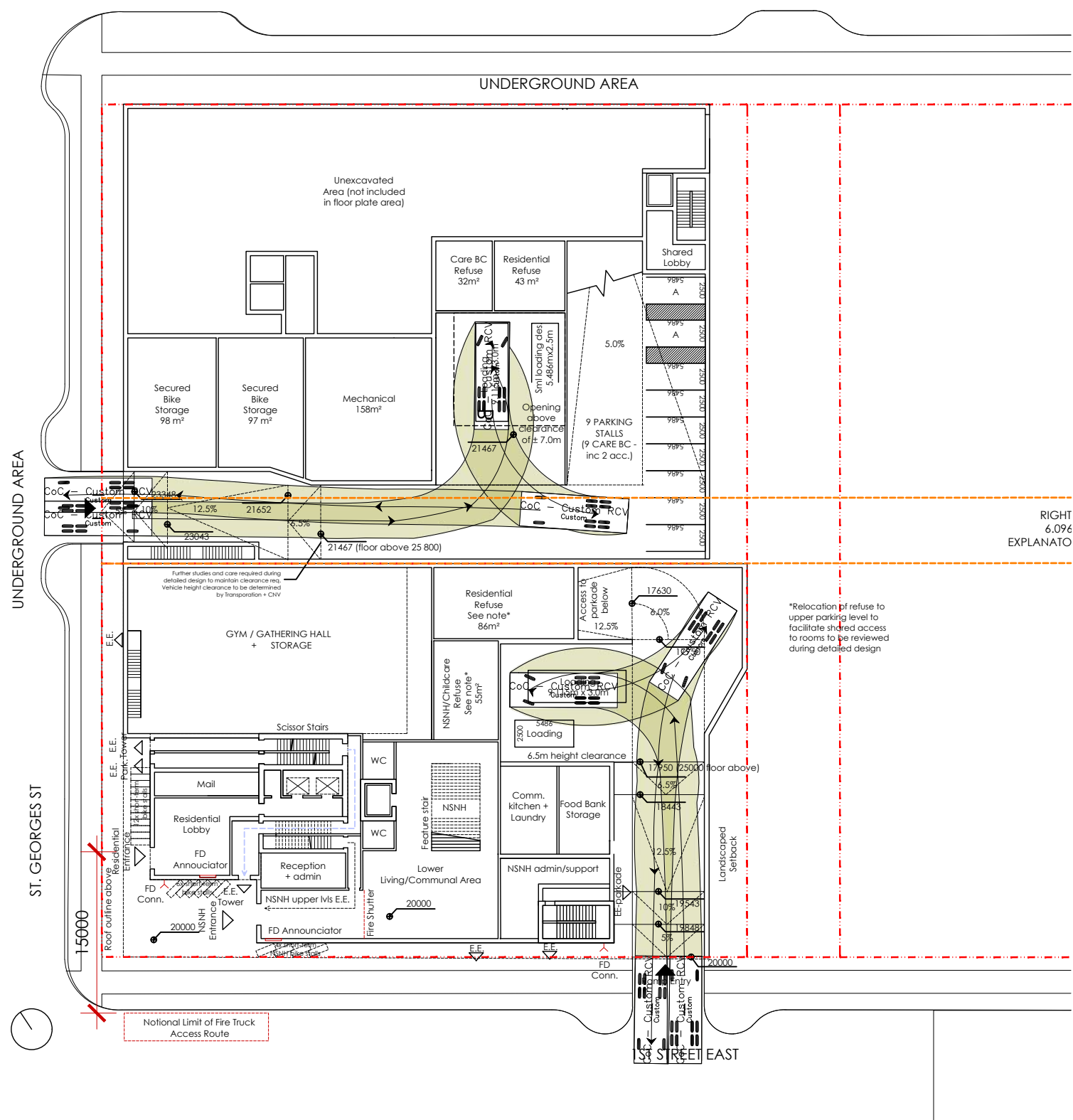
Analysis Period (min) 15

Splits and Phases: 8: E Esplanade & St Georges Ave



APPENDIX C

AUTOTURN TEMPLATES



CoC - Custom RCV

meters

Width : 3.20

Track : 2.60

Lock to Lock Time : 6.0

Steering Angle : 32.7



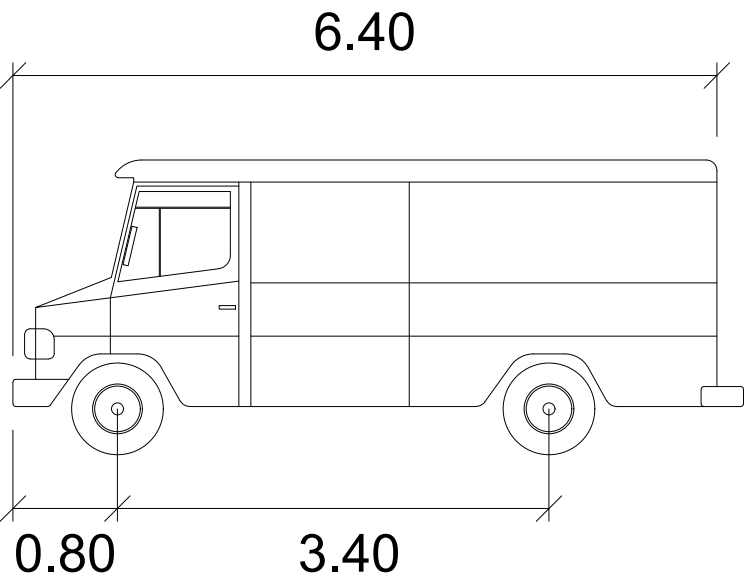
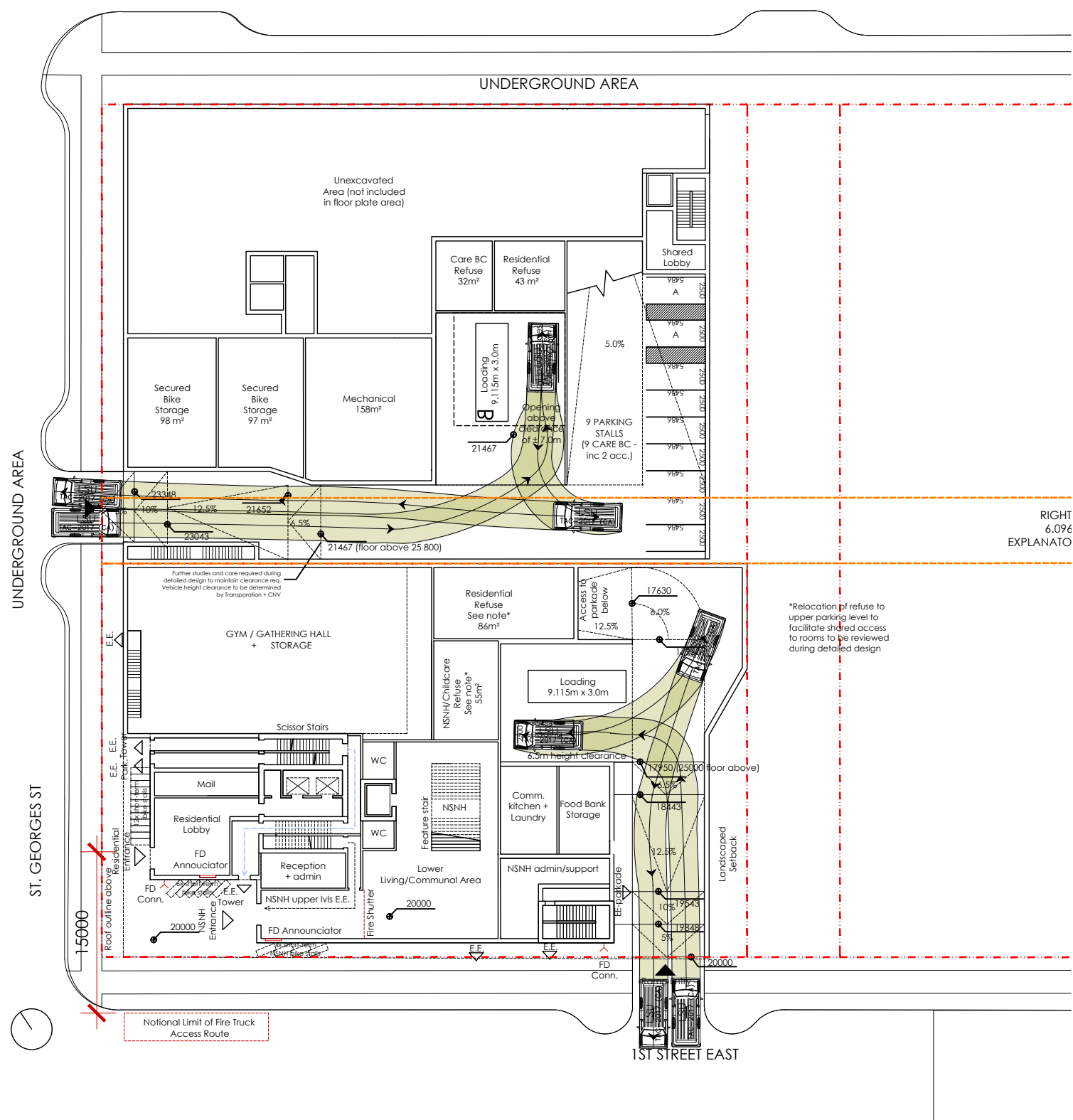
ISSUED FOR DISCUSSION

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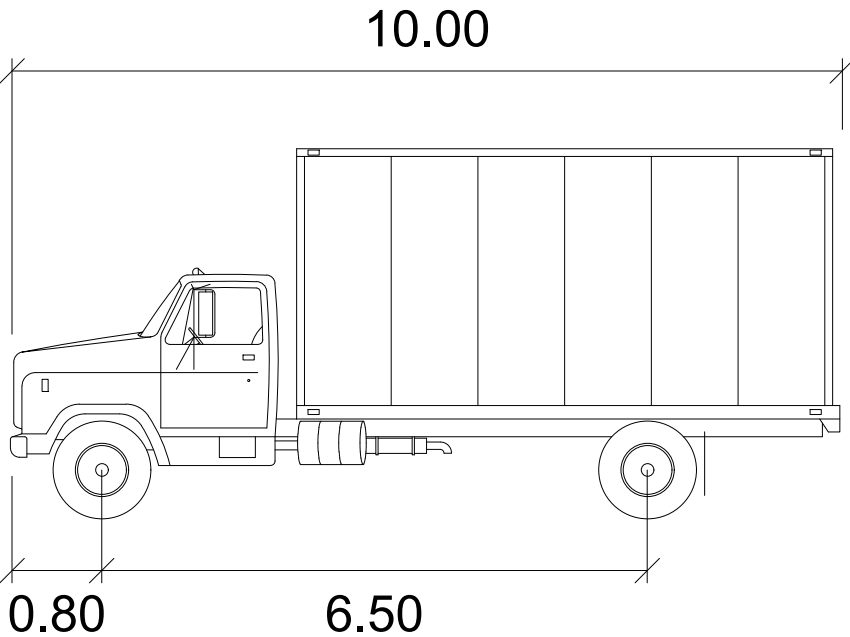
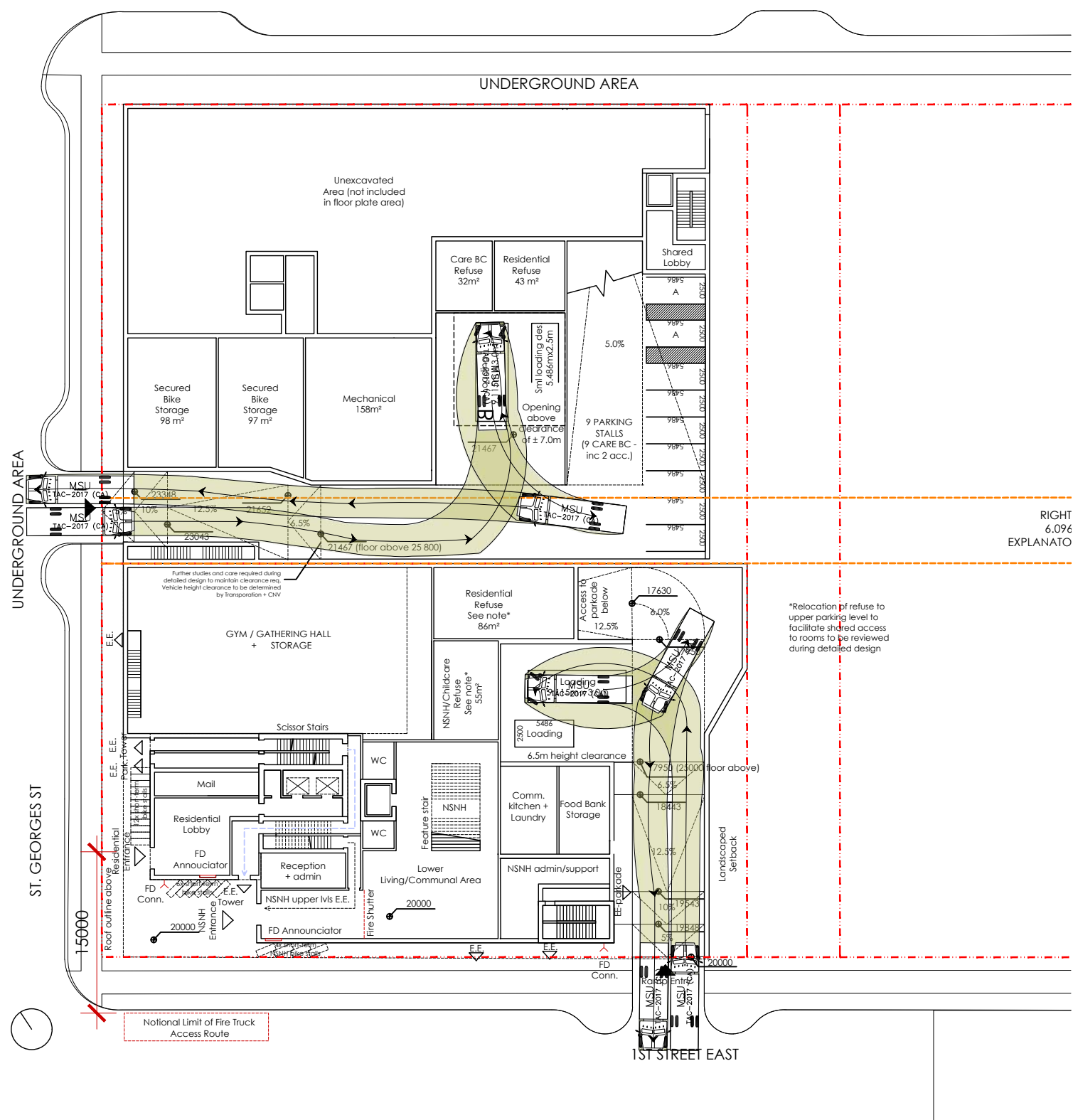


Client/Project	
HCMA Architecture + Design North Shore Neighbourhood House	
Revision Date	Figure
2021-10-13	1
4237.0008.01	Title

Vehicle Turning Template
Garbage Truck/Refuse Collection Vehicle (RCV)



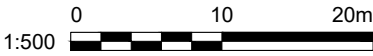
LSU	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 40.3



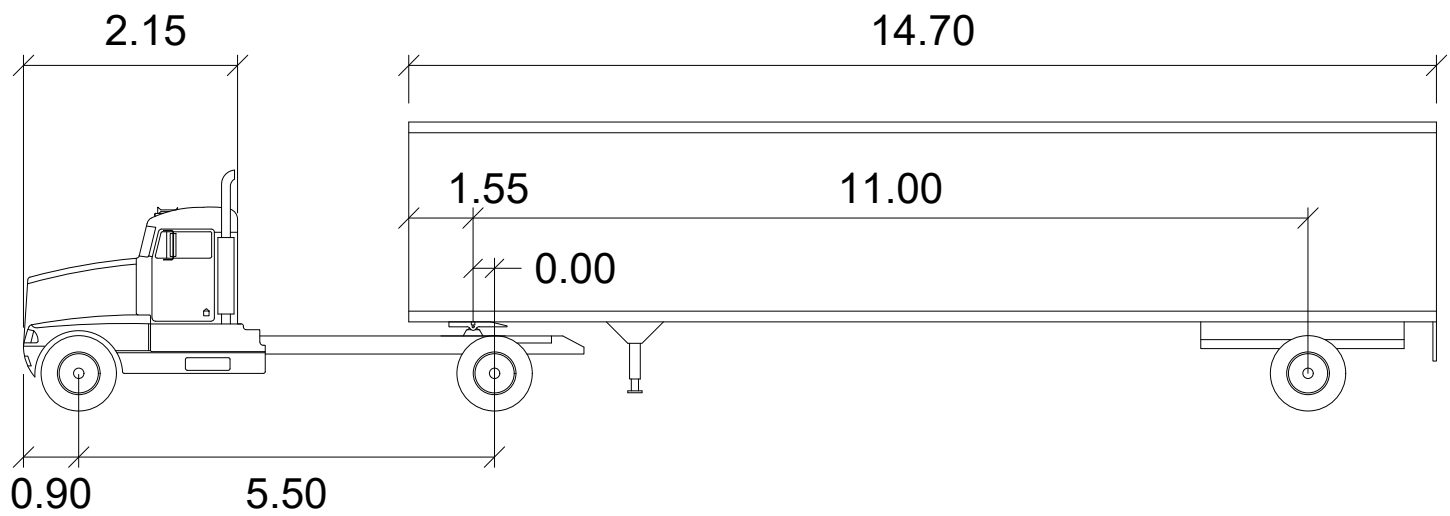
MSU

meters

- Width : 2.60
- Track : 2.60
- Lock to Lock Time : 6.0
- Steering Angle : 40.2



Client/Project	
HCMA Architecture + Design North Shore Neighbourhood House	
Revision Date	Figure
2021-10-13	3
4237.0008.01	Title
Vehicle Turning Template MSU	



WB-15 (BC)

meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.1
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

