



## FUNCTIONAL SERVICING REPORT

*SG Real Estate Developments LP III*

**Type of Document:**

Final Report

**Project Name:**

549 Killaly Street East, Port Colborne

**Project Number:**

ALL-22004555-A0

**Prepared and Reviewed By:**

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EXP

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**Approved By:**

Scott Passmore

**Date + Time Submitted:**

2023-06-26

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## 1. Introduction

EXP Services Inc. has been retained by SG Real Estate Developments LP III (“Owner”) to prepare a Functional Servicing Report (FSR) (“Report”) in support of a Draft Plan of Subdivision (DPA) for the proposed development (“Site”) located at 549 Killaly Street East in the City of Port Colborne.

The subject site is approximately 8.21 ha in area and is located on the south side of Killaly Street East, located east of the existing residential developments along Christmas Street, Bell Street and Johnston Street. The site is currently unoccupied with various treed and vegetated areas. Refer to Figure 1 for the Location Plan.

The objective of this FSR report is to give an overview of the proposed servicing strategy for the site including outlining the required demands on the municipal system while addressing any corresponding capacity concerns.

## 2. Proposed Development

The proposed development includes a network of subdivision roads to facilitate the development of the internal blocks into various townhouse blocks and semi-detached units. The proposed development is shown on the Owner’s Development Concept (provided in Appendix A), where development can be summarized as follows:

### Subdivision:

Phase 2 Street Townhouse units =	17
Phase 3 2-Storey Semi-detached units =	10
Phase 5 Street Townhouse units =	<u>13</u>
Sub-Total =	40 units

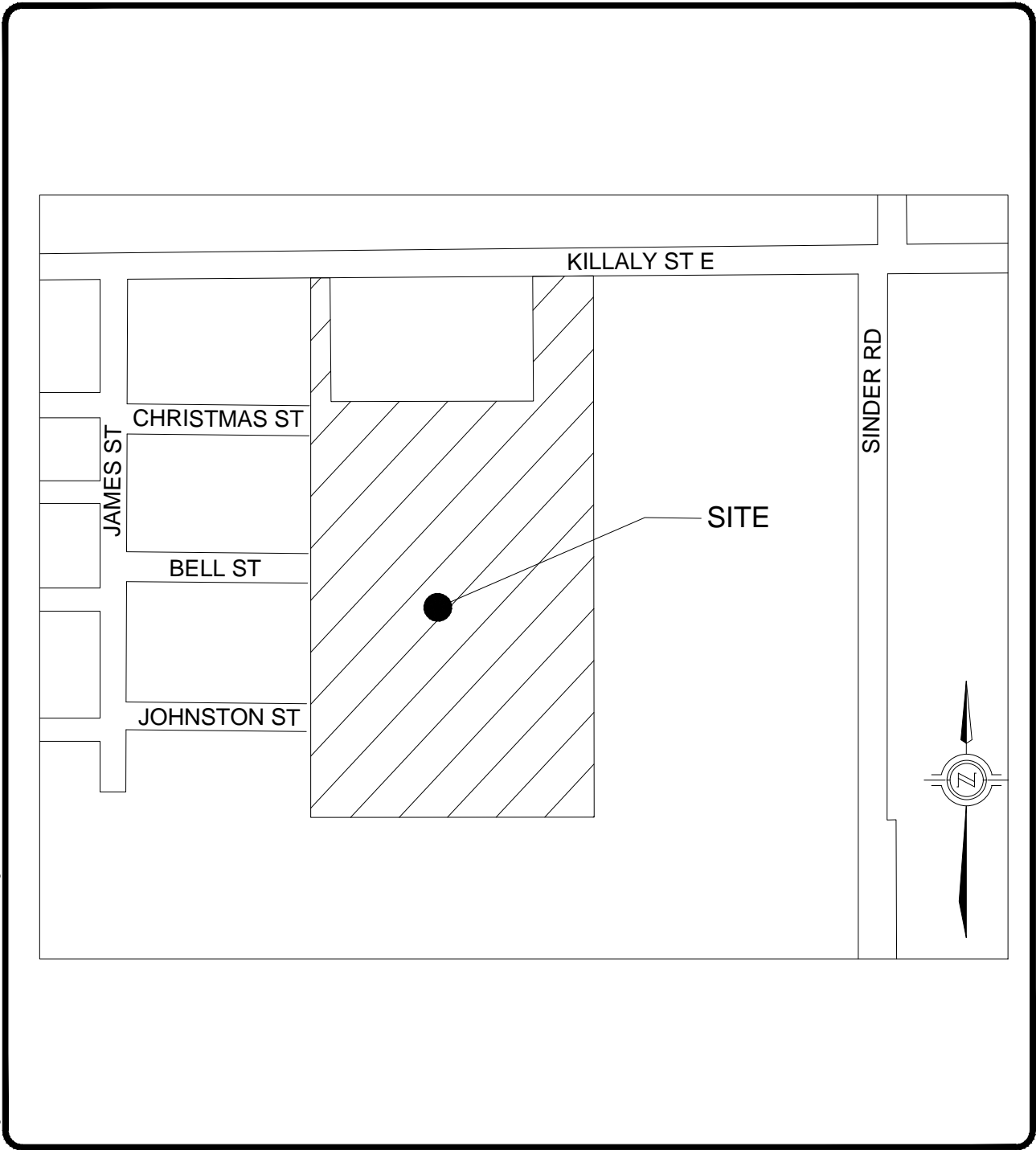
### Future Site Plan Blocks:

Phase 1 Block Townhouses units =	66
Phase 4 Stacked Townhouses units =	138
Phase 6 1.5-Storey Townhouses units =	<u>42</u>
Sub-Total =	246 units

Grand Total = Subdivision + Site Plan Blocks = 40 + 246 = 286 units

Therefore, the proposed development concept shows a grand total of 286 units including the future site plan blocks. The design population for the proposed development was then determined through various correspondence with City of Port Colborne staff where a density rate of 2.7 ppu was confirmed to be used, resulting in a total equivalent population of approximately 772 persons.

E:\MRK\ALL-22004555-A0\60 Execution\65 Drawings\Civil\22004555-FIG-01 LOCATION PLAN.dwg



Project: 549 KILLALY STREET EAST, PORT COLBORNE, ON			
Title: LOCATION PLAN			
Approved by:	S.P	Date:	AUG, 2022
Project No.:	ALL-22004555-A0		
Drawn by:	J.L	Scale:	N.T.S.
Figure no.:	FIG-01		

### 3. Existing Topography and Site Grading

Available records drawings and the topographic survey information completed for the site show the existing elevations across the site generally falling in the southeasterly direction. The west side of the site appears to be high point plan (or drainage divide) from the existing developments located to the west. Overall, the topography across the site is quite flat showing a total fall in grades falling in the range of approximately 1 m in the southeasterly direction. For additional details regarding the existing site topography, refer to the topographic survey (prepared by J. D. Barnes) which is included in Appendix A for reference.

To the east of the site, located approximately 105 m from the east property line, there is an existing watercourse (Wignell Drain) which is part of the overall Port Colborne Drain. The Wignell Drain is a municipal drain that is regulated by the NPCA for various hazards including a Regional Floodline where NPCA records show the theoretical floodline encroaching various portions of the site. Once a topographic survey was completed for the site, EXP staff met with both City and NPCA staff to discuss the actual elevations of the Regional Floodline water elevation where some bench mark discrepancies with NPCA records were identified by the OLS surveyor. After various meetings with NPCA staff, it was eventually requested that the NPCA's current floodline elevation of 177.13 be maintained for the design of the site for a conservative approach. EXP staff then completed preliminary 3D flood storage calculations using the recently completed topographic survey and the theoretical floodline elevation of 177.13, where a theoretical flood volume of approximately 6,800 m<sup>3</sup> was calculated across the site. Therefore, as part of completing the preliminary grading design for the site, EXP staff considered the required flood storage compensation and required flood protection for the proposed development.

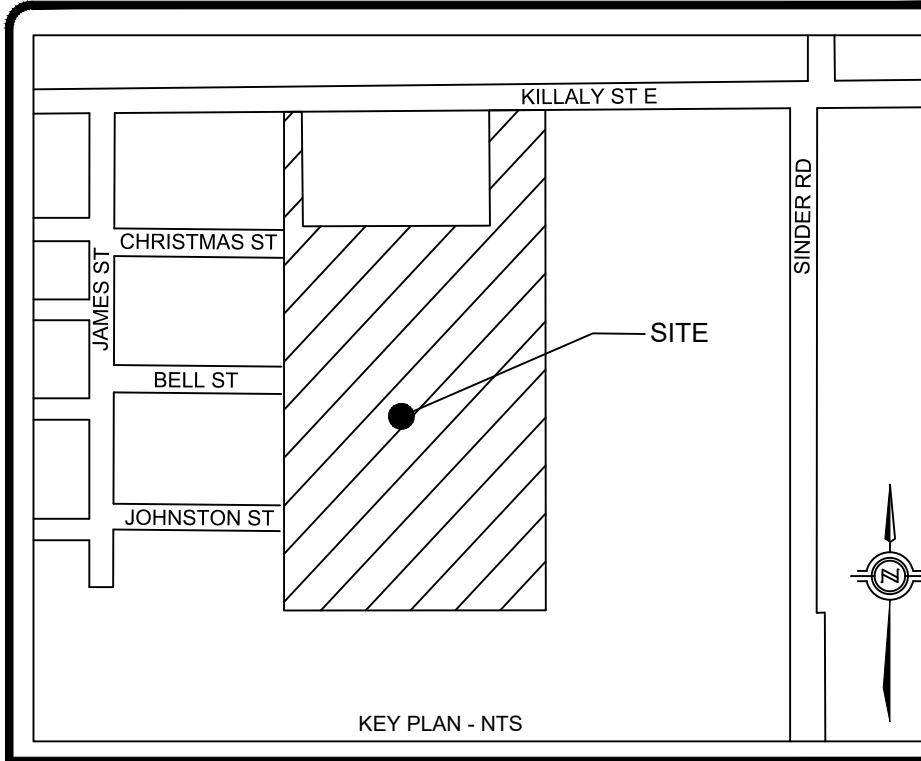
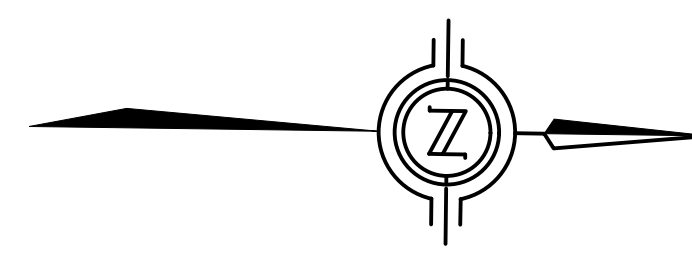
The proposed preliminary grading design for the site was completed in concert with the proposed stormwater management strategy for the site which included various pre-consultations with City of Port Colborne staff. After meeting with City staff, it was confirmed in principle that the proposed development for the site could utilize a portion of the capacity available at the existing Johnston Street Stormwater Pumping Station (SPS) located at the southwest corner of the site. Therefore, the proposed preliminary grading design included filling the easterly limits of the site for flood protection and directing drainage in the southwesterly direction to towards the proposed SWM facility located at the southwest corner of the site.

Some of the key features of the preliminary grading design can be summarized as follows:

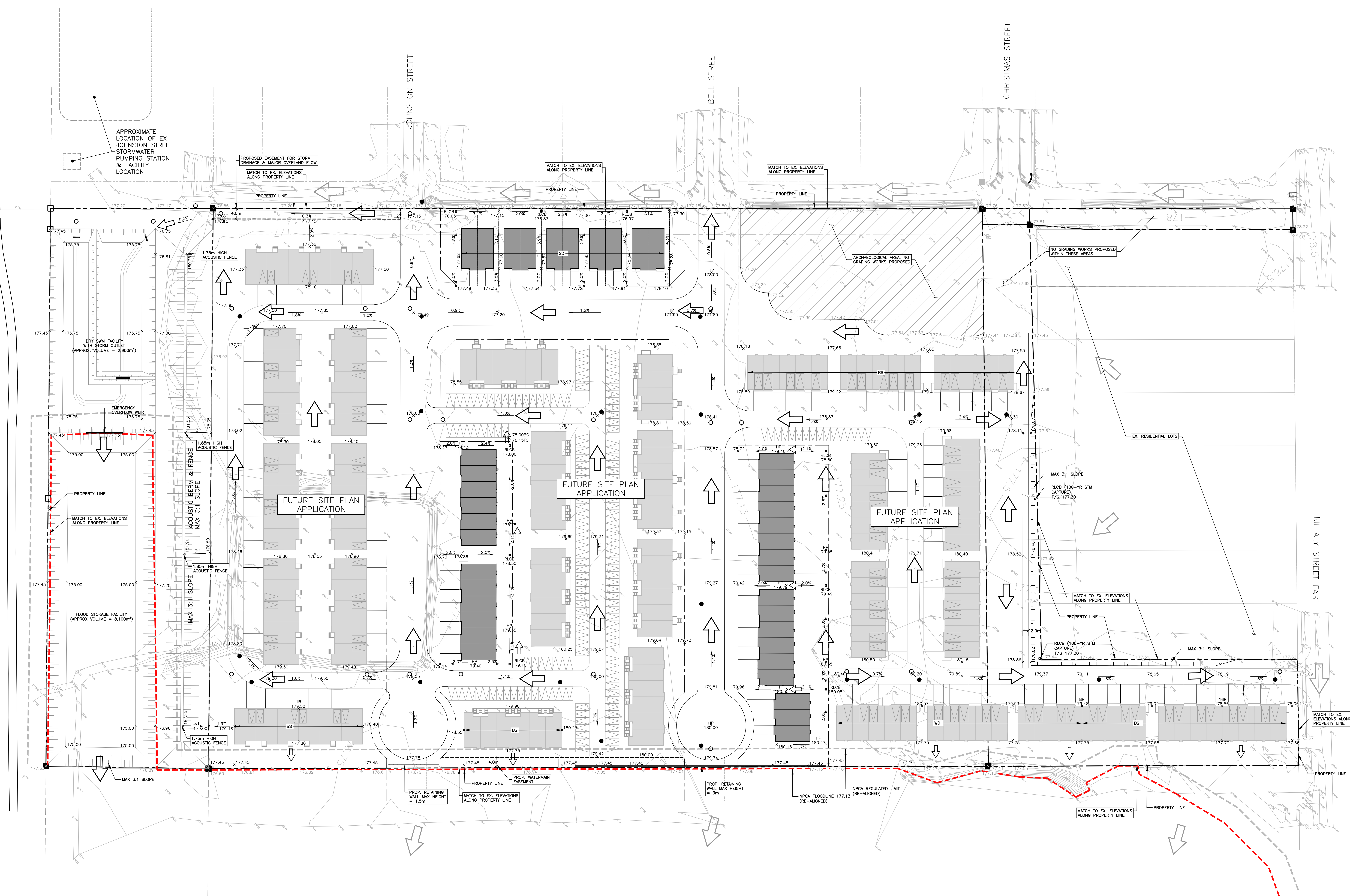
- Raised elevations along the east side of the site with all rear yard elevations set above 177.45 to provide 0.3m freeboard from the theoretical floodline elevation of 177.13
- Retaining walls located along the east property line adjacent to the new Bell Street and Johnston Street cul-de-sacs to match existing grades in that area
- Various lot grading drainage designs including split draining lots with some walk out and lookout lots along the east side of the site
- Existing elevations maintained within sensitive areas such as the Archaeological Area located to the northwest corner of the site.
- Meeting existing road elevations at proposed road connection points to Bell Street, Johnston Street and Killaly Street East
- A combined acoustic berm with acoustic fence along the south limits of the site (north of SWM facility and flood storage block) to provide adequate acoustic protection
- Major overland flow directed in the southwesterly direction towards the proposed SWM facility (dry SWM pond) and proposed emergency flood storage facility (flood storage compensation)

- Some transitional grading within the City owned lands on the south side of the SWM block and Flood Storage facility to meet existing grades where additional topography surveys are recommended

For additional grading details refer to the Preliminary Grading Plan Drawing SG-1.



- LEGEND**
- PROPERTY LINE
  - - - EX. CONTOUR (1.0m)
  - NEW / EX. STORM MANHOLE
  - NEW / EX. SANITARY MANHOLE
  - PROPOSED ROAD CATCHBASIN
  - PROPOSED REAR LOT CATCHBASIN
  - NEW / EX. WATER VALVE AND BOX
  - EX. HYDRANT
  - EX. LIGHT / UTILITY POLE
  - EX. FENCE
  - × 177.34 × 177.34 PROPOSED ELEVATION
  - EXISTING ELEVATION
  - - - 2.0% DRAINAGE ARROW / SLOPE (MAX 3:1)
  - SWALE
  - PROPOSED RETAINING WALL
  - >100 YEAR EMERGENCY OVERLAND FLOW
  - EXTERNAL EMERGENCY OVERLAND FLOW
  - SPLIT DRAINAGE
  - WALKOUT
  - BS BACKSPLIT
  - NPFA FLOODLINE ELEVATION 177.13 (REALIGNED)
  - APPROX. NPFA REGULATED LIMITS (REALIGNED)



**NOTES:**

- TOPOGRAPHIC SURVEY PROVIDED BY KIRKPATRICK AND LEUNG, A DIVISION OF J.S. BARNES LTD. COMPLETED ON MAY 5, 2021
- SITE PLAN PROVIDED BY CYNTHIA ZAKHOUR ARCHITECTS

NO.	REVISIONS	DATE	BY	APP.
1	ISSUED FOR COORDINATION	JUN 15 2023	JL	SP
2	1ST DPA SUBMISSION	JUN 28 2023	JL	SP

NO.	REVISIONS	DATE	BY	APP.

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 Brampton, ON L6T 4V1  
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 www.exp.com

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Owner/Client:  
**SG REAL ESTATE DEVELOPMENTS LP III**

Location:  
**549 KILLALY STREET EAST  
 CITY OF PORT COLBORNE**

Title:  
**PRELIMINARY GRADING PLAN**

Designed By: WK Drawn By: WK Checked By: SP  
 Scale: 1:500 Date: AUG. 2022 Drawing No.:  
 Project No.: ALL-2204555-A0 **SG-01**



## 4. Water Servicing

Available record drawings show the following existing municipal watermains surrounding the site:

- 200 mm diameter watermain on Killaly Street East;
- 150 mm diameter watermain on Bell Street;
- 150 mm diameter watermain on Johnston Street; and,
- 250 mm diameter watermain along the western boundary of the site which connects the above mentioned watermains from Killaly Street East, Bell Street and Johnston Street.

For existing record drawing information, refer to Appendix A.

The proposed preliminary water servicing design for the site consists of a network of proposed watermains within the subdivision with the following three (3) connection points to the municipal water distribution system:

- 250 mm diameter watermain along west side of the site at Bell Street;
- 250 mm diameter watermain along west side of the site at Johnson Street; and,
- 200 mm diameter watermain on Killaly Street East (through future site plan).

To provide equate looping within the subdivision and protection against possible watermain pipe breaks, a 4.0 m wide municipal watermain easement is proposed along the eastern boundary to connect the proposed watermains between the Bell Street and Johnston Street extensions.

To determine the water demands on the municipal water distribution system, the Niagara Region 2016 Master Servicing Plan was referenced where the calculations can be summarized as follows:

### **Subdivision:**

108 persons x 300 L/cap/day x 1.56 Max Day Factor = 50,544 L/day or 0.6 L/s

### **Future Site Plan Blocks:**

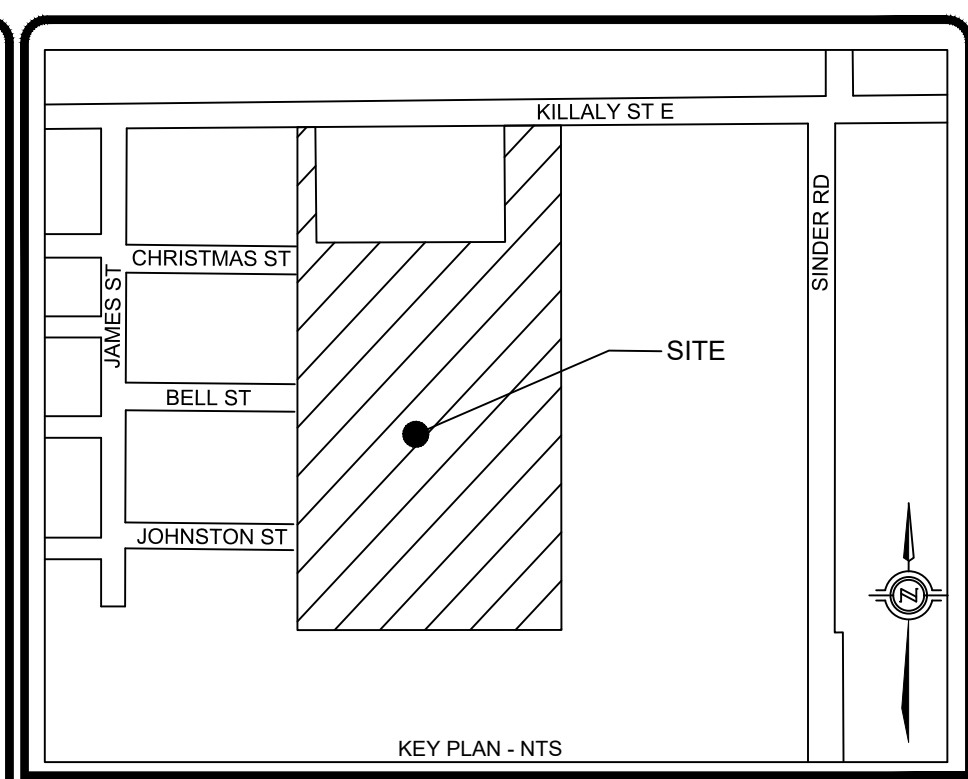
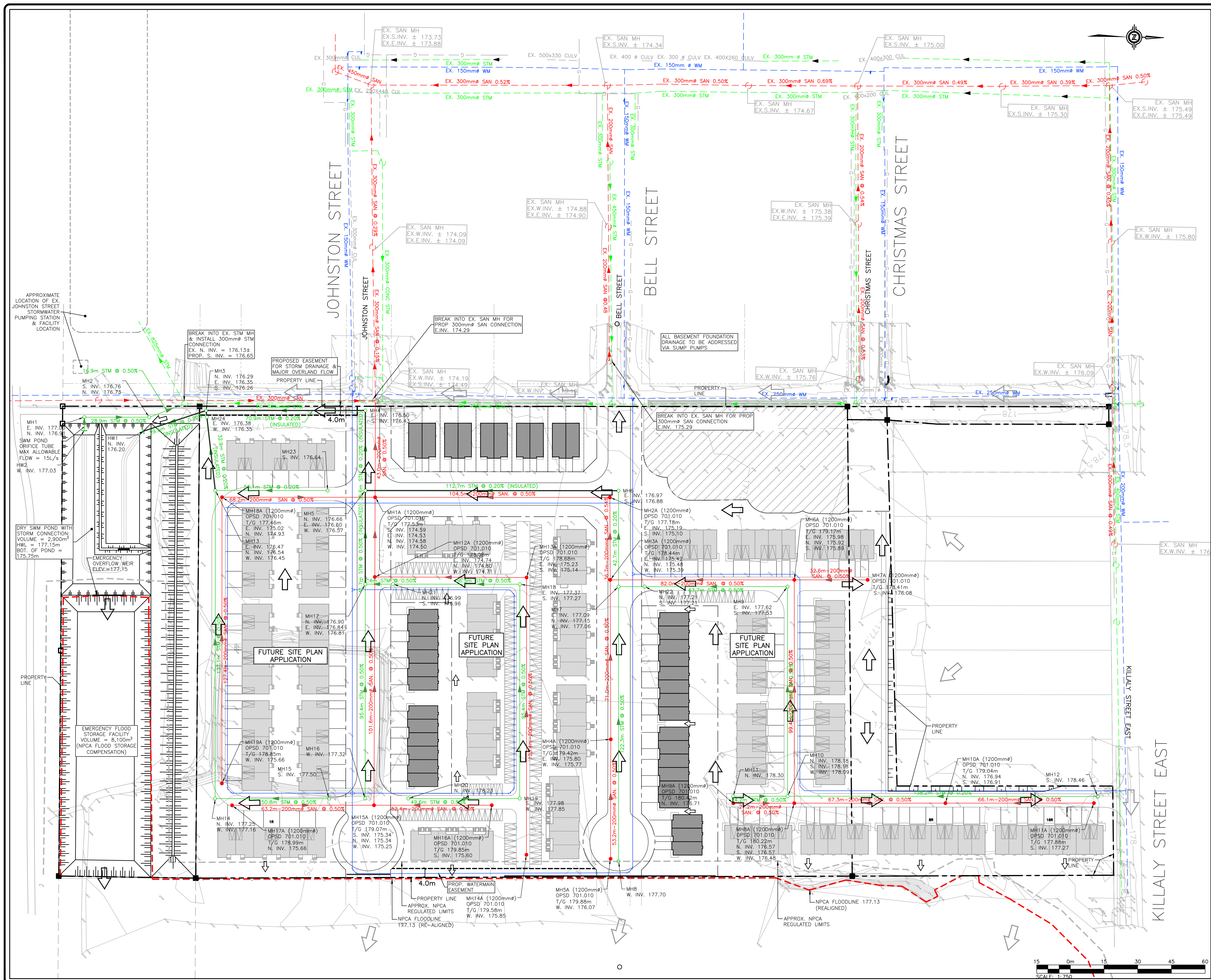
664 persons x 300 L/cap/day x 1.56 Max Day Factor = 310,752 L/day or 3.6 L/s

Total = Subdivision + Site Plan Blocks = 0.6 + 3.6 = 4.2 L/s Maximum Day Demand

Therefore, the proposed development concept shows total maximum day demand of approximately 4.2 L/s.

EXP staff then reviewed the fire protection requirements considering a 2-storey townhouse block of 4 units (adjacent to firewall) with standard wood construction as the worst-case condition for the fire flow calculations. Using the Fire Underwriter's Survey (2020), a fire demand was conservatively calculated to be in the range of 133 L/s, resulting in a maximum day plus fire demand of 137.2 L/s to be considered for the site. Finally, in order to verify existing flows and pressures within the municipal watermain against the proposed demands, EXP reviewed previously completed (2022) hydrant flow test results provided by the City. The results from the flow test results showed that adequate flows and pressures can be obtained to meet the required maximum day plus fire demand while still maintaining the minimum required 20 psi for the surrounding system. Refer to Appendix B for the water demand calculations and the hydrant flow test results completed in November 2022.





**LEGEND**

- PROPERTY LINE
- EXISTING HYDRO POLE
- EXISTING TREE
- EXISTING TREE DRIPLINE
- EXISTING OVERHEAD HYDRO WIRES
- EXISTING FENCELINE
- EXISTING CURBS
- EX. STORM SEWER
- EX. WATERMAIN
- EX. SANITARY SEWER
- NEW/EXISTING WATER VALVE&BOX
- EXISTING/PROPOSED HYDRANT
- EX. STORM/SANITARY M.H.
- EX. CATCH BASIN
- PROP. STORM M.H.
- PROP. SANITARY M.H.
- PROP. CATCHBASIN / REAR LOT CATCHBASIN
- PROP. CATCHBASIN MANHOLE
- PROPOSED CURBS
- PROP. STORM SEWER
- PROP. WATERMAIN
- PROP. SANITARY SEWER
- PIPE TO BE INSULATED
- REALIGNED NPCA FLOODLINE ELEVATION 177.13
- APPROX. NPCA REGULATED LIMITS (REALIGNED)

**NOTES:**

- TOPOGRAPHIC SURVEY PROVIDED BY KIRKUP MASCOE AND URE, A DIVISION OF J.D. BARNES LTD. COMPLETED ON MAY 5, 2022.
- SITE PLAN PROVIDED BY CYNTHIA ZAHORUK ARCHITECTS

No.	REVISIONS	Date	By	App.
2	1ST DPA SUBMISSION	JUN 26 2023	JL	SP
1	ISSUED FOR COORDINATION	JUN 15 2023	JL	SP

**exp Services Inc.**  
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**exp.**

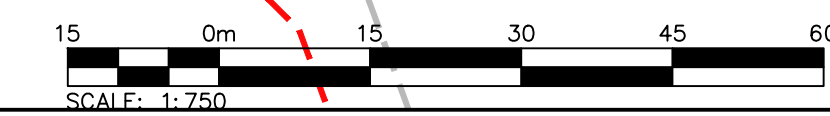
- BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
- INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

Owner/Cliet:  
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Location:  
**549 KILLALY STREET EAST  
 CITY OF PORT COLBORNE**

Title:  
**PRELIMINARY SITE SERVICING PLAN**

Designed By: WK    Drawn By: WK    Checked By: SP  
 Scale: 1:750    Date: AUG, 2022    Drawing No.: **SS-01**  
 Project No.: ALL-22004555-A0



## 5. Sanitary Servicing

Available record drawings show the following existing municipal sanitary sewers surrounding the site:

- 200 mm diameter sanitary sewer on Bell Street flowing in the westerly direction;
- 300 mm diameter sanitary sewer on Johnston Street flowing in the westerly direction;
- 300 mm diameter sanitary sewer along the western boundary of the site flowing in the northerly direction and connecting to the above-mentioned sanitary sewer on Johnston Street.

For the record drawing information refer to Appendix A.

The proposed preliminary sanitary servicing design for the site consists of a network of proposed municipal sanitary sewers throughout the subdivision that ultimately drains in the westerly direction towards the proposed connection to the existing 300 mm diameter sewer on Johnston Street. For additional sanitary servicing details refer to the Preliminary Servicing Plan Drawing SS-01.

To determine the domestic sanitary demands on the municipal sewer system, the Niagara Region 2016 Master Servicing Plan was referenced where the calculations can be summarized as follows:

### Subdivision:

108 persons x 275 L/cap/day x 3.87 Peaking Factor =	112,320 L/day or 1.3 L/s peak sanitary
1.96 ha x 0.286 L/s/ha =	0.6 L/s infiltration
1.3 L/s peak sanitary + 0.6 L/s infiltration =	1.9 L/s design dry weather flow

### Future Site Plan Blocks:

664 persons x 275 L/cap/day x 3.87 Peaking Factor =	708,480 L/day or 8.2 L/s peak sanitary
4.43 ha x 0.286 L/s/ha =	1.2 L/s infiltration
8.2 L/s peak sanitary + 1.2 L/s infiltration =	9.4 L/s design dry weather flow

**Total** = Subdivision + Site Plan Blocks = 1.9 + 9.4 = 11.3 L/s design dry weather flow

Therefore, the proposed development concept shows total design dry weather flow of approximately 11.3 L/s.

Refer to Appendix C for details on sanitary calculation.

EXP staff then reviewed the capacity of the existing 300 mm sanitary sewer on Johnston Street where the full flow capacity was calculated to be in the range of 39.1 L/s. Therefore, the post development increase from the site on the existing sanitary sewer was calculated to be approximately 29% of the existing municipal sanitary system on Johnston Street based on the Owner's development concept. Finally, the increased sanitary demand from the site is subject to approval and consultation with City staff.

## 6. Storm Servicing

Available record drawings from the City of Port Colborne show the following existing municipal storm sewers surrounding the site:

- 450 mm diameter storm sewer on Bell Street flowing in the easterly direction;
- 300 mm diameter storm sewer on Johnston Street flowing in the easterly direction; and,
- 750-825 mm diameter storm sewers along the western boundary of the site flowing in the southerly direction which ultimately drains to the Johnston Street Stormwater Pumping Station.

The existing record drawings show that the drainage from the adjacent lands to the west of the site, are conveyed in the southerly direction towards the Johnston Street Stormwater Pumping Station (SPS). For the record drawing information refer to Appendix A.

The proposed preliminary storm servicing design for the site consists of a network of proposed municipal catchbasins and storm sewers throughout the subdivision that ultimately drains in the southwesterly direction towards the proposed SWM block near the Johnston Street Stormwater Pumping Station (SPS). The proposed dry SWM facility incorporates an infiltration design with an orifice-controlled storm overflow connection to existing 825 mm diameter municipal storm sewer located upstream of the Johnston Street SPS. The proposed storm sewer design is to meet the 5-year storm design flows and the minimum velocities specified by the MECP and City standards.

As previously mentioned within the grading section of this report, due to the low-lying topography near the northeast corner of the site it is anticipated that a proposed DICB and 100-year storm capture design will be incorporated into the proposed storm sewer design to address the incoming external drainage area from the neighbouring properties. The design details of that inlet condition are to be refined through the future detailed design process.

As the Owner's development concept includes the provision for basements, the required foundation drainage strategy for each basement unit is to be addressed within the proposed storm servicing design as well. Due to the shallow storm system design and the low groundwater levels anticipated for the site, it was recommended by EXP staff that sump pumps be incorporated into the proposed storm servicing design. Therefore, it was recommended that each sump pump be discharged to splash to grade with the flow directed towards the rear of each lot to avoid contact with any sidewalks.

For additional storm servicing details refer to the Preliminary Servicing Plan Drawing SS-1 and the SWM report prepared by EXP.

## 7. Conclusions

In summary, based on the findings outlined in this report the proposed development can be adequately serviced where some of the key results can be summarized as follows:

- Proposed grading can be accommodated to generally maintain the existing drainage patterns for the site and perimeter elevations without any negative impact to neighbouring properties
- Water servicing can be provided with a proposed network of municipal watermains with connections to the existing watermains on Bell Street, Johnston Street and Killaly Street East
- Adequate fire protection can be provided based on the required maximum day plus fire flow demand and the hydrant flow testing results from the City
- Sanitary servicing can be provided with a proposed network of municipal sanitary sewers with a proposed connection to the existing 300 mm diameter sanitary sewer on Johnston Street
- The post development sanitary demand from the site equates to approximately 29% of the full flow capacity of the existing 300 mm diameter sanitary sewer on Johnston Street where the available capacity is to be confirmed with the City of Port Colborne
- Foundation drainage is to be managed by sump pump splashing to grade where minimal groundwater is anticipated based on geotechnical investigations completed to date
- Storm servicing can be provided with a proposed network of municipal storm sewers outletting into the proposed SWM block (dry SWM pond) with a storm sewer outlet connected to the existing 825 mm diameter storm sewer located upstream of the Johnston Street Stormwater Pumping Station
- Stormwater management can be provided with the proposed SWM measures outlined within the SWM Report prepared by EXP

Sincerely,

EXP Services Inc.



Jennifer Leung  
Project Designer, Land Development

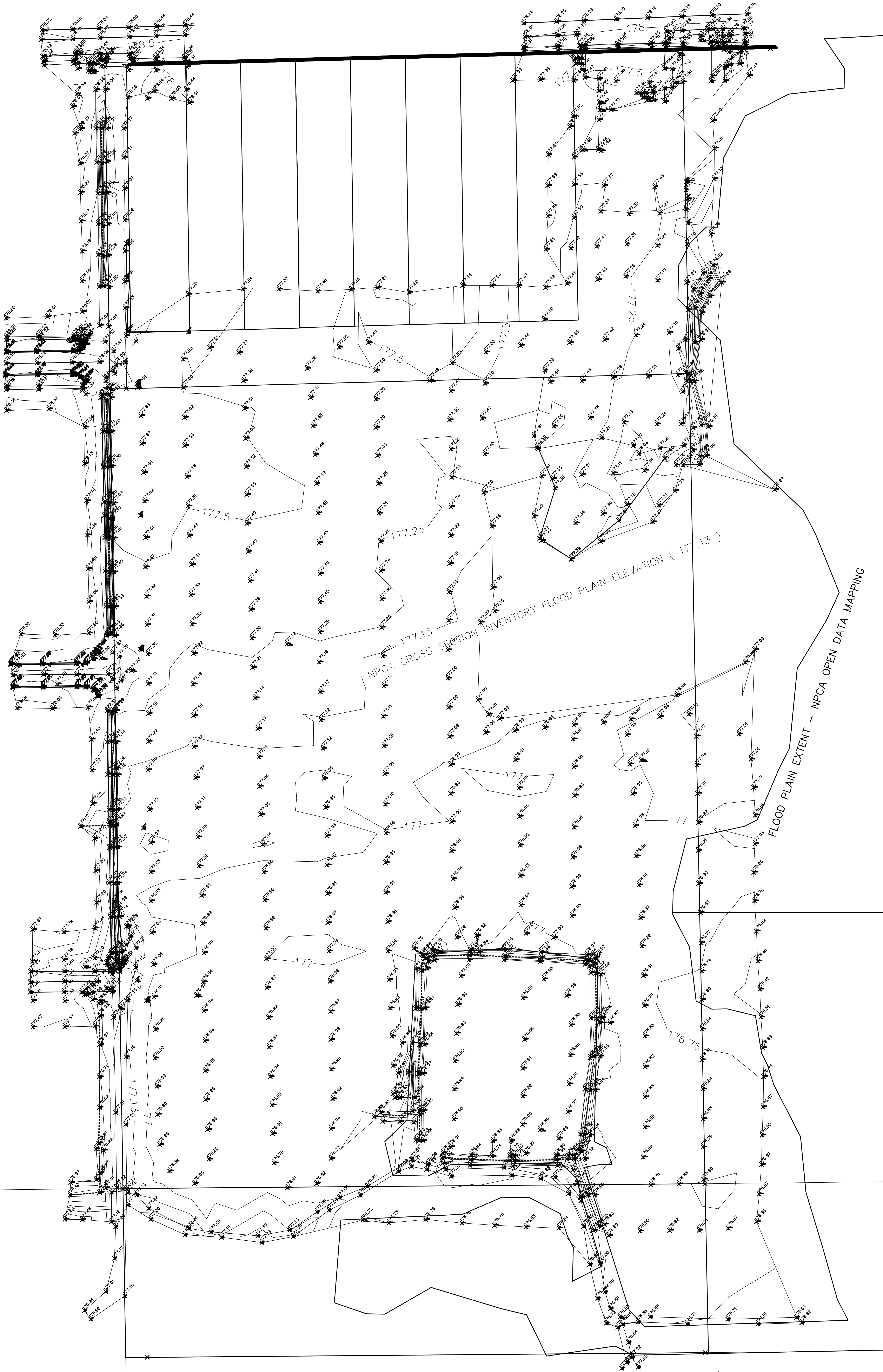


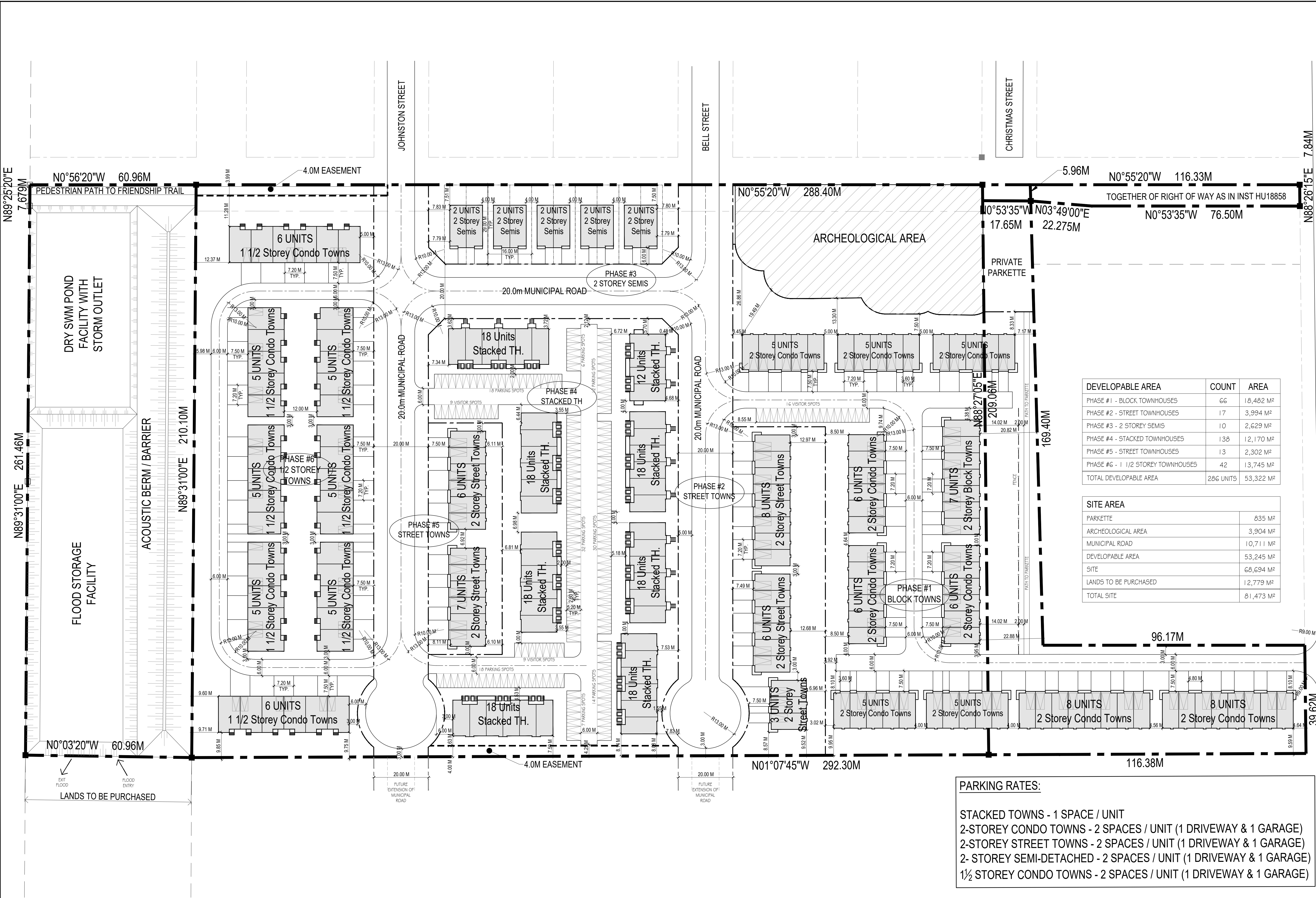
Scott W. Passmore, P.Eng.  
Vice President, Land Development

EXP Services Inc.

282 Stanley Street, Brantford – Functional Servicing Report  
EXP Project Number: ALL-21017694-A0  
January 2023

## Appendix A – Site Plan, Topographic Survey, and City’s Record Drawings





DEVELOPABLE AREA	COUNT	AREA
PHASE #1 - BLOCK TOWNHOUSES	66	18,462 M <sup>2</sup>
PHASE #2 - STREET TOWNHOUSES	17	3,994 M <sup>2</sup>
PHASE #3 - 2 STOREY SEMIS	10	2,629 M <sup>2</sup>
PHASE #4 - STACKED TOWNHOUSES	138	12,170 M <sup>2</sup>
PHASE #5 - STREET TOWNHOUSES	13	2,302 M <sup>2</sup>
PHASE #6 - 1 1/2 STOREY TOWNHOUSES	42	13,745 M <sup>2</sup>
<b>TOTAL DEVELOPABLE AREA</b>	<b>286 UNITS</b>	<b>53,322 M<sup>2</sup></b>

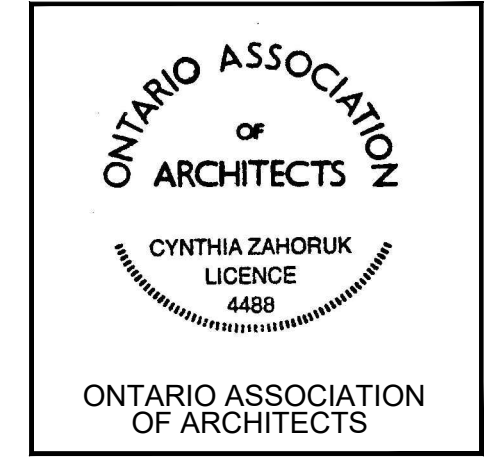
SITE AREA	
PARKETTE	835 M <sup>2</sup>
ARCHEOLOGICAL AREA	3,904 M <sup>2</sup>
MUNICIPAL ROAD	10,711 M <sup>2</sup>
DEVELOPABLE AREA	53,245 M <sup>2</sup>
SITE	68,694 M <sup>2</sup>
LANDS TO BE PURCHASED	12,779 M <sup>2</sup>
<b>TOTAL SITE</b>	<b>81,473 M<sup>2</sup></b>

**PARKING RATES:**

STACKED TOWNS - 1 SPACE / UNIT  
 2-STOREY CONDO TOWNS - 2 SPACES / UNIT (1 DRIVEWAY & 1 GARAGE)  
 2-STOREY STREET TOWNS - 2 SPACES / UNIT (1 DRIVEWAY & 1 GARAGE)  
 2- STOREY SEMI-DETACHED - 2 SPACES / UNIT (1 DRIVEWAY & 1 GARAGE)  
 1½ STOREY CONDO TOWNS - 2 SPACES / UNIT (1 DRIVEWAY & 1 GARAGE)



**CYNTHIA ZAHORUK ARCHITECTS**  
 3077 NEW STREET, BURLINGTON, ON L7N1M6  
 905.331.4460



**NOTES:**  
 1. THE CONTRACTOR OR PROJECT MANAGER WILL CHECK AND VERIFY ALL DIMENSIONS AND JOB CONDITIONS ON THE JOB AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. COORDINATION OF WORK IS THE RESPONSIBILITY OF THE CONTRACTOR OR OWNER/CONTRACTOR.  
 2. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION PURPOSES UNTIL SIGNED BY THE ARCHITECT.  
 3. ALL DRAWINGS ARE THE PROPERTY OF THE ARCHITECT AND MAY NOT BE COPIED, REPRODUCED OR ALTERED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.  
 4. DO NOT SCALE THE DRAWINGS.

DDMMYY	#	REVISION
06/07/2022		ISSUED FOR PRE-CON.

SCALE: AS NOTED  
 DRAWN BY: KR/EM  
 PRINT DATE: 13/06/2023

**CHEUNG**  
 PROPOSED TOWNHOUSES  
 KILLALY STREET EAST  
 PORT COLBORNE, ONTARIO

PROPOSED SITE PLAN

**A1.0**



Killaly Street East

James Avenue

Christmas Street

Cross Street



Bell Street

Johnston Street

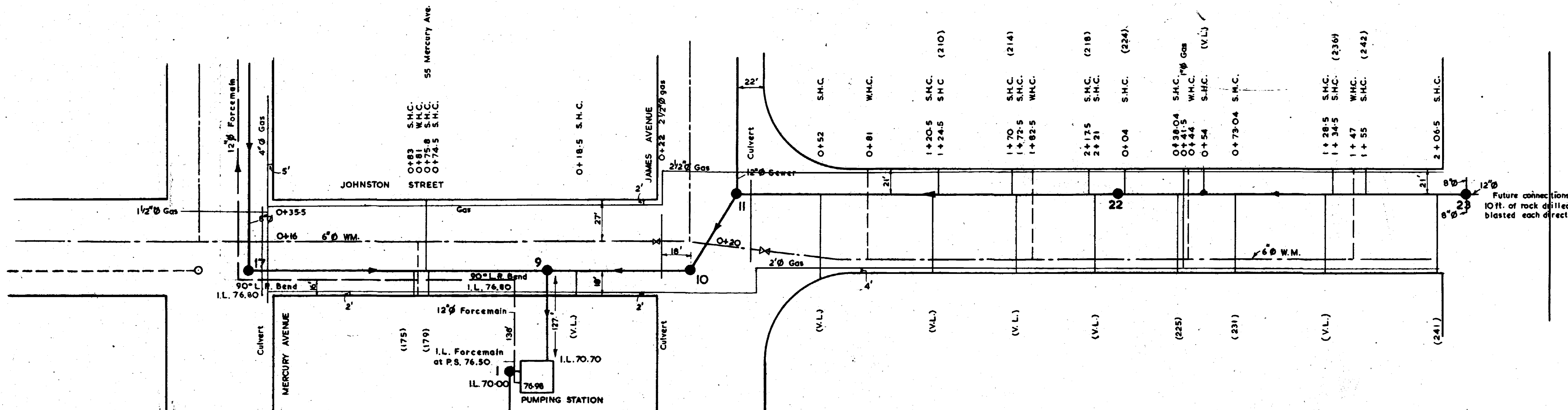
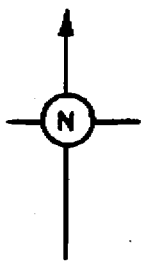
Durham Street

Snider Road

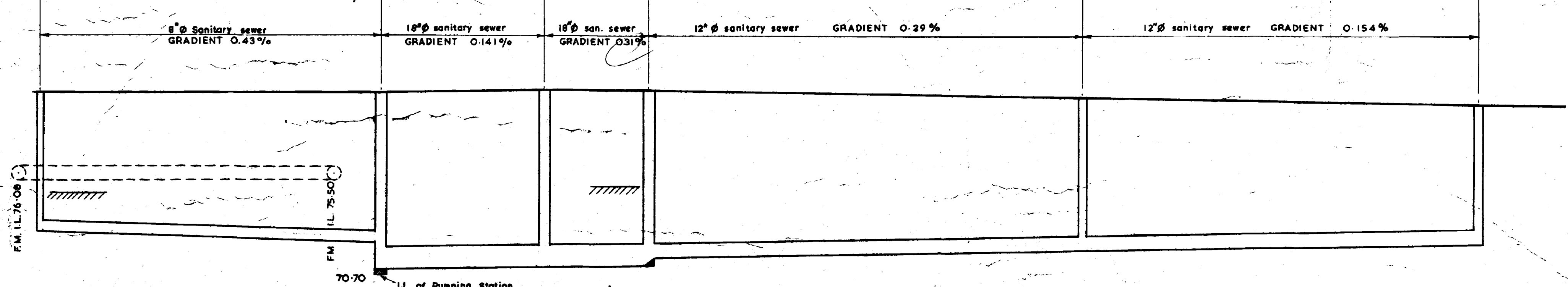
— Watermain  
— Sanitary Sewer  
— Storm Sewer



  
 PORT COLBORNE  
 March 28th, 2019





CHAINAGE FOR ROCK	ROCK ELEVATION	CHAINAGE IN FEET	GROUND LEVEL	SEWER INVERT LEVEL
1+51	76.69	1+51'	82.90	73.34 N 73.26 E
1+00	76.70	134'	82.82	72.61 W 70.82
0+50	76.68	55'	82.81	71.01 W 71.11 N
M.H.	76.70		83.26	71.28 S 71.61 E 71.66 N
0+15	76.80	237'	82.67	
1+00	76.86			
M.H.	76.96			
0+15	77.36			
M.H.	77.45			
1+00	77.58			
2+00	76.55			
M.H.	76.63			
1+00	76.52	227'		
2+00	76.57			
2+16	76.57		82.46	72.65 W 72.92 E 72.98 N

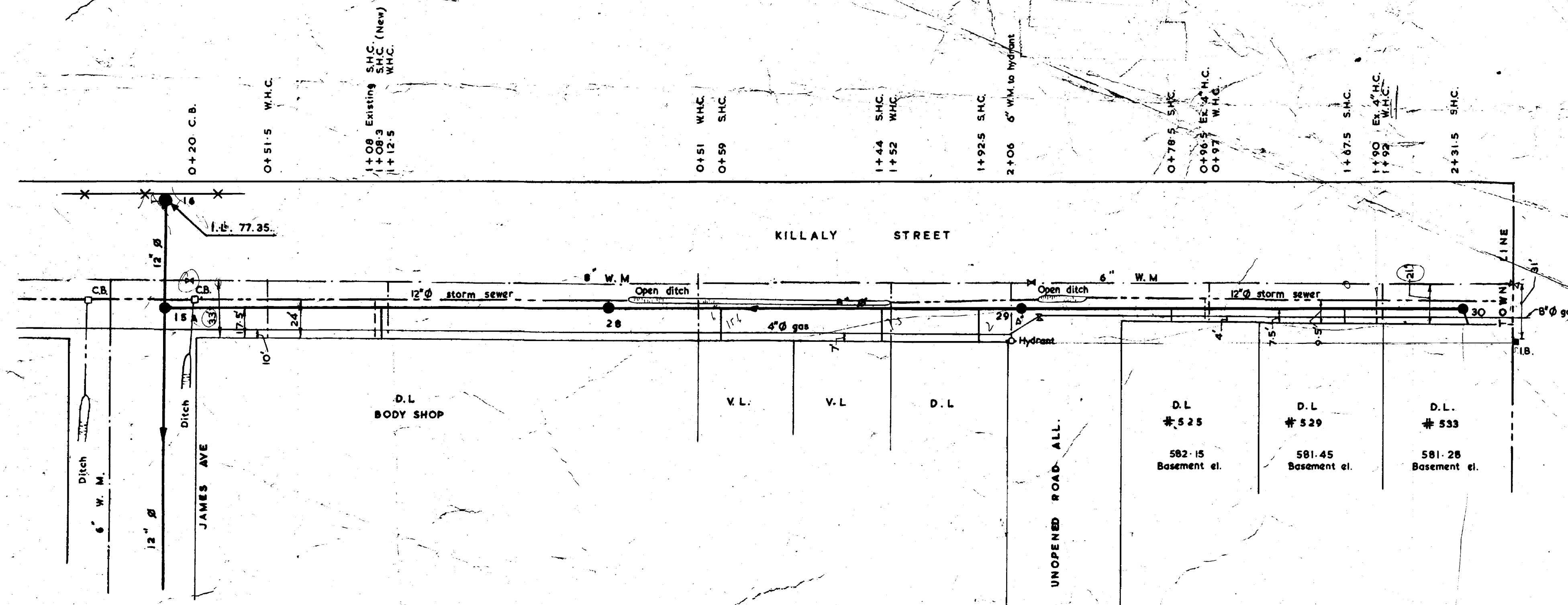


See Dwg No 3 for general notes.

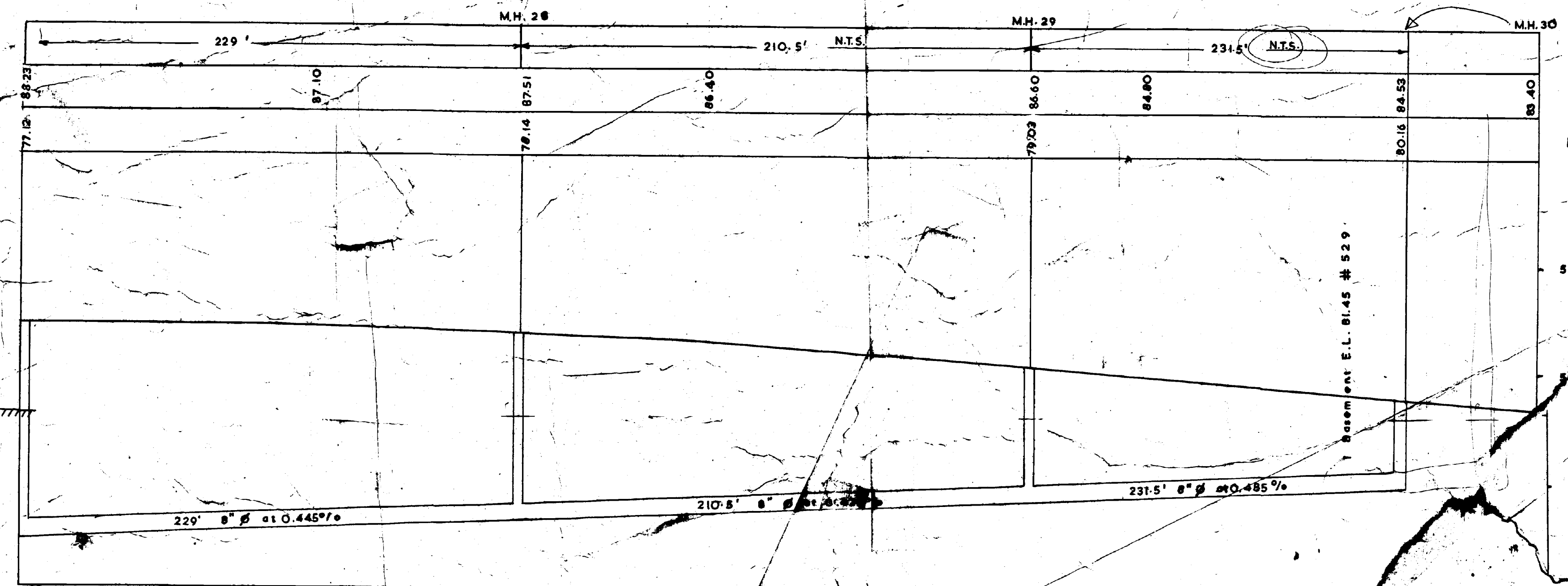
The City of Port Colborne and staff disclaims any liabilities to the current accuracy of the drawings provided. In using the information shown or contained on these drawings, the user agrees implicitly and explicitly that the City of Port Colborne and staff shall not be liable for special, incidental, consequential, or other damages arising from the use of such information. The user shall do an in-field verification of the information shown on or contained within these drawings.

<b>TOWN OF PORT COLBORNE</b> FRETZ SUB-DIVISION PLAN AND PROFILE No. 3			CANADIAN - BRITISH ENGINEERING CONSULTANTS 3089 BATHURST ST. TORONTO 19, ONTARIO		CONTRACT No. 0904/ DWG No. <b>5</b> FILE No. 0904/5
			DRAWN P. G. TRACED V. M. CHECKED D.L.W.	SCALE Horiz. - 1" to 20' Vert. - 1" to 5'	
REVISION DESCRIPTION DATE					

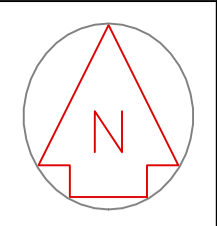
40-535-5



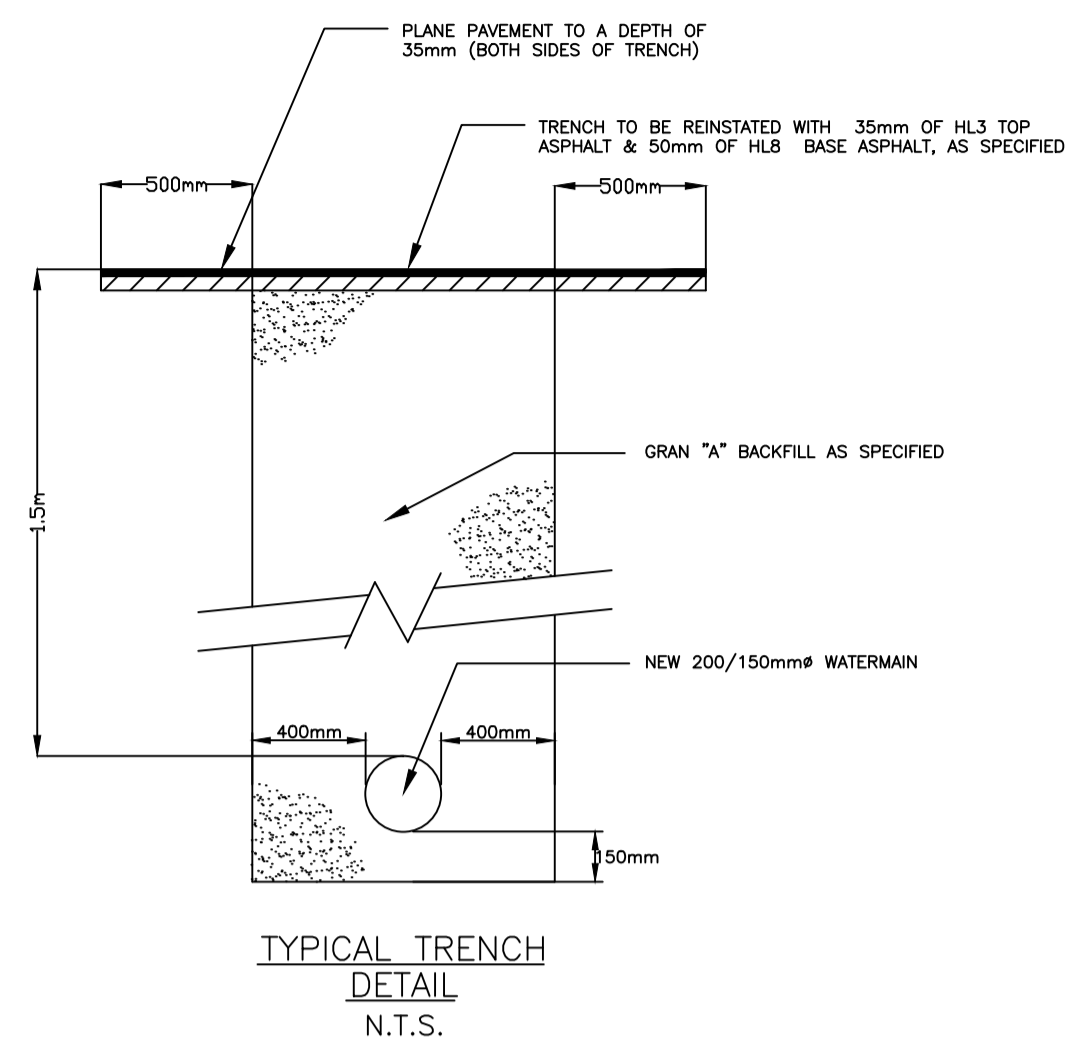
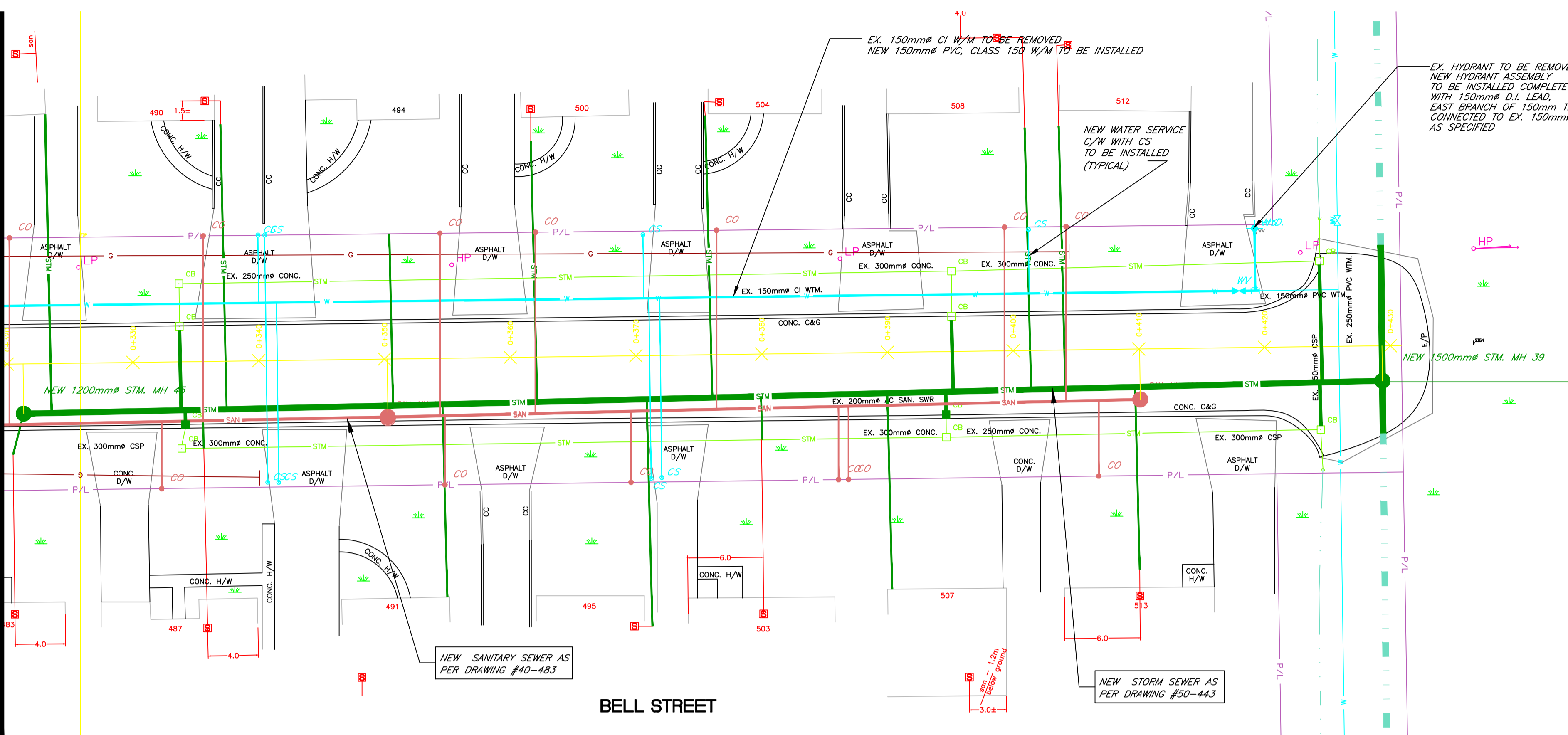
The City of Port Colborne and staff disclaims any liabilities to the current accuracy of the drawings provided. In using the information shown or contained on these drawings, the user agrees implicitly and explicitly that the City of Port Colborne and staff shall not be liable for special, incidental, consequential, or other damages arising from the use of such information. The user shall do an in-field verification of the information shown on or contained within these drawings.



40-535-10



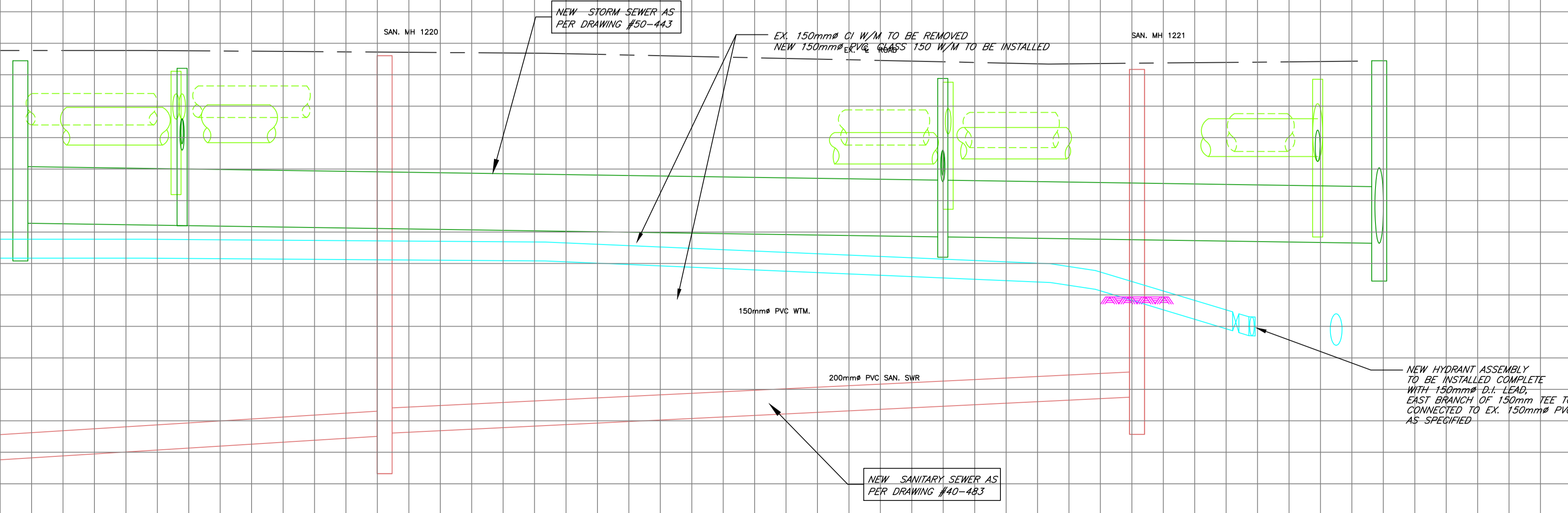
MATCH LINE - SEE DWG. # 60-470



NOTE:  
CS\*\* = EXACT LOCATION UNKNOWN, CURBSTOP TO BE LOCATED DURING CONSTRUCTION

The City of Port Colborne and staff disclaims any liabilities to the current accuracy of the drawings provided. In using the information shown or contained on these drawings, the user agrees implicitly and explicitly that the City of Port Colborne and staff shall not be liable for special, incidental, consequential, or other damages arising from the use of such information. The user shall do an in-field verification of the information shown on or contained within these drawings.

CHAINAGE	EX. ROAD ELEV.	EX. SAN. SWR. INV. ELEV.
3+20		
3+30	177.84	
3+40		
3+50	177.88	
3+60		
3+70	177.92	
3+80		
3+90		
4+00		
4+10	177.83	
4+20		
4+30	177.86	
		178.00
		177.00
		176.00
		175.00



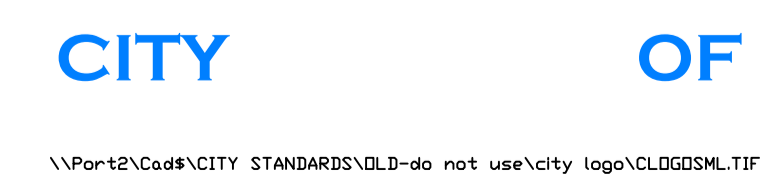
2	UPDATED DESIGN	NOV/99	JW
1	PLOTTED GAS, BELL & HYDRO	MAR/99	JW
No.	REVISION	DATE	INIT.

- NOTES
- 1) THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY ON THE CONSTRUCTION DRAWINGS AND WHERE SHOWN THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.
  - 2) BEFORE STARTING THE WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
  - 3) HYDRO AND BELL POLES ARE TO BE ANCHORED TO THE GROUND WHERE REQUIRED SO AS TO ENSURE THE STABILITY OF THE POLE LINES.
  - 4) THE CONTRACTOR IS TO CHECK WITH ALL THE UTILITIES INVOLVED.
  - 5) ALL MANHOLE FRAMES, CATCH BASIN FRAMES, WATER VALVES AND GAS VALVES TO BE ADJUSTED TO FINISH GRADE.

DRAFTING  
J.W.

DESIGN

CHECKED



BELL STREET

WATERMAIN REPLACEMENT

FIELD NOTES (METRIC)

DATE JAN/99

SCALE Horiz. 1:250  
Vert. 1:25

DWG No 60-471

CONTRACT No.

## Appendix B – Water Calculations and Background Documents



**Domestic Water Demand Calculations**

PROJECT: 549 Killaly St E  
 PROJECT No: ALL-22004555-A0  
 CREATED BY: 19-Jun-23  
 CHECKED BY: 19-Jun-23

**Site**

Average Day & Max Day Flow

*Niagara Region 2016 Master Servicing Plan Update Volume 3 Pg.12*  
 Residential Average Day Demand 300 L/cap/day  
 0.00347 L/cap/s

*Niagara Region 2016 Master Servicing Plan Update Volume 3 Part E Table 3.E.5*  
 Max Day Peaking Factor 1.56

	Phase	No. of Townhouse & Semi Units	Population per unit	Population	Avg Flow (L/s)	Max. Day Flow (L/s)
Site Plan	1	66	2.7	178	0.6	1.0
Subdivision	2	17	2.7	46	0.2	0.2
Subdivision	3	10	2.7	27	0.1	0.1
Site Plan	4	138	2.7	373	1.3	2.0
Subdivision	5	13	2.7	35	0.1	0.2
Site Plan	6	42	2.7	113	0.4	0.6
	<b>Subdivision Subtotal</b>	<b>40</b>		<b>108</b>	<b>0.4</b>	<b>0.6</b>
	<b>Site Plan Subtotal</b>	<b>246</b>		<b>664</b>	<b>2.3</b>	<b>3.6</b>
	<b>TOTAL</b>	<b>286</b>	-	<b>772</b>	<b>2.7</b>	<b>4.2</b>



**Fire Flow Calculation**

**2-Storey Townhouse**

PROJECT: 549 Killaly St E

PROJECT No: ALL-22004555-A0

CREATED BY: 19-Jun-23

CHECKED BY: 19-Jun-23

*Fire Underwriters Survey 2020 Water Supply for Public Fire Protection - Page 19*

1 **Estimate of the required fire flow for a given area can be determined by the formula:**

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

Where F = required fire flow in litres/minute  
 C = coefficient related to the type of construction  
 A = total floor area in square meters

For Wood construction: C =  
 Total area : A =

1  
 640 m<sup>2</sup>

\*assumes 4 units  
 of 2-storey street towns  
 with fire wall

Therefore $F = 220 \times 0.8 \times (A)^{1/2} =$	<b>5,566</b> L/m
---------------------------------------------------	------------------

*Fire Underwriters Survey 2020 Water Supply for Public Fire Protection - Page 25*

2 **Reduction for fire hazard**

Limited 15%  
 (1) - 15% = **4,731 L/m**

3 **Reduction for Sprinkler protection**

Sprinkler  
 Fully Supervised system  
 - L/m

4 **Addition for Structures exposed within 45m**

20.1-30m	North	10%
>30m	South	0%
0-3m	East	25%
0-3m	West	25%
		<b>2,838 L/m</b>

5 **Total Estimated Fire flow** **7,569 L/m**

The estimated fire flow is approx.	<b>8,000</b> L/m
	<b>133</b> L/s



**Fire Flow Calculation**

**3-Storey Stacked Townhouse**

PROJECT: 549 Killaly St E

PROJECT No: ALL-22004555-A0

CREATED BY: 19-Jun-23

CHECKED BY: 19-Jun-23

*Fire Underwriters Survey 2020 Water Supply for Public Fire Protection - Page 19*

1 **Estimate of the required fire flow for a given area can be determined by the formula:**

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

Where F = required fire flow in litres/minute  
 C = coefficient related to the type of construction  
 A = total floor area in square meters

For Wood construction: C =  
 Total area : A =

1  
 732 m<sup>2</sup>

\*assumes 3 units  
 of 3-storey staked towns  
 with fire wall

Therefore $F = 220 \times 0.8 \times (A)^{1/2} =$	<b>5,952</b> L/m
---------------------------------------------------	------------------

*Fire Underwriters Survey 2020 Water Supply for Public Fire Protection - Page 25*

2 **Reduction for fire hazard**

Limited	15%
(1) - 15% =	<b>5,059</b> L/m

3 **Reduction for Sprinkler protection**

Sprinkler	
Fully Supervised system	- L/m

4 **Addition for Structures exposed within 45m**

>30m	North	0%
20.1-30m	South	10%
0-3m	East	25%
3.1-10m	West	20%
		<b>2,783</b> L/m

5 **Total Estimated Fire flow** **7,842** L/m

The estimated fire flow is approx.	<b>8,000</b> L/m
	<b>133</b> L/s

Zone Id	Hyd Number	Key Street	Hydrant Address	Fire flow tested Yes No	Static PSI	Residual PSI	Residual Hydrant No.	Actual Flow GPM	Theoretical Flow GPM @ 20psi	Colour Code	Date mm/dd/yy	Time Hrs	Initials	
3	3	63000389	MITCHELL STREET	IN FRONT OF # 153 DURHAM STREET	✓	63	52	487	1432	2990	Blue	14-Nov-22	11:05	DB
4	3	63000390	REUTER ROAD	ACROSS FROM # 837 REUTER ROAD	✓	55	42	520	1390	2373	Blue	16-Nov-22	12:00	DB
5	3	63000391	CHRISTMAS STREET	IN FRONT OF # 199 CHRISTMAS STREET	✓	58	50	392	1508	3499	Blue	28-Nov-22	11:15	DB
6	3	63000392	CROSS STREET	EAST OF # 181 CROSS STREET	✓	58	49	410	1508	3283	Blue	28-Nov-22	10:55	DB
7	3	63000393	JOHNSTON STREET	IN FRONT OF # 56 LINCOLN STREET	✓	55	46	545	1390	2894	Blue	24-Nov-22	10:40	DB
8	3	63000394	BELL STREET	IN FRONT OF # 410 BELL STREET	✓	59	49	544	1582	3298	Blue	25-Nov-22	9:15	DB
9	3	63000395	CHRISTMAS STREET	IN FRONT OF # 117 CHRISTMAS STREET	✓	58	51	425	1508	3759	Blue	28-Nov-22	12:35	DB
10	3	63000396	CROSS STREET	IN FRONT OF # 133 CROSS STREET	✓	62	59	506	1508	3692	Blue	28-Nov-22	10:00	DB
11	3	63000397	CLARKE STREET	IN FRONT OF # 85 CLARKE STREET	✓	62	49	416	1390	2619	Blue	23-Nov-22	9:20	DB
12	3	63000398	CLARKE STREET	IN FRONT OF # 241 CLARKE STREET	✓	60	45	438	1259	2138	Blue	23-Nov-22	11:40	DB
14	3	63000400	McRAE AVENUE	IN FRONT OF # 97 McRAE AVENUE	✓	58	47	509	2060	4023	Blue	28-Nov-22	8:10	DB
17	3	63000409	BELL STREET	IN FRONT OF # 512 BELL STREET	✓	58	47	543	2057	4017	Blue	25-Nov-22	8:20	DB
18	3	63000410	CROSS STREET	IN FRONT OF # 159 CROSS STREET	✓	57	48	396	1508	3236	Blue	28-Nov-22	10:35	DB
19	3	63000411	CHRISTMAS STREET	IN FRONT OF # 129 McRAE AVENUE	✓	56	45	508	2016	3824	Blue	28-Nov-22	1:30	DB
21	3	63000413	FARES STREET	IN FRONT OF # 472 FARES STREET	✓	58	49	529	1432	3117	Blue	29-Nov-22	1:55	DB
24	3	63000416	CLARKE STREET	IN FRONT OF # 43 CLARKE STREET	✓	61	48	513	1262	2346	Blue	23-Nov-22	8:40	DB
27	3	63000419	CLARKE STREET	IN FRONT OF # 119 CLARKE STREET	✓	62	49	397	1262	2378	Blue	23-Nov-22	10:10	DB
28	3	63000420	WELLINGTON STREET	IN FRONT OF # 71 WELLINGTON STREET	✓	55	40	421	1390	2196	Blue	17-Nov-22	1:10	DB
29	3	63000421	WELLINGTON STREET	IN FRONT OF # 39 WELLINGTON STREET	✓	55	40	422	1432	2263	Blue	17-Nov-22	12:00	DB
30	3	63000422	WELLINGTON STREET	IN FRONT OF # 176 KILLALY STREET EAST	✓	55	45	421	1508	2966	Blue	17-Nov-22	11:30	DB
31	3	63000423	McRAE AVENUE	CORNER McRAE AVENUE & KILLALY STREET EAST	✓	52	43	507	1432	2841	Blue	17-Nov-22	10:45	DB
32	3	63000424	CHRISTMAS STREET	IN FRONT OF # 93 CHRISTMAS STREET	✓	58	52	395	1306	3538	Blue	28-Nov-22	12:50	DB
33	3	63000425	CHRISTMAS STREET	IN FRONT OF # 143 CHRISTMAS STREET	✓	58	50	391	1508	3499	Blue	28-Nov-22	12:10	DB
34	3	63000426	CHRISTMAS STREET	IN FRONT OF # 238 CHRISTMAS STREET	✓	59	47	391	2060	3893	Blue	28-Nov-22	11:55	DB
36	3	63000428	KILLALY STREET EAST	IN FRONT OF # 555 KILLALY STREET EAST	✓	55	42	429	1168	1994	Blue	16-Nov-22	10:40	DB
37	3	63000429	KILLALY STREET EAST	IN FRONT OF # 517 KILLALY STREET EAST	✓	56	40	428	1432	2218	Blue	16-Nov-22	11:25	DB
38	3	63000430	KILLALY STREET EAST	KILLALY STREET EAST @ JAMES STREET	✓	52	43	431	1546	3067	Blue	16-Nov-22	1:15	DB
39	3	63000431	KILLALY STREET EAST	IN FRONT OF # 155 MERCURY AVENUE	✓	53	47	430	1542	3372	Blue	16-Nov-22	1:35	DB
40	3	63000432	KILLALY STREET EAST	KILLALY STREET EAST @ LINCOLN AVENUE	✓	52	40	433	1508	2561	Blue	17-Nov-22	8:20	DB
41	3	63000433	ELIZABETH STREET	IN FRONT OF # 385 KILLALY STREET EAST	✓	52	42	432	1470	2755	Blue	17-Nov-22	8:40	DB
42	3	63000434	ELIZABETH STREET	IN FRONT OF # 210 ELIZABETH STREET	✓	52	47	433	1066	2905	Blue	17-Nov-22	9:10	DB
43	3	63000435	WELLINGTON STREET	IN FRONT OF # 109 WELLINGTON STREET	✓	55	40	420	1390	2196	Blue	17-Nov-22	1:25	DB
46	3	63000438	CLARKE STREET	IN FRONT OF # 201 CLARKE STREET	✓	62	49	548	1306	2461	Blue	23-Nov-22	11:00	DB
47	3	63000439	JOHN STREET	WEST END OF JOHN STREET	✓	58	42	398	1168	1863	Blue	23-Nov-22	12:50	DB
56	3	63000461	WELLINGTON STREET	IN FRONT OF # 311 WELLINGTON STREET	✓	60	42	470	1306	2010	Blue	22-Nov-22	10:30	DB
65	3	63000470	WELLINGTON STREET	IN FRONT OF # 263 WELLINGTON STREET	✓	62	45	474	1300	2119	Blue	22-Nov-22	9:40	DB
66	3	63000471	CLARKE STREET	IN FRONT OF # 279 CLARKE STREET	✓	58	42	398	1262	2013	Blue	23-Nov-22	1:20	DB
67	3	63000472	CLARKE STREET	IN FRONT OF # 307 CLARKE STREET	✓	60	40	471	1262	1835	Blue	23-Nov-22	1:40	DB
69	3	63000474	WELLINGTON STREET	IN FRONT OF # 233 WELLINGTON STREET	✓	59	45	475	1215	2113	Blue	22-Nov-22	8:35	DB
70	3	63000475	WELLINGTON STREET	IN FRONT OF # 199 WELLINGTON STREET	✓	59	40	474	1306	1926	Blue	22-Nov-22	8:10	DB
71	3	63000476	WELLINGTON STREET	IN FRONT OF # 161 WELLINGTON STREET	✓	55	40	435	1348	2130	Blue	17-Nov-22	1:40	DB
72	3	63000477	RODNEY STREET	RODNEY STREET & FARES STREET	✓	62	50	515	1066	2097	Blue	15-Nov-22	7:45	DB
73	3	63000478	RODNEY STREET	IN FRONT OF # 103 RODNEY STREET	✓	59	46	480	1066	1929	Blue	15-Nov-22	1:25	DB
74	3	63000479	RODNEY STREET	ACROSS FROM # 136 RODNEY STREET	✓	61	50	486	533	930	Orange	15-Nov-22	11:00	DB
75	3	63000480	MITCHELL STREET	IN FRONT OF # 105 MITCHELL STREET	✓	59	49	485	1216	2171	Blue	15-Nov-22	12:50	DB
76	3	63000481	MITCHELL STREET	MITCHELL STREET @ DECEW STREET	✓	58	46	490	1216	2265	Blue	15-Nov-22	12:00	DB
77	3	63000482	WELLAND STREET	IN FRONT OF # 155 WELLAND STREET	✓	58	40	497	1306	1955	Blue	16-Nov-22	8:30	DB
78	3	63000483	WELLAND STREET	IN FRONT OF 123 WELLAND STREET	✓	59	45	582	1306	2271	Blue	16-Nov-22	8:45	DB
79	3	63000484	FARES STREET	IN FRONT OF # 180 FARES STREET	✓	62	47	503	1470	2564	Blue	14-Nov-22	13:05	DB
80	3	63000485	MITCHELL STREET	CORNER OF MITCHELL STREET & NICKEL STREET	✓	59	44	481	1432	2399	Blue	15-Nov-22	12:20	DB



81	3	63000486	DAVIS STREET	IN FRONT OF # 92 NICKEL STREET	✓	61	45	502	1306	2171	Blue	15-Nov-22	10:15	DB
82	3	63000487	FARES STREET	IN FRONT OF 109 DURHAM STREET	✓	61	52	389	1262	2860	Blue	14-Nov-22	10:30	DB
83	3	63000488	DAVIS STREET	DAVIS STREET & DURHAM STREET	✓	61	50	389	1066	2169	Blue	14-Nov-22	9:15	DB
84	3	63000489	DAVIS STREET	LOUIS STREET & DAVIS STREET	✓	62	48	488	1216	2201	Blue	15-Nov-22	8:30	DB
85	3	63000490	MITCHELL STREET	IN FRONT OF # 223 MITCHELL STREET	✓	58	45	389	1432	2556	Blue	15-Nov-22	11:40	DB
86	3	63000491	FARES STREET	IN FRONT OF # 30 LOUIS STREET	✓	63	46	487	1432	2364	Blue	14-Nov-22	11:20	DB
87	3	63000492	WELLAND STREET	IN FRONT OF # 231 WELLAND STREET	✓	60	47	482	1508	2767	Blue	16-Nov-22	8:05	DB
89	3	63000494	FARES STREET	IN FRONT OF # 329 FARES STREET	✓	59	50	495	1432	3160	Blue	29-Nov-22	11:45	DB
90	3	63000495	MITCHELL STREET	IN FRONT OF # 301 MITCHELL STREET	✓	59	49	532	1432	2984	Blue	29-Nov-22	10:30	DB
95	3	63000500	LAKE ROAD	FARES STREET @ LAKE ROAD	✓	60	43	501	1306	2073	Blue	14-Nov-22	8:20am	DB
96	3	63000501	LAKE ROAD	EAST OF # 1 LAKE ROAD	✓	56	35	518	1306	1747	Blue	15-Nov-22	1:50	DB
97	3	63000502	DAVIS STREET	IN FRONT OF # 224 DAVIS STREET	✓	62	50	489	1066	2097	Blue	15-Nov-22	9:30	DB
98	3	63000503	FARES STREET	IN FRONT OF # 216 FARES STREET	✓	62	47	491	1432	2497	Blue	Nov 14, 2022	11:45	DB
99	3	63000504	JOHNSTON STREET	IN FRONT OF # 50 ELIZABETH STREET	✓	55	46	393	1508	3140	Blue	24-Nov-22	11:00	DB
100	3	63000505	ELIZABETH STREET	IN FRONT OF # 383 BELL STREET	✓	57	45	394	2016	3703	Blue	25-Nov-22	9:35	DB
101	3	63000506	CROSS STREET	IN FRONT OF # 96 ELIZABETH STREET	✓	58	43	509	2182	3605	Blue	28-Nov-22	9:25	DB
102	3	63000507	KILLALY STREET EAST	IN FRONT OF # 333 KILLALY STREET EAST	✓	52	42	423	1432	2684	Blue	17-Nov-22	10:25	DB
103	3	63000508	CHRISTMAS STREET	IN FRONT OF # 48 CHRISTMAS STREET	✓	55	45	424	1470	2891	Blue	28-Nov-22	1:10	DB
104	3	63000509	ATHOE STREET	IN FRONT OF # 57 CROSS STREET	✓	56	45	400	1582	3001	Blue	28-Nov-22	9:00	DB
105	3	63000510	GRASSIE AVENUE	IN FRONT OF # 102 GRASSIE AVENUE	✓	55	44	535	1972	3684	Blue	28-Nov-22	2:00	DB
106	3	63000511	DAVIS STREET	IN FRONT OF # 439 DAVIS STREET	✓	60	50	512	533	1127	Green	29-Nov-22	9:00	DB
107	3	63000512	DAVIS STREET	IN FRONT OF # 477 DAVIS STREET	✓	58	43	511	1066	1761	Blue	29-Nov-22	8:15	DB
108	3	63000513	CLARKE STREET	WESTSIDE OF # 114 KILLALY STREET EAST	✓	61	48	416	1117	2077	Blue	23-Nov-22	8:15	DB
110	3	63000515	FARES STREET	IN FRONT OF # 134 FARES STREET	✓	64	50	484	1066	1978	Blue	14-Nov-22	13:45	DB
111	3	63000516	WELLAND STREET	IN FRONT OF # 77 WELLAND STREET	✓	59	40	483	1432	2112	Blue	16-Nov-22	9:05	DB
112	3	63000517	WELLAND STREET	IN FRONT OF 49 WELLAND STREET	✓	59	40	516	1432	2112	Blue	16-Nov-22	9:25	DB
113	3	63000518	WELLAND STREET	ACROSS FROM # 1 LAKE ROAD	✓	54	37	501	1432	2802	Blue	15-Nov-22	2:20	DB
115	3	63000520	REUTER ROAD	DURHAM STREET @ REUTER ROAD	✓	55	45	390	1432	2817	Blue	16-Nov-22	12:30	DB
117	3	63000528	FARES STREET	IN FRONT OF # 379 FARES STREET	✓	57	46	556	1470	2830	Blue	29-Nov-22	1:00	DB
118	3	63000529	FARES STREET	IN FRONT OF # 435 FARES STREET	✓	58	51	528	1306	3256	Blue	29-Nov-22	1:30	DB
121	3	63000532	DAVIS STREET	EASTSIDE OF # 178 FRASER STREET	✓	59	50	533	1476	3457	Blue	29-Nov-22	10:15	DB
122	3	63000533	DAVIS STREET	IN FRONT OF # 361 DAVIS STREET	✓	60	52	534	1306	3115	Blue	29-Nov-22	9:35	DB
123	3	63000534	BELL STREET	IN FRONT OF # 409 DAVIS STREET	✓	60	50	511	1582	3344	Blue	29-Nov-22	9:20	DB
125	3	63000536	BELL STREET	IN FRONT OF # 83 MCRAE AVENUE	✓	59	47	542	1926	3640	Blue	25-Nov-22	11:00	DB
126	3	63000537	JOHNSTON STREET	NORTHSIDE OF # 37 MCRAE AVENUE	✓	58	50	541	1432	3322	Blue	24-Nov-22	1:15	DB
127	3	63000538	COLBORNE STREET	IN FRONT OF # 9 MCRAE AVENUE	✓	58	50	537	1508	3499	Blue	24-Nov-22	1:35	DB
128	3	63000539	COLBORNE STREET	IN FRONT OF # 111 COLBORNE STREET	✓	58	48	504	1432	2944	Blue	24-Nov-22	11:20	DB
129	3	63000540	COLBORNE STREET	IN FRONT OF # 43 COLBORNE STREET	✓	58	48	541	1306	2685	Blue	24-Nov-22	12:45	DB
130	3	63000541	ATHOE STREET	IN FRONT OF # 57 JOHNSTON STREET	✓	59	46	540	1878	3399	Blue	24-Nov-22	12:10	DB
131	3	63000542	ATHOE STREET	IN FRONT OF # 331 BELL STREET	✓	59	51	505	1508	3547	Blue	25-Nov-22	10:30	DB
132	3	63000543	BELL STREET	IN FRONT OF # 466 BELL STREET	✓	58	50	409	1470	3410	Blue	25-Nov-22	8:40	DB
133	3	63000544	BELL STREET	IN FRONT OF # 438 BELL STREET	✓	60	47	543	1972	3619	Blue	25-Nov-22	9:00	DB
134	3	63000545	JOHNSTON STREET	IN FRONT OF # 166 JOHNSTON STREET	✓	58	46	393	1878	3499	Blue	24-Nov-22	10:00	DB
135	3	63000546	JOHNSTON STREET	IN FRONT OF # 56 JAMES STREET	✓	60	51	547	1262	2824	Blue	24-Nov-22	8:40	DB
136	3	63000547	JOHNSTON STREET	IN FRONT OF # 241 JOHNSTON STREET	✓	60	46	546	2012	3547	Blue	24-Nov-22	9:10	DB
137	3	63000548	CLARKE STREET	IN FRONT OF # 161 CLARKE STREET	✓	62	49	419	1306	2461	Blue	23-Nov-22	10:40	DB
138	3	63000549	HUMBOLDT PARKWAY	IN FRONT OF # 203 HUMBOLDT PARKWAY	✓	60	46	550	1262	2225	Blue	22-Nov-22	1:50	DB
139	3	63000550	HUMBOLDT PARKWAY	IN FRONT OF # 159 HUMBOLDT PARKWAY	✓	61	47	551	1262	2254	Blue	22-Nov-22	1:20	DB
140	3	63000551	HUMBOLDT PARKWAY	IN FRONT OF # 121 HUMBOLDT PARKWAY	✓	60	45	552	1306	2218	Blue	22-Nov-22	12:50	DB
141	3	63000552	HUMBOLDT PARKWAY	IN FRONT OF # 83 HUMBOLDT PARKWAY	✓	60	44	544	1350	2214	Blue	22-Nov-22	11:55	DB
142	3	63000553	HUMBOLDT PARKWAY	WESTSIDE OF # 148 KILLALY STREET EAST	✓	62	43	554	1262	1937	Blue	22-Nov-22	11:20	DB
143	3	63000554	HUMBOLDT PARKWAY	IN FRONT OF # 37 HUMBOLDT PARKWAY	✓	58	43	553	1306	2158	Blue	22-Nov-22	11:40	DB
145	3	63000556	FARES STREET	IN FRONT OF # 355 FARES STREET	✓	59	48	494	1508	2984	Blue	29-Nov-22	12:10	DB

## Appendix C – Sanitary Calculations and Background Documents



**Sanitary Flow Calculations**

PROJECT: 549 Killaly St E  
 PROJECT No: ALL-22004555-A0  
 CREATED BY: 21-Jun-23  
 CHECKED BY: 21-Jun-23

**Site**

1 Average Day

Niagara Region - 2016 Master Servicing Plan Update Volume IV page 12  
 Residential Average Day Demand= 275 L/cap/d  
 0.00318 L/cap/s

	Phase	Units	Population per unit	Population	Avg Flow (L/s)
Site Plan	1	66	2.7	178	0.6
Subdivision	2	17	2.7	46	0.1
Subdivision	3	10	2.7	27	0.1
Site Plan	4	138	2.7	373	1.2
Subdivision	5	13	2.7	35	0.1
Site Plan	6	42	2.7	113	0.4
	<b>Subdivision Subtotal</b>	<b>40</b>	-	<b>108</b>	<b>0.3</b>
	<b>Site Plan Subtotal</b>	<b>246</b>	-	<b>664</b>	<b>2.2</b>
	<b>TOTAL</b>	<b>286</b>	-	<b>772</b>	<b>2.5</b>

Ontario Ministry of the Environment and Climate Control's Design Guidelines for Sewage Works

2 Peaking Factor =  $1 + (14 / (4 + (P / 1000)^{1/2}))$  772  
 Cumulative Population = 772  
 Peaking Factor = 3.87

	Phase	Population	Peak Factor	Avg Flow (L/s)	Peaked Flow (L/s)
Site Plan	1	178	3.87	0.6	2.2
Subdivision	2	46	3.87	0.1	0.6
Subdivision	3	27	3.87	0.1	0.3
Site Plan	4	373	3.87	1.2	4.6
Subdivision	5	35	3.87	0.1	0.4
Site Plan	6	113	3.87	0.4	1.4
	<b>Subdivision Subtotal</b>	<b>108</b>	-	<b>0.3</b>	<b>1.3</b>
	<b>Site Plan Subtotal</b>	<b>664</b>	-	<b>2.2</b>	<b>8.2</b>
	<b>TOTAL</b>	<b>772</b>	-	<b>2.5</b>	<b>9.5</b>

3 Infiltration allowance 0.286 L/s/ha

	Phase	Area (ha)	Infiltration (L/s)
Site Plan	1	1.85	0.5
Subdivision	2	0.40	0.1
Subdivision	3	0.26	0.1
Site Plan	4	1.21	0.3
Subdivision	5	0.23	0.1
Site Plan	6	1.37	0.4
	Municipal Road	1.07	0.3
	<b>Subdivision Subtotal</b>	<b>1.96</b>	<b>0.6</b>
	<b>Site Plan Subtotal</b>	<b>4.43</b>	<b>1.2</b>
	<b>TOTAL</b>	<b>6.39</b>	<b>1.8</b>

4 Design Flow = average flow x peaking factor + infiltration allowance

	Phase	Peaked Flow (L/s)	Infiltration (L/s)	Design Flow (L/s)
Site Plan	1	2.2	0.5	2.7
Subdivision	2	0.6	0.1	0.7
Subdivision	3	0.3	0.1	0.4
Site Plan	4	4.6	0.3	4.9
Subdivision	5	0.4	0.1	0.5
Site Plan	6	1.4	0.4	1.8
	Municipal Road	0	0.3	0.3
	<b>Subdivision Subtotal</b>	<b>1.3</b>	<b>0.6</b>	<b>1.9</b>
	<b>Site Plan Subtotal</b>	<b>8.2</b>	<b>1.2</b>	<b>9.4</b>
	<b>TOTAL</b>	<b>9.5</b>	<b>1.8</b>	<b>11.3</b>

EXP Services Inc.

282 Stanley Street, Brantford – Functional Servicing Report

EXP Project Number: ALL-21017694-A0

January 2023

End Document

