

ANTECH

Design & Engineering Group

FUNCTIONAL SERVICING REPORT

PROJECT NAME:

Residential Development
Phase 2

PROJECT ADDRESS:

644 Garrison Road, Fort Erie, Ontario

PROJECT NO.

200608

DATE

May 14, 2021

PROJECT ABSTRACT

Functional Servicing Report for the submission of an Official Plan Amendment, Zoning By-law Amendment and Site Plan Control for the proposed six (6) storey, 190 unit residential building. This document contains the information on the site servicing for the proposed development. The sanitary service, water service, and fire flow calculations are contained within.

ANTECH DESIGN

Project Summary

Project No.
200608

Version	Date	Description
1.0	2021.05.17	Initial Release

Client
2350048 Ontario Ltd.

Client Contact
Ben Kooh

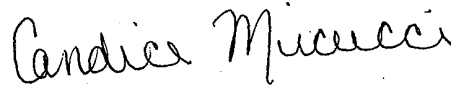
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Property Address
644 Garrison Road, Fort Erie,
Ontario

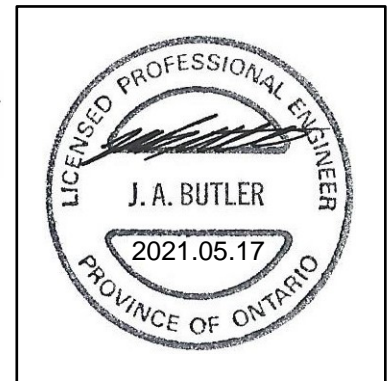
Signatures and Seals



Signature



Signature



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Appendix A – Proposed Site Plan.....	Encl.
Appendix B – Phase One Site Servicing Plan	Encl.
Appendix C – Sanitary Services Design Sheets	Encl.
Appendix D – Fire Flow Calculations	Encl.

1.0 INTRODUCTION AND BACKGROUND

1.1 OVERVIEW

Antech Design and Engineering has been retained by 2350048 Ontario Ltd. to provide Consulting Engineering services for the proposed development of 644 Garrison Road in the Town of Fort Erie. This report will outline the general functional servicing strategy for the proposed development.

The proposed development consists of a single U-shaped six (6) storey, one hundred and ninety (190) unit residential apartment building. This building is located between an existing single family residential neighbourhood and on the recently approved and currently under construction three building commercial development.

This functional Servicing Report will provide information on the proposed servicing scheme for this development.

Figure 1 below is a site location map.

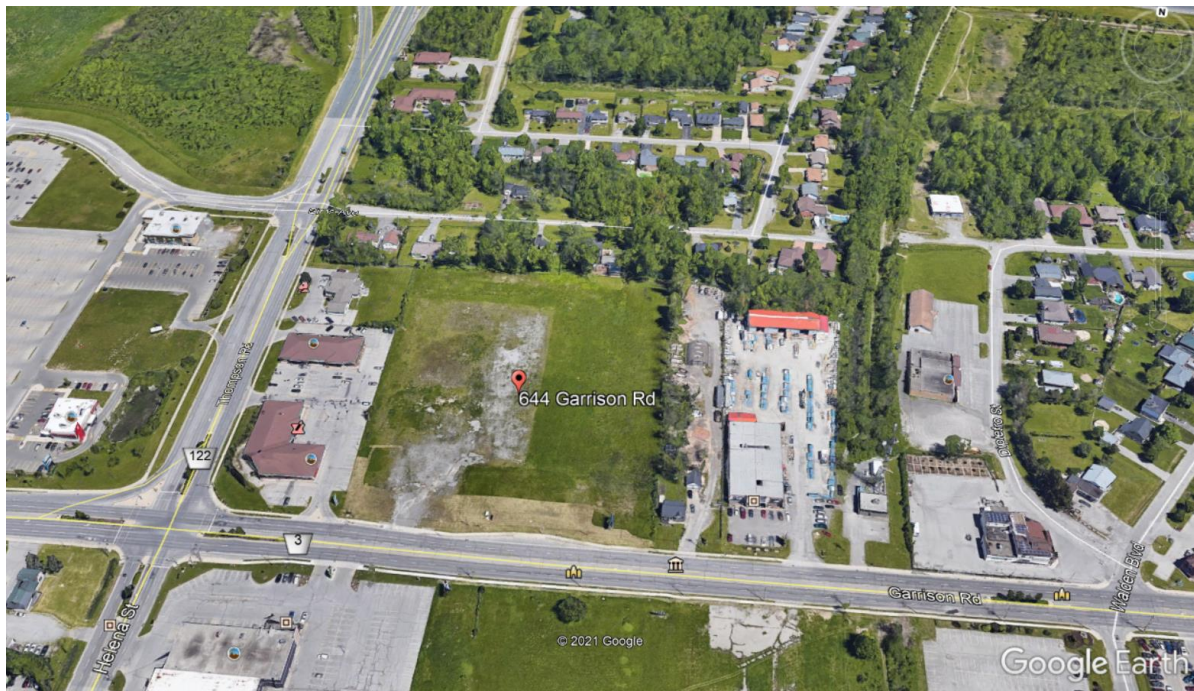


Figure 1: Site Location Map

2.0 EXISTING CONDITIONS / SITE INFORMATION

The subject property has a legal description of Lot 224, Registered Plan No. 113 (AKA Plan 453) Part of Lot 1 Concession 2 NR in the Town of Fort Erie, Regional Municipality of Niagara. The subject property has a total lot area of 25762 square meters with 10624 square meters as phase one (commercial) and

15138 square meters for phase 2, the residential development. The property has a regular shape with frontage on Garrison Road.

The existing site topography is flat with limited vegetation.

The site is an infill development. To the north of the property is single family residential development. To the east and west of the property is existing commercial development. To the south of the property is commercial development currently being constructed and on the subject lands.

The site, as demonstrated in Appendix A: Proposed Site Plan, is developed with three (3) existing commercial buildings.

3.0 PROPOSED DEVELOPMENT

The proposed development is considered Phase Two of the development of the subject lands. Phase Two of the development is for a six storey 190 unit residential apartment complete with parking and open space. The site plan of the proposed development is shown in *Appendix A*. The existing site servicing plan is included as *Appendix B*. During the servicing of Phase One services were extended for Phase Two. The site servicing plan will be updated during the final design process and through the requirements of the site plan process.

4.0 SANITARY SEWERS

4.1 PRE-DEVELOPMENT CONDITIONS

There is an existing 250mm diameter PVC sanitary sewer at 1% which is located on the subject property. During Phase One of the development this sanitary service was extended and calculated for the proposed use.

4.2 SANITARY DEMAND

Sanitary demand for the proposed development is based on the number of fixture units and is calculated as per Ontario Building Code (OBC) Section 7 Table 7.4.9.3., Minimum Permitted Size of Fixture Outlet Pipe and Hydraulic Loads for Fixtures and Table 7.4.10.8. Maximum Permitted Hydraulic Load Drained to a Horizontal Sanitary Drainage Pipe. Sanitary demand is also calculated using a population-based approach. *Appendix C*, of this report, contains the sanitary site services design calculation sheets.

As per the OBC, a total of 2391 fixture units were assumed for the proposed development. Based on this fixture unit count, a proposed 250 mm (10") diameter sanitary sewer, at a 1% slope will accommodate the proposed use. The existing 250mm (10") diameter has a design capacity above the design flows as determined by the population-based approach.

4.3 POST DEVELOPEMTN SANITARY SERVICING

The development is proposed to tie into the existing 250mm (10”) sanitary service that was constructed during Phase 1 of the development. The existing servicing can be seen in *Appendix B* the Site Servicing Plan.

4.4 WASTE WATER DESIGN FLOW

Wastewater design flow for the site was calculated based on OBC Table 8.2.1.3 B. The estimated wastewater generation for the proposed development is calculated as follows:

Apartments, Condominiums, Other Multi-family Dwellings – Per Person

191 Units assume 2 people per unit	275L times (191*2)	105050
<u>Food Service Operations (approximate)</u>		
Restaurant (not 24 hour), per seat (24 Seats)	125 * 24	3000
Restaurant (not 24 hour), per seat	125 * 30	3750
Restaurant (not 24 hour), per seat	125 *40	5000

The total wastewater generation is 116,800 L/day for the development.

The existing / proposed sanitary sewer is 250mm (10”) PVC service that was installed during Phase 1 is sufficient.

5.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

5.1 PRE AND POST DEVELOPMENT CONDITIONS

The proposed water service is to tie into the existing 250mm PVC DR 18 pipe that was run to this area of the property during Phase 1 construction. This existing water service will provide the required fire flow and pressure to service the building.

5.3 FIRE FLOW ESTIMATE

Calculating the fire flow estimate has been completed for the proposed development based on the site plan herein. The fire flow estimate is based on Water Supply for Public Fire Protection – 1999 issued by Fire Underwriters Survey.

The fire flow estimate is calculated from the following formula:

$$F = 220C\sqrt{A}$$

The fire flow calculation for the proposed development, rounded to the nearest 1,000 L/min, is 9,000 L/min for a 2.0-hour duration for the commercial development. The calculations can be found in *Appendix E*.

6.0 STORM SERVICE

The storm water will be designed and calculated as per the City of Fort Erie requirements. Specific information regarding the stormwater design will be completed during the design phase of the development. The existing Storm Water design from Phase 1 was designed to accommodate Phase Two of the development. *Appendix B* contains the existing site servicing drawing, which illustrates the current services on the property and available locations to tie into. The existing 300mm PVC storm pipe is sufficient to accommodate Phase Two.

7.0 UTILITIES

Through preliminary investigation with the active utility agencies in the area, all required utilities are located that the site is serviceable.

8.0 MAINTENANCE RECOMMENDATIONS

The maintenance of the site services is crucial to the functionality of the system. The following are the basic maintenance requirements:

1. Inspection of all catch basins and manholes a minimum of once annually;
2. All manholes and valves shall always be kept clear and functioning;
3. No shut-off to be buried or landscaped in a way that makes it inaccessible;
4. Any structure that requires repair must be immediately repaired or replaced;
5. All sediment buildup to be removed four times annually once at the beginning of spring, once at the beginning of summer, once beginning of fall once before the first frost;
6. All areas of landscaping shall be maintained. Where grass or ground cover is required, these areas shall be kept-up;
7. All sediment disposal to be in accordance with MOE standards;

9.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information contained within this report and its appendices, it is concluded that the proposed Phase Two development on Garrison Road can be constructed to meet the requirements of the City of Fort Erie.

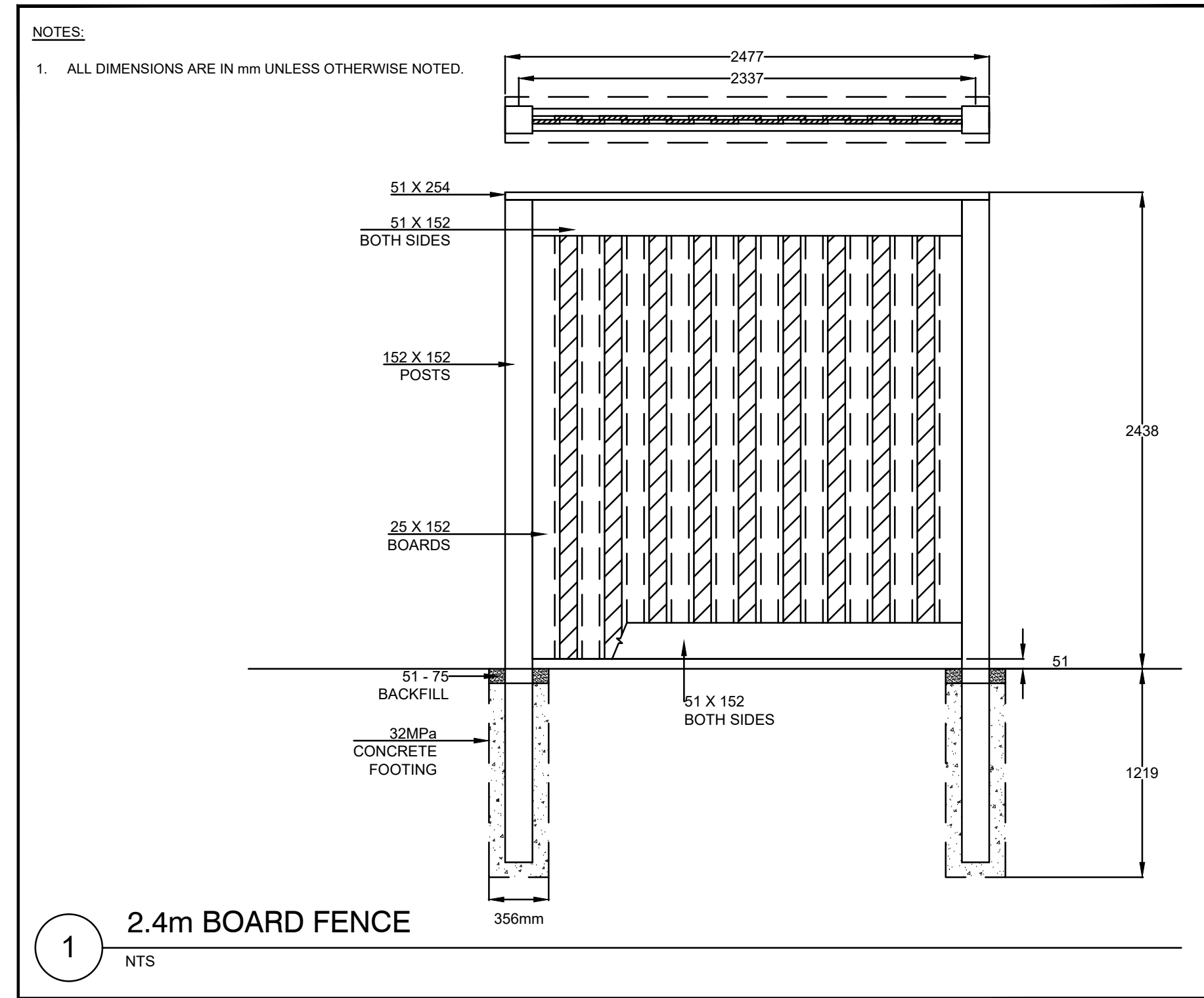
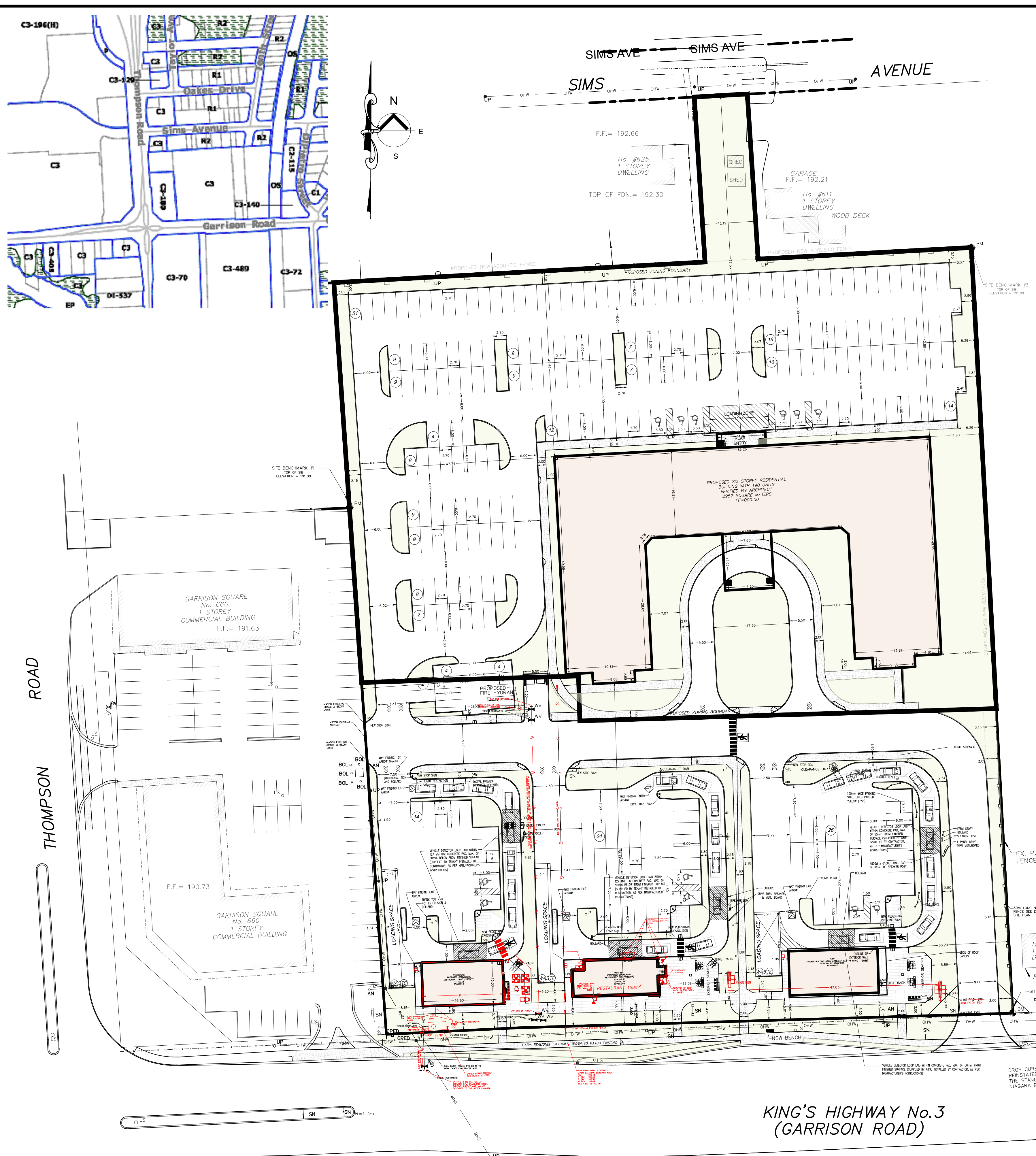
In summary, the features of the design for the proposed development are as follows:

- Sanitary servicing can be provided by using the existing 250mm (10") diameter gravity pipe

- Domestic water servicing can be provided by using the existing 250mm (10") diameter service.
- Fire service for the proposed sprinkler system can be provided by using the existing 250mm(10") water service.
- Storm servicing can be provided using the existing 300mm Storm Service.
- Adequate fire flow protection can be provided by the existing private hydrant
- The required utilities can be provided to service the site based on preliminary findings

We trust the information enclosed herein is satisfactory. Should you have any questions please do not hesitate to contact our office.

APPENDIX A
Existing Site Plan



1 2.4m BOARD FENCE
NTS

SITE STATISTICS PHASE 1

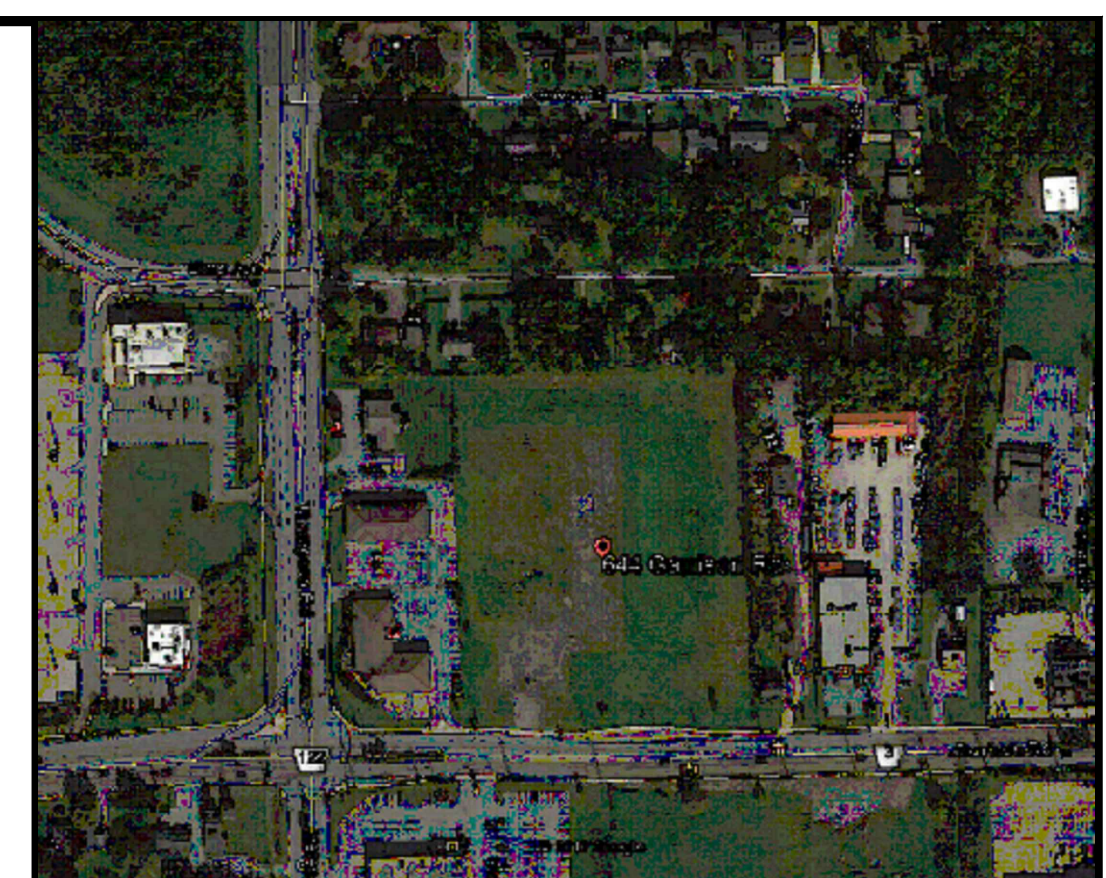
ZONING REQUIREMENTS	PROPOSED
MINIMUM LOT AREA	450m ²
MINIMUM LOT FRONTAGE (SIMS AVE)	15.0m
MAXIMUM LOT COVERAGE	60%
MAXIMUM BUILDING HEIGHT	12.0m (2.5 STOREYS)
FRONT YARD SETBACK (SIMS AVENUE)	15.0m PLUS
REAR YARD SETBACK	7.3m
SIDE YARD	3.0m PLUS
LANDSCAPE OPEN SPACE	0%
NO. OF PARKING SPACES	0.65-2.0 (MVA24/19)
ACCESSIBLE SPACES	76 PHASE 1
PARKING SPACE DIM.	2 TYPE A (3.4m X 6.0m)
LOADING SPACE DIMENSIONS	2.7m X 6.0m
STACKING SPACE	3.5m X 9.0m
STACKING LANE	3.0m X 6.0m
STACKING LAND LENGTH	10 PLUS FOR RESTAURANTS
ABW SEATING	60
TACO BELL	58 INSIDE + 12 OUTSIDE = 70 TOTAL
STARBUCKS	40 INSIDE + 16 OUTSIDE = 56
TOTAL REQUIRED PARKING	14
MAXIMUM WIDTH OF ENTRANCE	13
DAYLIGHT TRIANGLE	45 SPACES
AISLE WIDTH	76 SPACES 64 SPACES
ACCESS DRIVE WIDTH	9.0m
	7.0m AT ENTRANCE
	6.0m MINIMUM
	7.5m MINIMUM

SITE STATISTICS PHASE 2

ZONING REQUIREMENTS	PROPOSED
MINIMUM LOT AREA	115m ² 190 UNITS
MINIMUM LOT FRONTAGE (SIMS AVE)	21850m ²
MAXIMUM LOT COVERAGE	30.0m
MAXIMUM BUILDING HEIGHT	19.5%
FRONT YARD SETBACK (SIMS AVENUE)	2957m ²
REAR YARD SETBACK	26m (9 STOREYS)
SIDE YARD	7.5m
MINIMUM FLOOR AREA PER UNIT	77.5m
	78.4m
	11.8m
	46.9m
LANDSCAPE OPEN SPACE	ONE-BEDROOM UNIT 50m ²
BUFFERING	TWO-BEDROOM UNIT 60m ²
NO. OF PARKING SPACES	MORE THEN 3 UNITS 79m ²
ACCESSIBLE SPACES	25%
	13%
	0.65-2.0 (MVA24/19)
PARKING SPACE DIM.	1.5 SPACES PER UNIT
LOADING SPACE DIMENSIONS	2 TYPE A (3.4m X 6.0m)
TOTAL REQUIRED PARKING	2.7m X 6.0m
MAXIMUM WIDTH OF ENTRANCE	3.5m X 9.0m
DAYLIGHT TRIANGLE	1.5x 190 = 285
AISLE WIDTH	9.0m
ACCESS DRIVE WIDTH	7.0m
	6.0m
	6.0m
	7.5m

UNIT COUNT

FLOOR	UNIT COUNT
1st FLOOR	30
2nd FLOOR	32
3rd FLOOR	32
4th FLOOR	32
5th FLOOR	32
6th FLOOR	32
TOTAL	190



- NOTES**
- ALL TOPOGRAPHIC & SERVICE INFORMATION COMPILED FROM SURVEY DATA COMPLETED BY SANDS SURVEYING AND DRAFTING.
 - THE POSITION & SIZE OF POLE LINES, CONDUITS, WATERMAINS, SEWERS & OTHER UNDERGROUND & ABOVE GROUND UTILITIES & STRUCTURES ARE NOT NECESSARILY SHOWN ON THE DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION & SIZE OF SUCH UTILITIES & STRUCTURES IS NOT GUARANTEED. BEFORE COMMENCING WORK, THE CONTRACTOR SHALL FAMILIARIZE HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES & STRUCTURES & SHALL ASSUME ALL LIABILITY FROM DAMAGE TO SAME.
 - ALL WORKS INVOLVED IN THE CONSTRUCTION, RELOCATION AND REPAIR OF MUNICIPAL SERVICES SHALL BE TO THE SATISFACTION OF THE DIRECTOR OF INFRASTRUCTURE SERVICES.
 - REMOVE CURBS AND POUR NEW CURBS FOR ANY NEW DRIVEWAYS OR DRIVEWAYS TO BE ABANDONED AND / OR MADE GOOD.
 - NO PERSON SHALL CONSTRUCT OR DEMOLISH A BUILDING OR CAUSE A BUILDING TO BE CONSTRUCTED OR DEMOLISHED (INCLUDING SITE SERVICING) UNLESS A BUILDING PERMIT HAS BEEN ISSUED BY THE CHIEF BUILDING OFFICIAL.
 - ABANDONED ENTRANCES TO BE REMOVED AND CURBS / SIDEWALKS RESTORED AS REQUIRED.
 - SNOW STORAGE TO BE ON PROPOSED LANDSCAPED AREAS AND PHASE TWO UNDEVELOPED LANDS.
 - THE EXISTING SIDEWALK IS TO BE REMOVED AND DISPOSED OFF-SITE AND THE AREA RESTORED TO SOD.

REV	DESCRIPTION	DATE	APPROVED BY
0	REDLINES FOR EXISTING DEVELOPMENT	2020.08.17	OWNER
0	INITIAL RELEASE	2020.07.07	CHM

ANTECH DESIGN & ENGINEERING GROUP
Engineers and Urban Planners
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PROJECT:
SITE PLAN OF PROPOSED NEW CONSTRUCTION OF
LOT 224
REGISTERED PLAN No. 113
(AKA PLAN 453)
PART OF LOT 1, CONCESSION 2 N.R.
TOWN OF FORT ERIE
REGIONAL MUNICIPALITY OF NIAGARA

644 GARRISON ROAD
Scale 1 : 500
20 15 10 5 0 10 20 Metres

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

ELEVATION NOTES
ELEVATIONS ARE GEODETIC AND WERE DERIVED USING THE LEICA SMARTNET RTK NETWORK. ELEVATION VALUES ARE REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD1928), H.T.2.0.

TITLE:
SITE PLAN

DRAWN BY: CHM | CHECKED BY: JAB | DRAWING DATE: 2020.02.12
CUSTOMER: MELKO DEVELOPMENTS
DRAWING NUMBER: 172903-V101-20

- LEGEND & NOTES:** (IF APPLICABLE)
- | | | | | |
|---|--|---|--|---|
| <ul style="list-style-type: none"> ■ DENOTES FOUND MONUMENTS □ DENOTES SET MONUMENTS IB DENOTES IRON BAR SSIB DENOTES STANDARD IRON BAR SSIB DENOTES SHORT STANDARD IRON BAR CC DENOTES CUT CROSS N&W DENOTES NAIL & WASHER PL DENOTES REGISTERED PLAN OUJ DENOTES ORIGIN UNKNOWN M DENOTES MEASURED PROP DENOTES PROPORTIONED WT DENOTES WITNESS | <ul style="list-style-type: none"> BM DENOTES BENCHMARK INVT DENOTES TREETLINE VCM DENOTES VERTICAL CONTROL MONUMENT IBP DENOTES BELL PEDESTAL FL DENOTES FLOOD LIGHT SA DENOTES SANITARY MANHOLE AC DENOTES AIR CONDITIONER GMARK DENOTES GAS MARKER CULV DENOTES CULVERT DCB DENOTES DOUBLE CATCH BASIN CBMH DENOTES CATCH BASIN MANHOLE CB DENOTES CATCH BASIN DCBMBH DENOTES DOUBLE CATCH BASIN MANHOLE DIBS DENOTES DITCH INLET CATCH BASIN ST DENOTES STORM MANHOLE MH-F DENOTES FIBER OPTIC MANHOLE MH-S DENOTES SANITARY MANHOLE MH-BMH DENOTES BELL MANHOLE MH-H DENOTES HYDRO MANHOLE MH-T DENOTES TRAFFIC MANHOLE VC DENOTES VALVE CHAMBER DRN DENOTES DRAIN WELL DENOTES WATER WELL | <ul style="list-style-type: none"> HYD DENOTES FIRE HYDRANT CHUY DENOTES HYDRO GUIDE WIRE UP DENOTES UTILITY POLE HP DENOTES HYDRO POLE OLS DENOTES LIGHT STANDARD HLS DENOTES HYDRO LIGHT STANDARD FP DENOTES FLAG POLE HH DENOTES HAND HOLE SN DENOTES SIGN MHB DENOTES MAIL BOX BP DENOTES BELL POLE BLRD DENOTES BOLLARD OW DENOTES OBSERVATION WELL TL DENOTES TRAFFIC LIGHT MP DENOTES MONITORING PIN CS DENOTES CURB STOP VALVE RXS DENOTES RAILWAY SIGN RSB DENOTES RAILWAY SIGNAL CONTROL BOX CGUY DENOTES CABLE GUIDE WIRE CTY DENOTES CABLE PEDESTAL TCB DENOTES TRAFFIC CONTROL BOX WV DENOTES WATER VALVE DP DENOTES DECORATIVE POLE BP DENOTES BELL MARKER PLR DENOTES PILLAR GP DENOTES GUARD POST | <ul style="list-style-type: none"> IP DENOTES IRON PIPE OIS DENOTES SPRINKLER HEAD OFC DENOTES OIL FILLER CAP OHW DENOTES HAND WELL HTRAN DENOTES HYDRO TRANSFORMER PS DENOTES POWER SUPPLY PS DENOTES UNDERGROUND SERVICE LOCATE - GAS PS DENOTES UNDERGROUND SERVICE LOCATE - WATER TH DENOTES TEST HOLE BH DENOTES BOREHOLE BMW DENOTES MONITORING WELL BM DENOTES BELL MARKER MBW DENOTES MONITORING WELL CMRK DENOTES CABLE TV MARKER | <ul style="list-style-type: none"> ST DENOTES UNDERGROUND SERVICE LOCATE - STORM S DENOTES UNDERGROUND SERVICE LOCATE - SANITARY B DENOTES UNDERGROUND SERVICE LOCATE - BELL, TELEPHONE, CABLE P DENOTES UNDERGROUND SERVICE LOCATE - HYDRO G DENOTES UNDERGROUND SERVICE LOCATE - GAS G DENOTES UNDERGROUND SERVICE LOCATE - WATER OHW DENOTES OVERHEAD WIRES OHW DENOTES OVERHEAD WIRE OHW DENOTES PROPERTY LINE OHW DENOTES TRAFFIC FLOW DIRECTION OHW DENOTES DIRECTION OF SURFACE WATER |
|---|--|---|--|---|

PROPRIETARY AND CONFIDENTIAL

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J. A. BUTLER
2021.05.17
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

APPENDIX B

Existing Site Servicing Plan

APPENDIX C

Sanitary Service Design Sheets

Minimum Permitted Size of Fixture Outlet Pipe and Hydraulic Load for Fixtures

Project: 200608

Client: 2350048 Ontario Ltd.

Date: May 17, 2021

Property: 664 Garrison Road, Fort Erie Ontario

Reference OBC table 7.4.9.3	Hydraulic Load			
	Waste			
	<u>Outlet Pipe</u>	<u>Fixture Units</u>	<u>Quantity</u>	<u>Total</u>
<u>Fixture or Device</u>				
Bathroom group with 6 LPF flush tank		6.00	200	1200
Bathroom group with greater than 6 LPF flush tank		6.00		
Bathroom group with more than 3 fixtures	1.5"	1.50		
Bathroom sink	1.5"	3.00		
Bathtub with or without shower head	1.5"	1.50		
Bathtub with 3/4 in. spout	1.50	1.50		
Bedpan washer	3.0"	6.00		
Beer cabinet	1.5"	1.50		
Bidet	1.25"	1.00		
Chinese Range	1.5"	3.00		
Clothes washer, 3.5kg		1.50		
Clothes washer, 6.8kg		2.00	50.00	100.00
Clothes washer, commercial		2.00		
Cup sinks	1.25"	0.50		
Dental unit, cuspidor	1.25"	1.00		
Dishwasher, commercial	2"	3.00		
Dishwasher, domestic	1.5"	1.00	191.00	191.00
Drinking fountain or water cooler	1.25"	0.50		
Fish tank or tray	1.5"	1.50		
Floor drain	2"	2.00		
Floor drain	3"	3.00	200.00	600.00
Floor drain, funnel	2"	3.00		
Garbage grinder, commercial type	2"	3.00		

Minimum Permitted Size of Fixture Outlet Pipe and Hydraulic Load for Fixtures

Reference OBC table 7.4.9.3	Hydraulic Load			
	Waste			
	<u>Fixture or Device</u>	<u>Outlet Pipe</u>	<u>Fixture Units</u>	<u>Quantity</u>
Icebox	1.25"	1.00		
Laundry tray single or double	1.5"	1.50		
Lavatory, barber or beauty parlor	1.5"	1.50		
Lavatory, dental	1.25"	1.00		
Lavatory, domestic type single or 2 single with common trap	1.25"	1.00		
Lavatory, domestic type single or 2 single with common trap	1.5"	1.50		
Lavatory multiple or industrial type	1.5"	3.00		
Macerating Toilet System	0.75"	3.00		
Potato Peeler	2"	3.00		
Shower drain from 1 head	1.5"	1.50		
Shower drain from 2 or 3 heads	2"	3.00		
Shower drain from 4 to 6 heads	3"	6.00		
Sink, domestic or other small, single or double with common trap	1.5"	1.50	200.00	300.00
Sink, other	1.5"	3.00		
Urinal, pedestal, siphon jet or blowout type	2.00	4.00		
Urinal stall, washout type	2"	2.00		
Urinal wall washout type	1.5"	1.50		
Urinal wall other types	2"	3.00		
Water closet with flush tank	3"	4.00		
Water closet with direct flush	3"	6.00		
Total				2391.00

Maximum Permitted Hydraulic Load Drained to a Horizontal Sanitary Drainage Pipe

Reference OBC table 7.4.10.8

Drain Size, Nominal in	Maximum Hydraulic Load, fixture units					
	Slope (ratio of rise over run)					
	1 in 400	1 in 200 0.5%	1 in 133 0.75%	1 in 100 1.0%	1 in 50 2.0%	1 in 25 4.0%
3					27	36
4				180	240	300
5			380	390	480	670
6			600	700	840	1300
8		1400	1500	1600	2250	3370
10		2500	2700	3000	4500	6500
12	2240	3900	4500	5400	8300	13000
15	4800	7000	9300	10400	16300	22500

Sanitary Sewer Design Sheet

Project No.	200608
Project Name	Garrison Road
Project Address	Fort Erie Residentail
Date	12-Feb-20

Design Criteria

Average Dry Weather Flow (Residentail)	320.00	L/cap/d
Average Dry Weather Flow (Employment)	300.00	L/cap/d
Mannings Roughness Coefficient (n)	0.013	
Harmon Peaking Factor	4.50	M
Extraneous Flow	0.15	L/s/ha
Trunk Sewer	NA	

Population Equivalents

Low Desnity	35 ppha
Medium Density	80 ppha
High Density	228.00 ppha
Light Commercial (125-750)	500 ppha
Institutional	40 ppha
Light Industrial	125 ppha

Location			Area				Peaking Factor	Res. Pop Flow	Com. Pop Flow	Ins. Pop Flow	Extraneous Flow	Design Flow	Proposed Sewer						
Street	From MH	TO MH	Individual Pop*	Individual Area (ha)	Cumulative Pop	Cumulative Area (ha)							Length	Pipe Size	Type	Grade	Capacity	Full Flow Velocity	Actual Velocity
			Pop*	Area (ha)	Pop	Area (ha)	M	Q(p) L/s			Q(i) L/s	Q(d) L/s	m	m		%	L/s	m/s	m/s
Residential	Building	manhole-1	0.35	1.52	0.35	1.52	4.50	5.78			0.23	6.00	7.90	0.25	PVC	0.010	59.47	1.21	0.66
Residentail	manhole-1	manhole-2			0.35	1.52	4.50	5.78			0.23	6.00	73.90	0.25	PVC	0.010	59.47	1.21	0.66
A&W	Building	manhole-5	0.21	0.43	0.21	0.43	4.50		3.34		0.06	3.41	1.20	0.15	PVC	0.0200	21.54	1.22	0.75
Emplyment	manhole-5	manhole-4	0.000	0.000	0.21	0.43	4.50		3.34		0.06	3.41	50.100	0.150	PVC	0.0200	21.54	1.22	0.750
Taco Bell	Building	manhole-4	0.14	0.283	0.14	0.28	4.500		2.213		0.042	2.256	1.200	0.150	PVC	0.0200	21.54	1.22	0.660
A&W + Taco Bell	manhole-4	manhole-2	0.000	0.000	0.36	0.71	4.500		5.558		0.107	5.665	1.000	0.150	PVC	0.0100	15.23	0.86	0.680
Starbucks	Building	manhole-3	0.176	0.351	0.18	0.35	4.500		2.745		0.053	2.798	1.200	0.150	PVC	0.0200	21.5376	1.219	0.710
Employment	manhole-3	manhole-2	0	0	0.1757	0.3514	4.5		2.74531		0.05271	2.79802	31.2	0.15	PVC	0.0200	21.5376	1.218781	0.710
Employment	manhole-2	City	0	0	0.88	2.58	4.5	5.78	8.30		0.39	14.47	7.5	0.25	PVC	0.0100	59.4675	1.211463	0.85

*Population in thousands

APPENDIX D

Fire Flow Estimate Design Sheet

Fire Flow Estimate

Project: 200608

Date: May 17, 2021

Client: 2350048 Ontario Ltd.

Property: 664 Garrison Road, Fort Erie Ont

$$F = 220C(A^{0.5})$$

Determine the type of construction

C (coefficient related to type of construction)

- 1.5 Wood Frame Construction
- 1 Ordinary Construction
- 0.8 Non-combustible Construction
- 0.5 Fire Resistive Construction

C =	1
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Determine the ground floor area

A (total floor area (m²))

A =	2957
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Determine the required fire flow to the nearest 1,000L/min

1. Base F (liters per minute)

F1 =	12000
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Determine the increase or decrease by up to 25% given the combustibility of the contents of the building.

2. E (Contents Occupancy Modifier)

- 25% Non-combustible Contents
- 15% Limited Combustible Contents
- 0% Combustible
- 15% Free Burning
- 25% Rapid Burning

O =	-15%
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E = 10200

Determine the decrease, if any, for automatic sprinkler protection.

Maximum reduction is 30%.

3. FS (Sprinkler Modifier)

- 50% Fully automatic and supervised sprinkler system
- 30% Sprinkler system designed to NFPA 13

S =	-30%
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FS = -3060

Determine the total increase for exposures

4. G (Exposure Correction Allowance)

	Exposure (m)	% Correction
North	42.8	5%
South	63	0%
East	11.95	15%
West	47.74	0%

E = 20%

G = 2040

Ftotal = 9,000 L/min

Water Supply for Public Fire Protection	
Required Duration of Fire Flow	
Fire Flow Required (litres per minute)	Duration (hours)
2000 or less	1.00
3000	1.25
4000	1.50
5000	1.75
6000	2.00
8000	2.00
10000	2.00
12000	2.50
14000	3.00
16000	3.50
18000	4.00
20000	4.50
22000	5.00
24000	5.50
26000	6.00
28000	6.50
30000	7.00
32000	7.50
34000	8.00
36000	8.50
38000	9.00
40000 and over	9.50