STRIK BALDINELLI MONIZ
PLANNING • CIVIL • STRUCTURAL • MECHANICAL • ELECTRICAL

LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
132 Queen St. S. Unit 4
Kitchener, ON N2G 1V9
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

March 25, 2025

SBM-23-2723

York Developments
303 Richmond Street Unit 201
London, Ontario N6B 2HB

Attn: Frank Gerrits

Re: Revision 1 – Servicing Feasibility Study
Proposed Mixed-Use Development – Phase 1 Tower 'D'
756 St. Clair Street, Chatham, Ontario

1. INTRODUCTION

This Servicing Feasibility Study (Study) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) for York Developments. The information has been reviewed by SBM for the proposed residential development located at 756 St. Clair Street, Chatham, Ontario.

This Study is intended to represent a component of the OPA/ZBA approval application package submitted to the Municipality of Chatham-Kent (Municipality) and should be read in conjunction with all other submitted documents. The following along with the Conceptual Site Plan (SP1) provided in Appendix A, have been prepared to address the Municipality's requirements.

The area of the site is approximately 3.78 ha. The subject lands currently consist of undeveloped grassland. The site borders existing commercial developments to the north, east, and west, and borders undeveloped grassland to the south. The proposed development includes two 178-unit residential buildings (Tower 'A' and 'B') and two 209-unit residential buildings (Tower 'C' and 'D'), plus a proposed underground parking garage. Phase 1 is proposed to include the development of Tower 'D' (a single 209-unit residential building), and associated parking. Please refer to the proposed site plan by Patrick David Trottier Architect dated October 23, 2023 provided in Appendix A.

Design requirements have been based on the Municipality of Chatham-Kent Public Utilities Commission Watermain and Sanitary Design Manual (PUC W&SDM), updated June 2023, the Ministry of Environment Conservation and Parks (MECP), Design Guidelines for Drinking Water Systems (DGDWS), updated 2016, and the current Ontario Building Code (OBC).

2. WATER SERVICING

According to the Municipality's As-Constructed drawing (98503 sheet 2, dated May 30, 1998) provided in Appendix A, there is an existing 300 mm PVC watermain located in the south boulevard of St. Clair Street Right-of-Way (ROW). The subject site is proposed to connect to the existing 300 mm watermain constructed during Phase 1A, see Servicing Plan prepared by Stantec, provided in Appendix A.

2.1 Domestic Water Supply

As noted above, the site will be serviced by a private 300 mm diameter watermain which will pass through the development. Individual services to each building from the proposed 300 mm private watermain will be required. The site's occupancy load was determined by multiplying the minimum population density of 1.6 people per unit by the number of units within each building. Average Day demand was calculated by multiplying the total site population for each building by the design flow of 350 L/cap/day as per Section B.2.3.3 the PUC W&SDM. Max Hour and Max Day Demands were calculated by multiplying Average Daily Demand by the Max Hour Peak Factor of 3.0 and Max Day Peak Factor of 2.0 as per Section B.2.3.3

of the PUC W&SDM. Individual domestic water demand for each building is outlined in Domestic Water Demand, and Velocity Calculations provided in Appendix B. Total Average Day demand for buildings A, B, C, and D is 5.02 L/s, Max Hour and Max Day demand was calculated to be 15.05 L/s and 10.03 L/s, respectively. The proposed 300 mm private watermain has the capacity to provide water to the proposed development at a velocity of 0.21 m/s, which is lower than the maximum allowable velocity of 1.5 m/s as per Table B.1 in Section B.2.2.2 of the PUC W&SDM. Sizing and location of individual services off the proposed 300 mm private watermain will be provided at the time of detailed design.

2.2 Water Supply for Fire Protection

The proposed building(s) will have a sprinkler system installed, therefore fire-fighting demand will be determined as per NFPA 13, as outlined in the OBC, Section A-3.2.5.7. The proposed development consists of residential buildings which have a NFPA 13 hazard classification of "Light", and an underground parking garage which has a hazard classification of "Ordinary Group (1)." As such, the development has conservatively been taken to require the total "Ordinary Group (1)" flow rate of 500 USGP (1,893 L/min).

The hydrant flow test conducted by Northern Sprinkler Design at 756 St. Clair Street dated January 05, 2024, provided in Appendix B, shows that there is sufficient residual pressure within the system. At the required fire flow + maximum day demand rate of 2,494.80 L/min, the residual pressure will be approximately 62.70 psi (432.29 kPa) which exceeds the minimum required 20 psi (140 kPa) in emergency situations and is below the maximum allowable pressure of 120 psi as per Section B.2.5.1 of the PUC W&SDM. Please refer to the Fire-Fighting Flow NFPA#13 calculations provided in Appendix B. The final pressure in the sprinkler system will be calculated by the sprinkler system designer, upon sprinkler system layout completion (Mechanical scope of work). Additionally, the sprinkler system designer is to confirm if a 300 mm water service is sufficient to provide the required final pressure in the sprinkler system, upon sprinkler system layout completion.

2.3 Water Supply Conclusions

Based on the above, the existing 300 mm PVC watermain in the St. Clair Street ROW has sufficient capacity for fire fighting for the proposed development. As outlined in the OBC, a fire hydrant is to be located 45 m from the fire-fighters connection. Currently, there is no hydrant within 45 m of the site and therefore a new hydrant will be required at the time of detailed design. Additionally, pressure loss calculations will be confirmed at the time of detailed design once the water servicing layout is known, and the fire-fighters connection and hydrant location are finalized.

The water pressure under the fire fighting condition is approximately 61.70 psi, which is larger than 20 psi and less than 120 psi, and therefore meets the requirements of the PUC W&SDM.

3. SANITARY SERVICING

The subject site will be serviced by a 200 mm diameter private drain connection (PDC) which will pass through the development. For further clarification please refer to Appendix A for Stantec Servicing File No. 161401102, drawings 3 and 4, dated February 28, 2011. Branching out of the proposed 200 mm PDC will be four (4) 200 mm diameter sanitary services to each proposed residential building. Sanitary flows generated from the proposed residential buildings will ultimately drain into the existing 300 mm sanitary sewer in the St. Clair Street ROW shown on Municipality's As-Constructed drawing (02111 sheet 3 of 7 dated June 30, 2004) provided in Appendix A.

3.1 Sanitary Demands

The proposed flows from the subject site are shown on the Sanitary Sewer Design Sheet — Flow Monitoring Conditions shown in Appendix C. Flows were calculated using a design flow of 340 L/cap/day as per Section C.1.3.2 of the PUC W&SDM. With an occupancy load of 1361 people (374 units at 1.5 people per unit and 400 units at 2.0 people per unit), the anticipated peak sanitary population flow for the proposed development is 19.87 L/s. When combined with infiltration, this results in a total peak flow of 20.82 L/s. The density of 1.5 persons per unit was assumed for 1 bedroom apartments and 2.0 persons per unit was assumed for 2 bedroom apartments. These assumptions were provided by the Municipality of Chatham-Kent.

3.1 Municipal Sanitary Sewer Capacity Analysis (Excluding Flow Monitoring Results)

The Sanitary Design Sheet appended to this Study considered capacity up to MH78B located on Orangewood Boulevard ROW, pipes from MH78C to PS11 were not considered in the design analysis. The Sanitary Design Sheet previously showed

capacities over 80% within the existing sanitary sewers from maintenance hole (MH) 5 to MH13 and MH78 to MH78B as a result of increased sanitary flows from the proposed development. Based on the Sanitary Sewer Desing Sheet prepared by Todgham & Case Associates, provided in Appendix A, pump station 18 (PS 18) has a total capacity of 45.36 L/s. The proposed development results in 40.00 L/s flowing towards PS 18, shown in the Sanitary Sewer Design Sheet — Flow Monitoring Conditions provided in Appendix C. Flow monitoring of the sewer conditions was therefore conducted to alleviate the theoretical concerns calculated.

3.2 Flow Monitoring

To address the identified municipal sewer sections that were calculated to be over capacity, as per the sewer capacity analysis above, Civica Infrastructure Inc. (Civica) was retained to provide flow monitoring at six (6) downstream (of the proposed residential development) locations for a duration of approximately 3-months (September 19, 2024 to January 8, 2025). These 6 locations were strategically determined to observe the dry and wet weather sanitary flow conditions for 6 key study areas. Please refer to "*Figure 1: Study Area and Monitoring Locations*" within Civica's Flow Monitoring Report (FMR), provided in Appendix D, for the location of each flow monitoring area and placement of the flow meter. These flow monitoring areas and locations are also denoted with markups on the Municipal's Sanitary Sewer Collection System drawing (Sanitary Pump Sation No. 11), provided in Appendix C.

After the completion of the 3-month flow monitoring investigation, the highest observed wet weather flow was recorded on November 10, 2024, with a peak flow of 30.14 L/s at the flow monitoring location FM04; a summary of the highest measured flow at each flow monitoring location under wet weather conditions is presented in Table 1. These results were obtained from the findings outlined by Civica in the FMR dated February 18, 2025 (provided in Appendix D).

Table 1. Peak Wet Weather Flows (PWWF) observed for each flow monitoring location per Civica's Flow Monitoring Report

MONITORING LOCATION	DATE *	PEAK WET WEATHER FLOW (PWWF) L/s	PEAK I&I FLOW L/s	PEAK DOMESTIC SANITARY FLOW ** L/s
FM01	November 10, 2024	22.20	17.14	4.79
FM02	November 10, 2024	24.42	16.66	7.76
FM03	December 29, 2024	4.99	3.38	1.61
FM04	November 10, 2024	30.14	15.26	14.88
FM05	December 29, 2024	26.82	21.62	5.20
FM06	October 12, 2024	15.10	14.32	0.78

Note: * The day recorded for the highest observed peak wet weather flow at each flow monitoring location; highest flows at each flow monitoring location were not all recorded during the same rainfall event.

**** Peak Domestic flow was determined based on the difference between Civica's observed flow characteristics: the peak flow and peak I&I flows.

The highest observed wet weather flow, as reported by Civica and presented in Table 1 above, were subsequently used to update the (previously submitted) Sanitary Design Sheet at each flow monitoring location (closest sanitary maintenance hole and sanitary sewer section) to compare against the calculated design flows and conveyance capacities of those sanitary sewer sections, respectively. This was considered the most conservative approach in comparison to the dry weather flow conditions reported for the flow monitoring by Civica. To determine a comparative capacity, the sanitary demands calculated for subject site were added to the highest observed PWWF (Table 1). Please refer to the Sanitary Sewer Design Sheet — Flow Monitoring Conditions provided in Appendix C. For ease of comparison, each flow monitoring location is highlighted with the corresponding colour as seen for flow monitoring area in Figure 1 of Civica's FMR. Table 2, on the next page, shows the comparative summary at each flow monitoring location.

The updated Sanitary Design Sheet (*Sanitary Sewer Design Sheet — Flow Monitoring Conditions*) shows that when considering the highest observed PWWF plus the demands from the subject site, the conveyance capacities of the sewers at the respective flow monitoring locations are improved (i.e. a reduction in the Percent Full value calculated compared to

when utilizing the theoretical design flows). Of note, for the sanitary sewer from MH78 to MH78B, previously highlighted to be over capacity, is now extrapolated to be reduced under the 80% capacity threshold per the observed capacity difference at flow monitoring location FM05; please refer to Table 2. Since this flow monitoring location is upstream of MH78, located at MH77, this infers a reduction would also occur downstream for the sewer MH78 to MH78B. Taking the difference observed at FM05 (86.81 L/s – 49.44 L/s = 37.37 L/s difference in flow) and applying it to the sanitary sewer section between MH78 to MH78B (89.68 L/s – 37.37 L/s = 52.31 L/s) shows an approximate capacity of 50.66% (reduced from 86.86%); please refer to the Sanitary Sewer Design Sheet — Flow Monitoring Conditions provided in Appendix C.

Table 2. Comparative Flows and Percent Full (Sewer Capacity) for each flow monitoring location

MONITORING LOCATION	FROM MH	TO MH	TOTAL DESIGN FLOW L/s	PEAK WET WEATHER FLOW (PWWF) L/s	PWWF + SUBJECT SITE FLOW L/s	THEORETICAL/ PREVIOUS PERCENT FULL %	ACTUAL PERCENT FULL %
FM01	11	12	46.29	22.20	43.02	129.67	120.50
FM02	99	100	60.35	24.42	45.24	76.93	57.66
FM03	14	15	12.68	4.99	4.99	37.10	14.60
FM04	52	56	81.63	30.14	50.96	41.74	26.06
FM05	66	77	86.81	28.62	49.44	48.12	26.43
	78	78B	89.68	—	52.31*	86.86	50.66*
FM06	7	8	43.51	15.10	35.92	95.88	79.15

Note: * Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM05, and as applied to the sewer section MH78 to 78B.

For the sanitary sewers between MH5 to MH13, the second section previously highlighted to be over capacity, upon review of the flow monitoring results and calculated capacity at the closest flow monitoring locations (FM06 and FM01) shows that the capacity (when the subject site is added to the PWWF) is still over the 80% threshold. However, it has been identified it is only the 250 mm diameter portion of this section (MH10 to MH13) that exceeds the threshold. The 300 mm diameter portion of this section now falls under the capacity threshold, based on the 79.15% capacity determined for the flow monitoring location FM06 (approximately located before MH8); please refer to Table 2. It is therefore proposed that only the sanitary sewers between MH10 to MH13 be upgraded to 300 mm diameter sanitary sewers, maintaining the existing slope. This will result in the flows (under observed peak wet weather conditions) being under 80% capacity. According to the Municipality's As-Constructed drawings for the St. Clair Road ROW (provided in Appendix A), MH10 to MH13 has an approximate total sewer length of 223.1 m. This section of sanitary sewer is also denoted with markups on the Municipal's Sanitary Sewer Collection System drawing (Sanitary Pump Sation No. 11), provided in Appendix C.

3.3 Phase 1 Sanitary Demands and Capacity Analysis

For Phase 1 of this proposed development, the downstream capacity of the existing municipal sanitary sewer collection system was assessed using the same methodology by applying the flow monitoring results as reported by Civica; please refer to Sanitary Sewer Design Sheet (Phase 1) — Flow Monitoring Conditions in Appendix C. The sanitary demand for the portion of the proposed development under Phase 1 was again calculated using a design flow of 340 L/cap/day as per Section C.1.3.2 of the PUC W&SDM. For the single 209-unit apartment building (Tower 'D') an occupancy load of 366 people (105 units at 1.5 people per unit and 104 units at 2.0 people per unit), results in an anticipated peak sanitary population of 5.82 L/s. When combined with infiltration, this results in a total peak flow of 6.77 L/s. Based on the flow monitoring locations, and the extrapolated flows beyond the flow monitoring locations, all sanitary sewer sections of concern (identified when considering the entire proposed development) have sufficient capacity to accommodate the development of Tower 'D'. It is noted that, at the flow monitoring location FM01, the calculated capacity is 81.1%. However, this capacity is determined through the use of a conservative design flow for the proposed site, and actual demands (per flow monitoring of current domestic demands of Chatham-Kent) suggest capacity would fall under 80%.

3.3 Sanitary Servicing Conclusions

After review of the flow monitoring report prepared by Civca, for the 6 study areas (FM01 to FM06) over a 3-month period, and updating the sanitary capacity analysis to reflect the observed PWWF plus the subject site demands, an improvement in sanitary capacity was determined when considering the entire proposed development. One of the sanitary sewer sections of concern (MH78 to MH78B) has now been assessed to have sufficient capacity, while a portion of the second section of concern (MH5 to MH13), has now been assessed that only MH10 to MH13 of this section remain over 80% capacity. It is recommended that the pipes between MH10 to MH13 (223.1 m in length) are upgraded to 300 mm diameter, when further development of the site is considered. Under Phase 1 of the proposed development, sufficient sanitary capacity has been assessed, and the existing municipal sanitary sewer collection system can accommodate the expected demands from the site.

4. STORM SERVICING AND STORMWATER MANAGEMENT

The Site Servicing Plan prepared by Stantec, provided in Appendix A, shows existing storm servicing throughout the site from Phase 1A construction. There is a Storm Water Management (SWM) pond located north-west of the subject site. As shown on the Runoff Coefficient Calculations provided in Appendix F, the post-development runoff coefficient is 0.67 for the proposed development which is less than the pre-development runoff coefficient of 0.84, therefore no additional Stormwater Management quantity controls are required. Due to the decrease in the runoff coefficient, the existing SWM pond facility is sufficient to convey stormwater flows. Onsite flows will outlet to the stormwater management pond (designed by others) that discharges to the municipal drain adjacent to the site. The 250-year storm event will be safely conveyed overland generally matching the existing conditions of the site.

Stormwater Management quality controls demonstrating compliance with the SWM criteria and environmental targets identified will be addressed to the standards of the MECP (quality control of 80% TSS removal) at the time of detailed design.

5. SUMMARY

Based on the above, the Municipality's existing water distribution has sufficient capacity to accommodate the proposed development. Storm flows are to be directed to the SWM pond (designed by Stantec) through underground storm sewer system. Sizing and calculations to be provided at the time of detailed design.

Based on the sanitary capacity review analyzing sanitary sewers up to MH78B, it appears that the section of pipes from MH10 to MH13 are over 80% capacity when considering the entire proposed development. There is sufficient capacity to accommodate Phase 1, however, it is recommended that the pipes between MH10 to MH13 are upgraded to 300 mm diameter to meet capacity requirements when further site development is considered.

6. LIMITATIONS

This Study was prepared by SBM for York Developments, and the Municipality of Chatham-Kent. Use of this Study by any third party, or any reliance upon its findings, is solely the responsibility of that party. SBM accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions undertaken as a result of this Study. Third party use of this Study, without the express written consent of the Consultant, denies any claims, whether in contract, tort, and/or any other cause of action in law, against the Consultant.

All findings and conclusions presented in this Study are based on site conditions as they appeared in the information presented to SBM and related to in this document. This Study is not intended to be exhaustive in scope, or to imply a risk-free development. It should be recognized that the passage of time may alter the opinions, conclusions, and recommendations provided herein, as well as any changes in the layout of the development.

The design was limited to the documents referenced herein and SBM accepts no responsibility for the accuracy of the information provided by others. All designs and recommendations presented in this Study are based on the information available at the time of the review.

7. CLOSURE

We trust this Study meets your satisfaction. Should you have any questions or require further information, please do not hesitate to contact us.

Respectfully submitted,

Strik, Baldinelli, Moniz Ltd.

Planning • Civil • Structural • Mechanical • Electrical

Louis Pinsonneault, P.Eng
Civil Project Lead, Eng II

Jacob Jamnicky, EIT
Civil Engineering Trainee I

List of Appendices

Appendix A:
Site Plan by Patrick David Trottier Architect dated October 10, 2023
Municipality of Chatham-Kent as constructed drawing 98503 dated May 30th, 1998
Municipality of Chatham-Kent as constructed drawing 02111 (Drawing No. 3) dated June 30th, 2004
Municipality of Chatham-Kent as constructed drawing 02111 (Drawing No. 4) dated June 30th, 2004
Municipality of Chatham-Kent as constructed drawing 5842 dated February 18th, 1986
Municipality of Chatham-Kent as constructed drawing 5840 dated February 18th, 1986
Stantec Servicing File No. 161401102 (drawing nos. 3 and 4) dated February 28, 2011
Sanitary Sewer Design Sheet by Todgham & Case Associates dated November 2003

Appendix B:
Domestic Water Demand, and Velocity Calculations by SBM
Fire-Flow NFPA#13 Calculations by SBM
Relevant NFPA Information
Hydrant Flow Test by Northern Sprinkler Design dated January 05, 2024

Appendix C:
Sanitary Sewer Design Sheet with Flow Monitoring Results
Sanitary Sewer Design Sheet (Phase 1) with Flow Monitoring Results
Markup of Municipal's Sanitary Sewer Collection System drawing (Sanitary Pump Sation No. 11

Appendix D:
Flow Monitoring Report prepared by Civica dated February 18, 2025

Appendix E:
Runoff Coefficient Calculations by SBM

APPENDIX A

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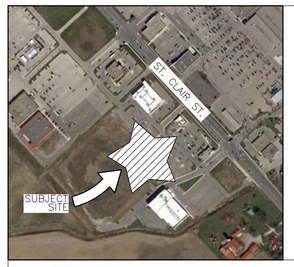


KEY PLAN

LIST OF DRAWINGS

SHEET SP1	SITE PLAN & ZONING CHART
SHEET SP2	DETAILS

REFERENCE DOCUMENTS:

1. LEGAL INFO OBTAINED PLAN OF SUBDIVISION PROVIDED BY STANTEC GEOMATICS LTD., DWGS DATED FEB. 16, 2022

ZONING DATA CHART

GROSS LOT AREA: 37,782.0m² BUILDING AREA: 6,755.6m²

ASPHALT: 14,736.7m² LANDSCAPE AREA: 16,289.6m²

No.	ITEM	REQUIRED	PROPOSED
1	ZONES	UC(PC)-1189	
2	LOT AREA (m² MIN.)	N/A	37,782.0m²
3	LOT FRONTAGE (m MIN.)	N/A	36.0
4	FRONT YARD SETBACK	7.62m	38.68
5	EXTERIOR SIDE YARD SETBACK	15.24m	N/A
6	INTERIOR SIDE YARD SETBACK	30.48m	7.33m*
7	REAR YARD SETBACK	N/A	20.54
8	LOT COVERAGE (MAX. %)	50	17.9
9	HEIGHT (MAXIMUM)	7.92m	48.0m*

*ZONING DEFICIENCY

PARKING DATA CHART

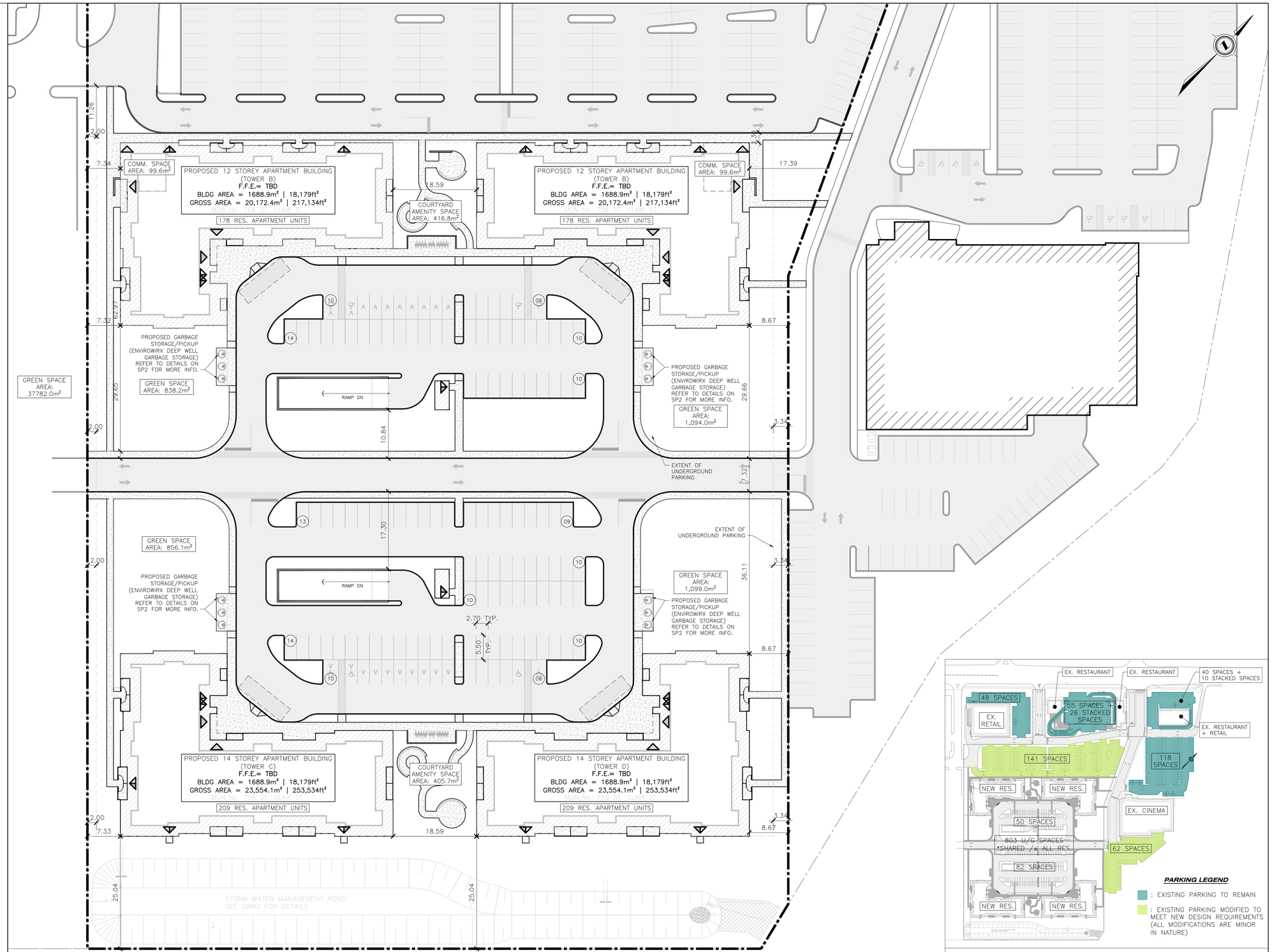
OFF-STREET VEHICLE PARKING

No.	ITEM	REQUIREMENT	REQUIRED	PROPOSED
1	RESIDENTIAL	1.25 SPACES/UNIT (774 UNITS)	968 SPACES	1076 SPACES
2	B.F. PARKING	11+1% OF TOTAL REQUIRED PARKING (1435 SPACES)	26 SPACES	36 SPACES (18 TYPE A, 18 TYPE B)
3	TOTAL	SEE ABOVE	968 SPACES	1076 SPACES

*NUMBER OF PARKING SPACES PROVIDED ARE 108 SPACES OVER THE MINIMUM REQUIRED FOR RESIDENTIAL & INCLUDED TO PROVIDE NEIGHBORING SITES WITH THE ADEQUATE PARKING REQUIRED.

LEGEND

SYMBOL:	DESCRIPTION:
△	PRINCIPAL BARRIER FREE ENTRANCE & FIRE FIGHTER ACCESS ENTRANCE
△	LOADING DOOR
◭	EMERGENCY EXIT
XX-X	PROPOSED SIGNAGE; REFER TO DETAILS FOR MORE INFO. ALL SIGNAGE TO BE ATTACHED TO ADJACENET WALL OR CURB NO SIGN SHALL IMPEDE THE SIDEWALK CLEAR WIDTHS
	PROPOSED BUILDING
	PROPOSED SNOW STORAGE
Ⓡ	PROPOSED BARRIER FREE S/W ACCESS CURB RAMP, REFER TO DETAILS FOR ADDITIONAL INFO.
	FIRE DEPARTMENT CONNECTION
	PROPOSED FIRE HYDRANT



SITE PLAN
SCALE: 1:400

PARKING KEY PLAN
SCALE: N.T.S

#	ISSUED FOR	DATE
01	ISSUED FOR CLIENT REVIEW	2023.07.24
02	ISSUED FOR CLIENT REVIEW	2023.08.31
03	ISSUED FOR CLIENT REVIEW	2023.09.19
04	ISSUED FOR SPC	2023.10.23

PROJECT:
MIXED USE DEVELOPMENT
756 ST.CLAIR ST.
CHATHAM, ON

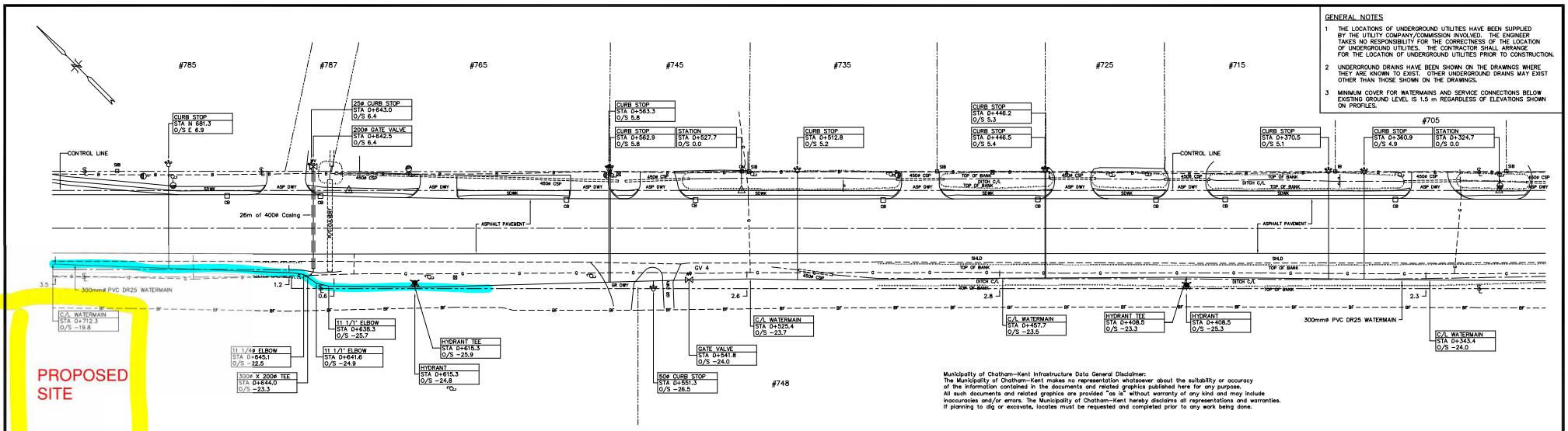
CLIENT:
*TENDER INQUIRIES CONTACT
Name: York Developements c/o
Address: 303 Richmond St. #201, London, ON
Phone: 519-433-7587
E-mail: info@yorkdev.ca

PATRICK DAVID TROTTIER ARCHITECT
266 DUFFERIN AVE, BRANTFORD, ON N3T 4S2 (226) 208-1543c patrick@pdtarch.ca

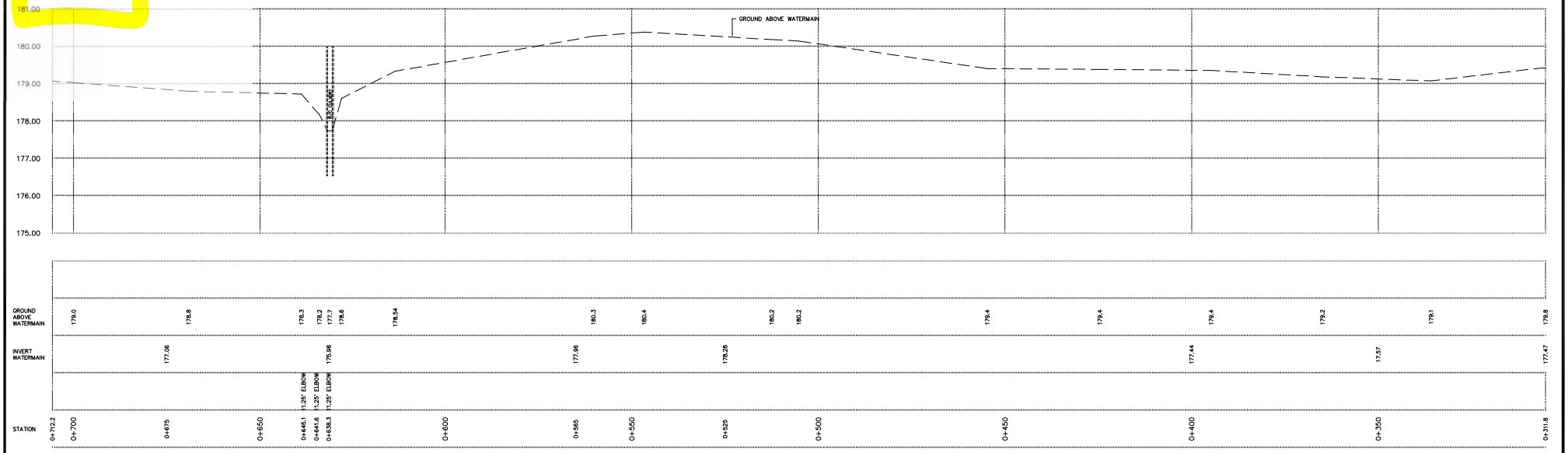
DRAWING DESCRIPTION
SITE PLAN & ZONING CHART

PROJECT #XX-XX PDTA
SRM-23-1491
SCALE: AS INDICATED
REVIEWED: PDTA
DRAWN: OMP DWG #

SP1



PLAN – ST. CLAIR STREET



PROFILE – ST. CLAIR STREET

LEGEND

STM EXISTING STORM SEWER	EXISTING HYDRANT	GV	GAS VALVE		SIGN
SAN EXISTING SANITARY SEWER	PROPOSED HYDRANT		UTILITY POLE		TREE
W EXISTING WATER MAIN	EXISTING CURB STOP		STREET LIGHT		FENCE
H EXISTING HYDRO LINE	PROPOSED CURB STOP	BS	BELL PEDESTAL		
G EXISTING GAS LINE	CB PROPOSED CATCH BASIN	DWYC	DRIVEWAY		
B EXISTING BELL LINE	CB EXISTING CATCH BASIN	SDWK	SIDEWALK		
CONTROL LINE	MH PROPOSED MANHOLE	IB	IRON BAR		
PROPERTY LINE	MH EXISTING MANHOLE	SIB	STD IRON BAR		
STREET LINE	GV PROPOSED WATER VALVE	181.25	PROPOSED ELEVATIONS		
BM BENCH MARK	WV EXISTING WATER VALVE	179.68	EXISTING ELEVATIONS		
STA STATION					

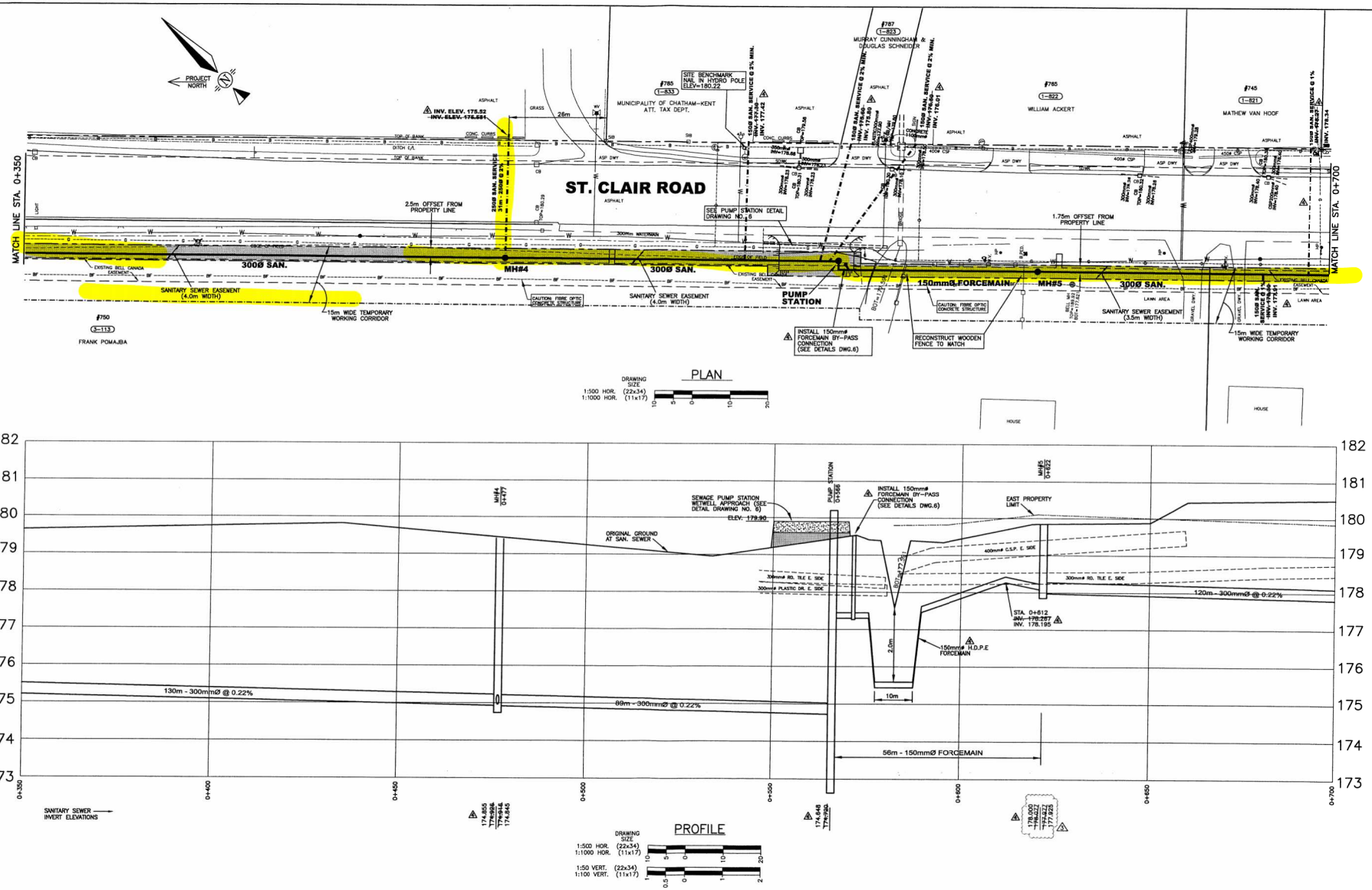
McGEORGE AND BARRY LTD.
CONSULTING ENGINEERS AND LAND SURVEYORS
55 RALEIGH STREET CHATHAM, ONTARIO N7M 2M6
PHONE (519) 354 5880 FAX (519) 354 5212

NO	REVISIONS	DATE
1	AS-CONSTRUCTED	1-Nov-98

DESIGN R.W.B.
DATE 30-May-98
SCALE HORIZ 1:500 VERT 1:50

MUNICIPALITY OF CHATHAM-KENT
SOUTHWEST WATER SYSTEM PHASE 3
PLAN AND PROFILE
ST. CLAIR STREET
STA 0+311.8 TO STA 0+712.2

FILE NO 98503
SHEET NO 2
OF 4
CAD FILE C:\WCW\SCW2AC



LEGEND:

- B — BELL CABLE
- H — UNDERGROUND HYDRO
- G — GASMAIN
- W — WATERMAIN
- STM — STORM SEWER
- SAN — SANITARY SEWER
- UTILITY POLE
- CONIFEROUS TREE
- DECIDUOUS TREE
- M.H. MANHOLE
- C.B. CATCH BASIN
- BELL PED.
- GV GAS VALVE
- I.B. S.I.B. OR I.B. (IRON BARS)
- F.H. FIRE HYDRANT
- STREET LIGHT
- #5802 911 NUMBER
- (8-027) ROLL NUMBER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE

No.	Date	Revision
4	JUNE 30/04	AS CONSTRUCTED
3	APR. 02/04	GRADE CHANGE FROM MH#5 TO MH#9
2	FEB. 06/04	ISSUED FOR TENDER
1	JAN. 16/04	ISSUED FOR APPROVAL

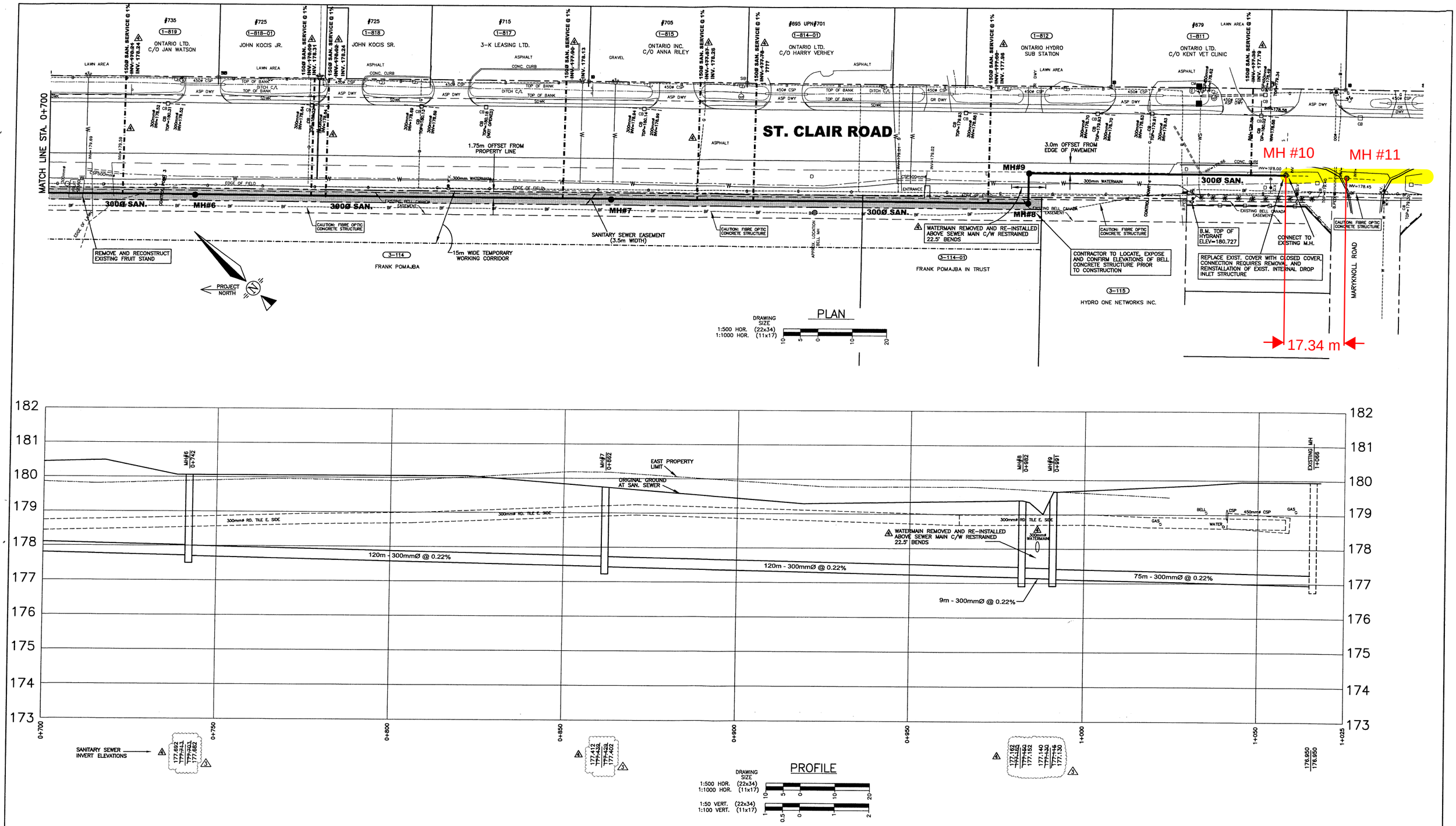
MUNICIPALITY OF CHATHAM-KENT

ST. CLAIR ROAD
SANITARY SERVICING
CONTRACT #03-141

ST. CLAIR ROAD
(STA. 0+350 TO STA. 0+700)

TODGHAM &CASE ASSOCIATES INC.
Consulting Civil Engineers
Chatham, Ontario

Scale	AS SHOWN
Date	JANUARY 2004
Drawn by	T.E./J.C.
Checked by	J.J.T.
CAD No.	02111
DRAWING No.	3 of 7



LEGEND:

- B — BELL CABLE
- H — UNDERGROUND HYDRO
- G — GASMAIN
- W — WATERMAIN
- STM — STORM SEWER
- SAN — SANITARY SEWER
- UTILITY POLE
- CONIFEROUS TREE
- DECIDUOUS TREE
- M.H. MANHOLE
- C.B. CATCH BASIN
- BELL PED.
- GV GAS VALVE
- I.B. S.I.B. OR I.B. (IRON BARS)
- F.H. FIRE HYDRANT
- STREET LIGHT
- #5802 911 NUMBER
- 6-027 ROLL NUMBER
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE

No.	Date	Revision
4	JUNE 30/04	AS CONSTRUCTED
3	APR. 02/04	GRADE CHANGE FROM MH#5 TO MH#9
2	FEB. 06/04	ISSUED FOR TENDER
1	JAN. 16/04	ISSUED FOR APPROVAL

MUNICIPALITY OF CHATHAM-KENT

ST. CLAIR ROAD
SANITARY SERVICING
CONTRACT #03-141

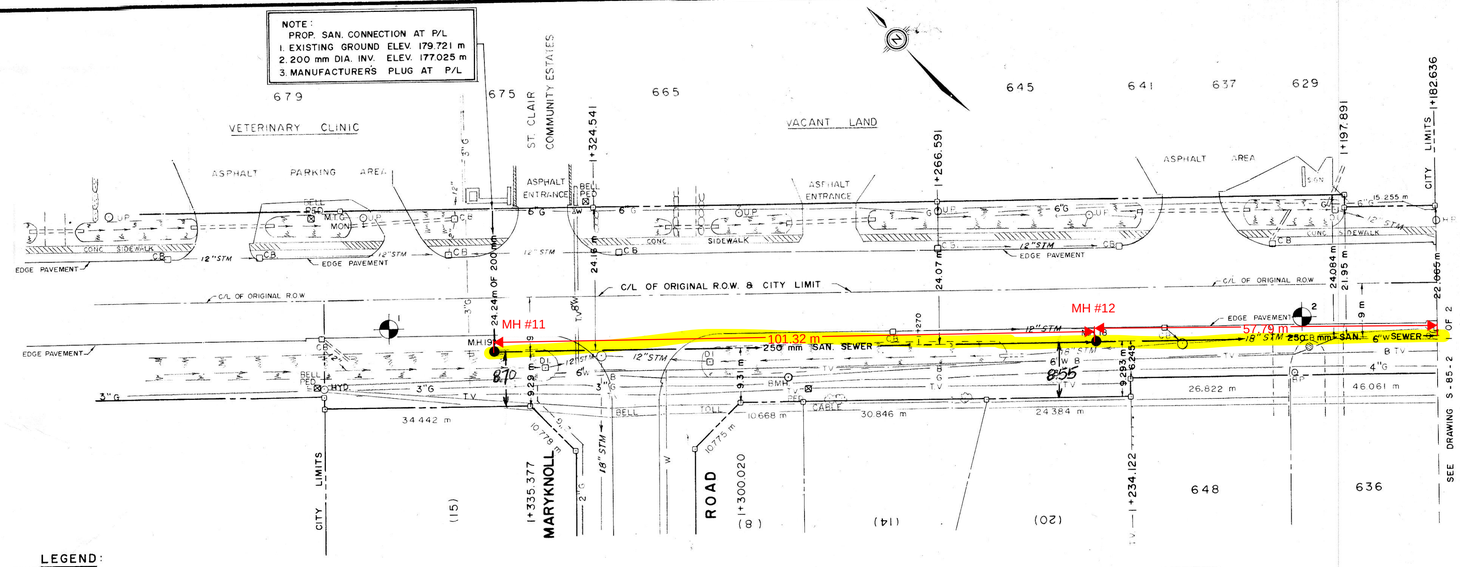
ST. CLAIR ROAD
(STA. 0+700 TO STA. 1+066)

TODGHAM &CASE ASSOCIATES INC.
Consulting Civil Engineers
Chatham, Ontario

Scale	AS SHOWN
Date	JANUARY 2004
Drawn by	T.E./J.C.
Checked by	J.J.T.
CAD No. 02111	DRAWING No. 4 of 7

CONTRACT Nº 85 - 120
JOB Nº
SHEET 10

NOTE:
PROP. SAN. CONNECTION AT P/L
1. EXISTING GROUND ELEV. 179.721 m
2. 200 mm DIA. INV. ELEV. 177.025 m
3. MANUFACTURERS PLUG AT P/L



LEGEND:

: BOREHOLE LOCATION & Nº

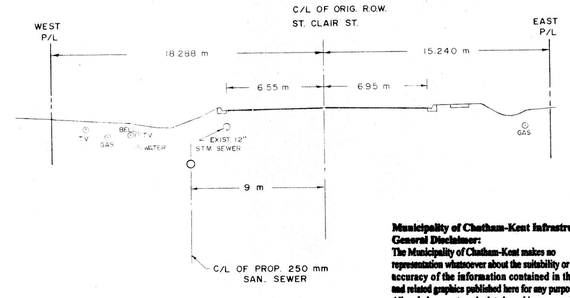
NOTE:

FOR BOREHOLE LOG RECORD
SEE SHEETS 15 & 16

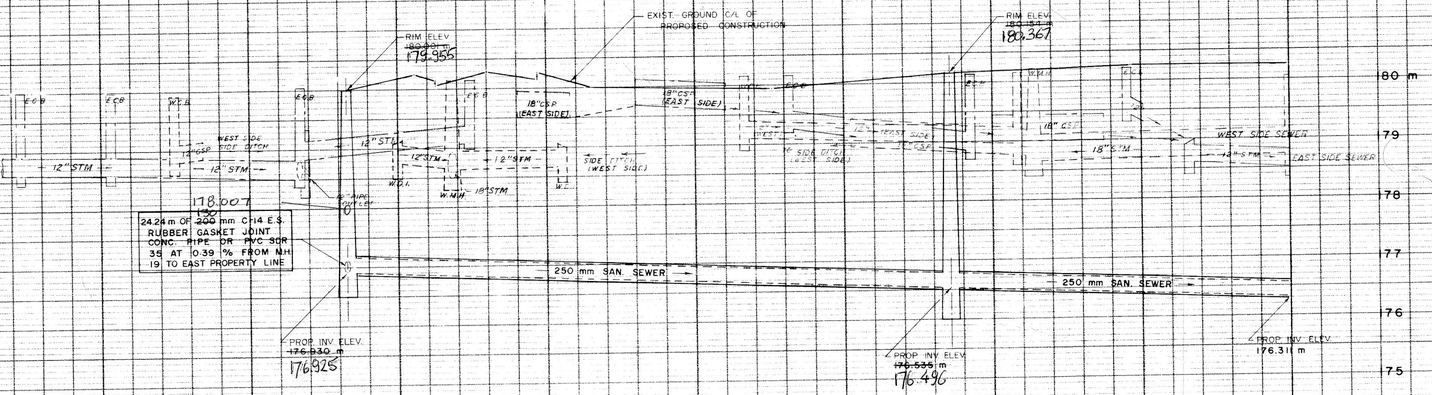
PLAN
SCALE: 1:500

NOTE:

CONTRACTOR RESPONSIBLE FOR VERIFYING UTILITY LOCATIONS FOR ESTIMATING AND CONSTRUCTION PURPOSES (INCLUDING DEPTH & SIZE)



TYPICAL CROSS SECTION AT STA. 1+270
SCALE: 1:200



99.78 m OF 250 mm C-14 E.S. RUBBER GASKET JOINT CONCRETE PIPE OR PVC SDR 35 AT 0.43 %

R421 m AT 0.36 %

PROFILE
HOR. 1:500
SCALE:
VER. 1:50

BENCHMARKS:

TOP OF HYDRANT AT HOUSE Nº 628 ST. CLAIR STREET
ELEVATION (181.017 m)

TOP OF HYDRANT WEST SIDE OF ST. CLAIR STREET AT NORTH CITY LIMITS
ELEVATION 180.108 m

Municipality of Chatham-Kent Infrastructure Data General Disclaimer:
The Municipality of Chatham-Kent makes no representation whatsoever about the suitability or accuracy of the information contained in the documents and related graphics published here for any purpose. All such documents and related graphics are provided "as is" without warranty of any kind and may include inaccuracies and/or errors. The Municipality of Chatham-Kent hereby disclaims all representations and warranties. If planning to dig or excavate, locates must be requested and completed prior to any work being done.

REVISION Nº	DATE
1	FEB. 18, 198

5842

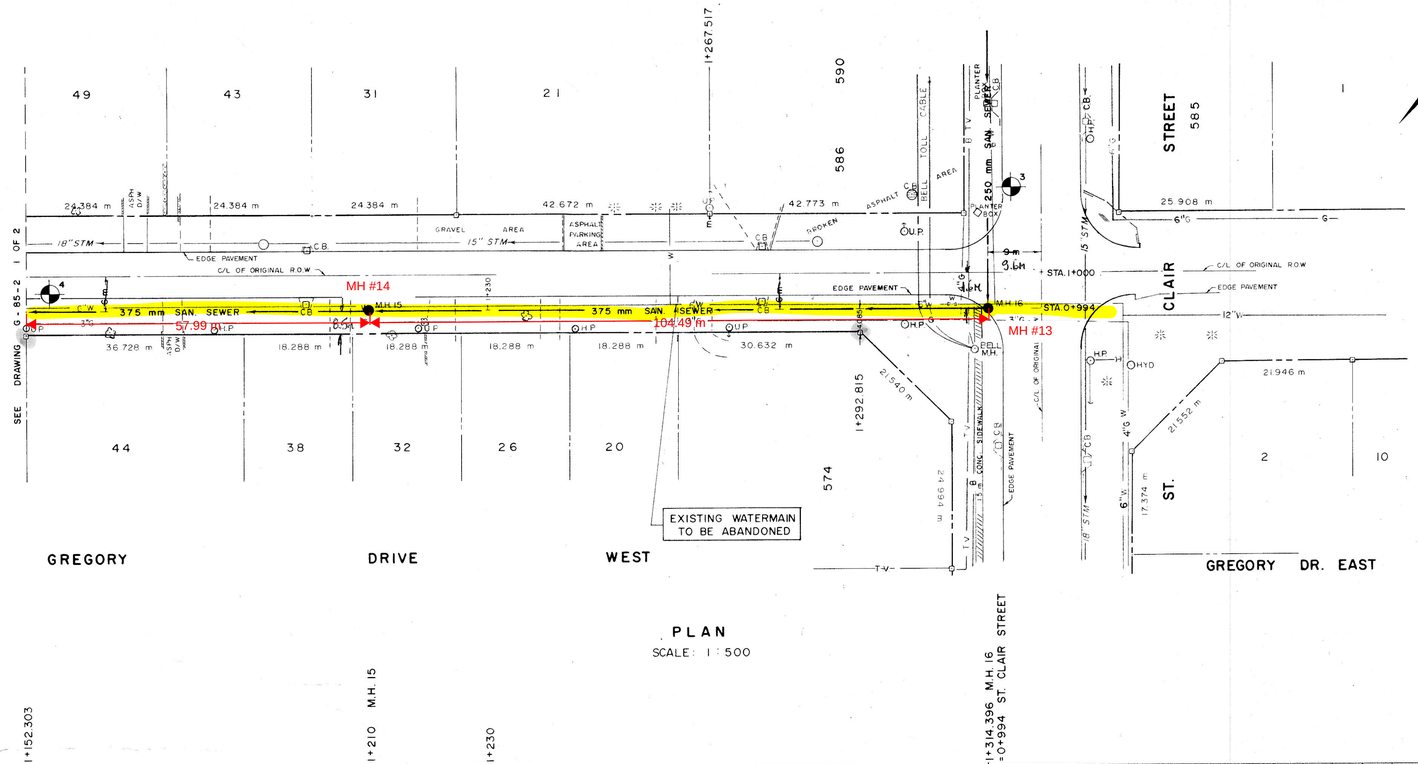
CITY OF CHATHAM, ONT.
OFFICE OF THE CITY ENGINEER

ST. CLAIR STREET
SANDYS - ST. CLAIR TRUNK SANITARY SEWER

DATE: NOVEMBER 4, 1985
SCALE: AS SHOWN
DRAWN BY: S. S. YANG
CHKD. BY:

S-85-2
2 OF 2

CONTRACT Nº	85 - 120
JOB Nº	
SHEET	8

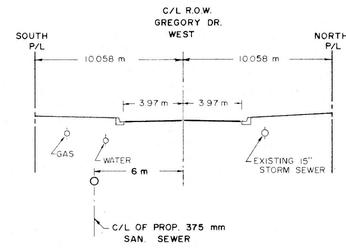


PLAN

SCALE: 1:500

NOTE:

CONTRACTOR RESPONSIBLE FOR VERIFYING UTILITY LOCATIONS FOR ESTIMATING AND CONSTRUCTION PURPOSES (INCLUDING DEPTH & SIZE)



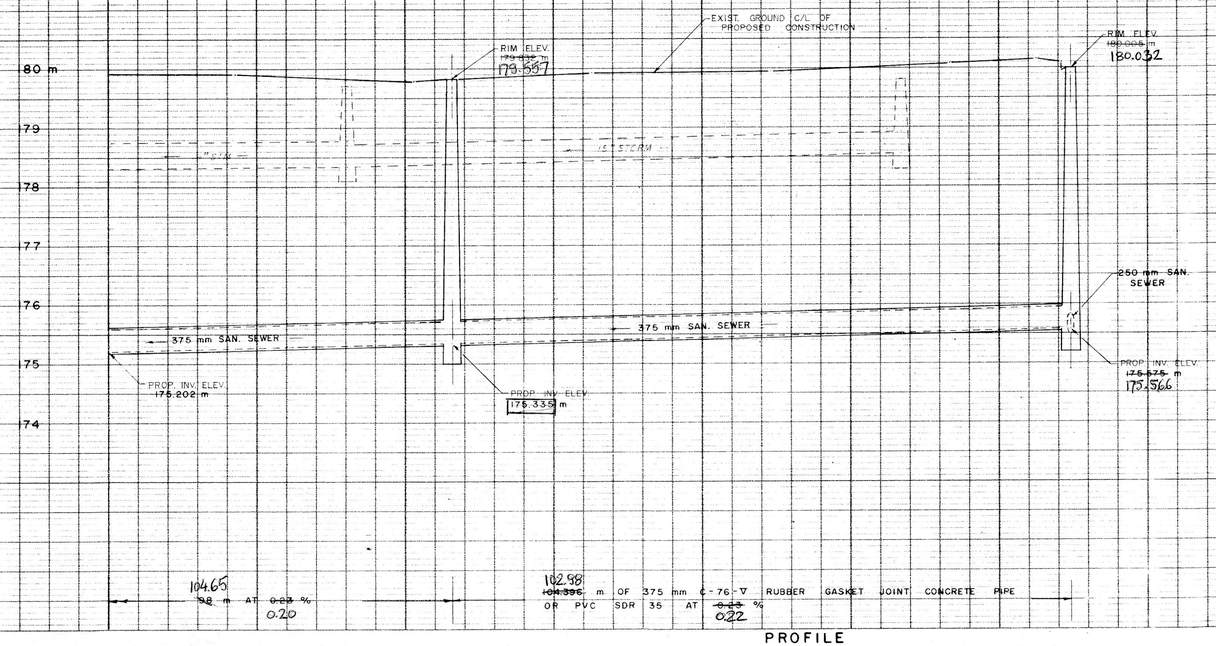
TYPICAL CROSS SECTION AT STA. 1+230 SCALE: 1:200

LEGEND:

4 : BOREHOLE LOCATION & Nº

NOTE:

FOR BOREHOLE LOG RECORD SEE SHEETS 15 & 16



PROFILE

SCALE: HOR. 1:500
VER. 1:50

BENCHMARKS:

TOP OF HYDRANT AT MARIE STREET AND GREGORY DRIVE WEST ELEVATION 180.567 m

SPIKE IN U.P. AT HOUSE Nº 44 GREGORY DRIVE WEST ELEVATION 180.432 m

TOP OF HYDRANT AT ST. CLAIR STREET AND GREGORY DRIVE WEST ELEVATION 181.007 m

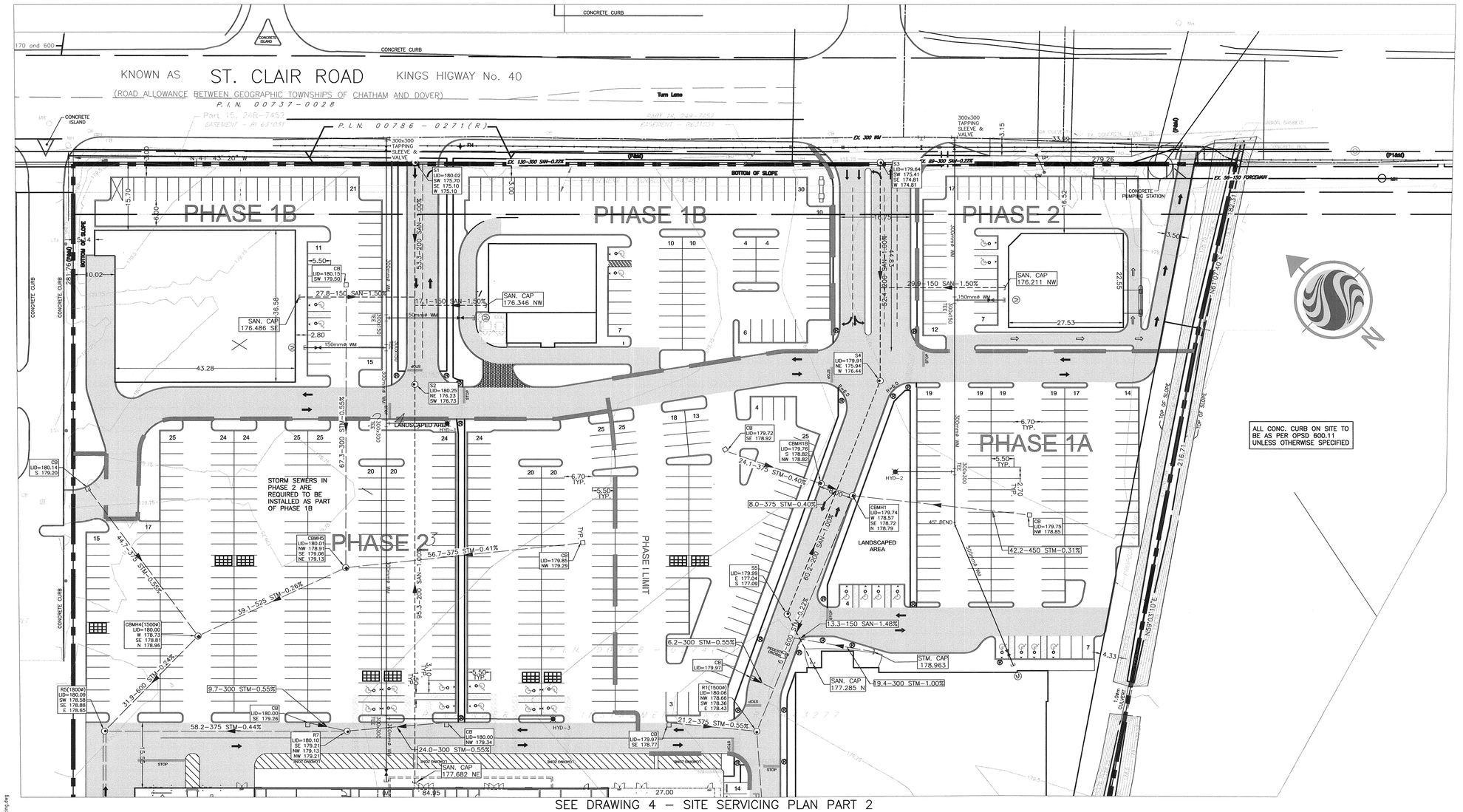
REVISION Nº	DATE
1	FEB. 18, 1986

5840

CITY OF CHATHAM, ONT.
OFFICE OF THE CITY ENGINEER

GREGORY DRIVE WEST
SANDYS - ST. CLAIR TRUNK SANITARY SEWER

DATE: NOVEMBER 4, 1985	G-85-2
SCALE: AS SHOWN	
DRAWN BY: S. S. YANG	2 OF 2
CHKD. BY:	



WATERMAINS

1. WATERMAIN SHALL BE POLYVINYL CHLORIDE (PVC) CLASS 150 DR-18 PIPE MANUFACTURED TO AWWA C900-89 AND CSA CAN3 B137.3-M1986 WITH GASKETED BELL END C/W #14 AWG SOLID COPPER TRACER WIRE.
2. ALL WATERMAIN BEDDING AND TRENCH DETAIL SHALL BE AS PER LOCAL MUNICIPAL, REGIONAL, OR PROVINCIAL STANDARDS, UNLESS SHOWN OTHERWISE.
3. ALL WATERMAINS SHALL HAVE MIN. COVER OF 1.80m. WATERMAINS ARE TO BE INSTALLED TO THE ELEVATIONS SHOWN ON THE APPROVED SITE SERVICING DRAWING. WHERE SPECIFIC WATERMAIN ELEVATIONS ARE NOT SHOWN ON SERVICING DRAWING, A MINIMUM COVER OF 1.80m FROM PROPOSED GRADES, AS SHOWN ON THE GRADING PLAN, MUST BE MAINTAINED AT ALL TIMES. IN PREGRADE AREAS COVER TO BE FROM PREGRADED ELEVATIONS.
4. ALL WATERMAIN HORIZONTAL AND VERTICAL BENDS, JOINTS AND PLUGS TO BE MECHANICALLY RESTRAINED. THRUST BLOCKS/MECHANICAL RESTRAINERS MUST BE INSTALLED ON ALL WATERMAIN BENDS, TEES, AND PLUGS AS PER LOCAL MUNICIPAL STANDARDS.
5. ALL FIRE HYDRANT INSTALLATIONS SHALL BE AS PER W-CS-1 STANDARDS. HYDRANTS SHALL BE CANADA VALVE, DARLING CENTURY WITH A THREE WAY STORY PUMPER NOZZLE AND PAINTED IN ACCORDANCE WITH LOCAL STANDARDS.
6. CONTRACTOR SHALL ORIENT HYDRANT AS DIRECTED BY THE LOCAL FIRE DEPARTMENT. CONTRACTOR TO CONTACT LOCAL FIRE DEPARTMENT AND OBTAIN WRITTEN DIRECTION AS TO THE REQUIRED ORIENTATION AND SPECIFICATIONS FOR FIRE HYDRANTS AND PROVIDE DOCUMENTATION PRIOR TO REQUESTING CERTIFICATION OF SUBSTANTIAL COMPLETION.
7. ALL HYDRANT FLANGE ELEVATIONS TO BE INSTALLED 75mm ABOVE PROPOSED FINISHED GRADE AT HYDRANT.
8. BUILDING SERVICE VALVES TO BE 3.0m OFF THE FACE OF THE BUILDING UNLESS OTHERWISE NOTED AND MUST BE RESTRAINED A MINIMUM OF 12.0m BACK FROM STUB.
9. WATERMAINS MUST COMPLY WITH MINIMUM HORIZONTAL AND VERTICAL CLEARANCES IN ACCORDANCE WITH LOCAL PROVINCIAL GUIDELINES AND THE APPLICABLE BUILDING AND PLUMBING CODE. WHERE HORIZONTAL SEPARATIONS CANNOT BE ACHIEVED, APPROVAL FROM THE ENGINEER MUST BE OBTAINED AND A MINIMUM 500mm VERTICAL SEPARATION MUST BE MAINTAINED.
10. ALL WATERMAINS SHALL BE HYDROSTATICALLY TESTED IN ACCORDANCE WITH LOCAL MUNICIPAL AND PROVINCIAL GUIDELINES UNLESS OTHERWISE DIRECTED. PROVISIONS FOR FLUSHING WATER LINE PRIOR TO TESTING, ETC. MUST BE PROVIDED.
11. ALL WATERMAINS SHALL BE BACTERIALOGICALLY TESTED IN ACCORDANCE WITH LOCAL MUNICIPAL AND PROVINCIAL GUIDELINES. ALL CHLORINATED WATER TO BE DISCHARGED AND PRETREATED TO ACCEPTABLE LEVELS PRIOR TO DISCHARGE. ALL DISCHARGED WATER MUST BE CONTROLLED AND TREATED SO AS NOT TO ADVERSELY EFFECT THE ENVIRONMENT. THE LOCAL MUNICIPALITY MAY HAVE SPECIFIC REQUIREMENTS TO BE COMPLIED WITH. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL MUNICIPAL AND/OR PROVINCIAL REQUIREMENTS ARE FOLLOWED.
12. ALL WATERMAIN STUBS SHALL BE TERMINATED WITH A PLUG AND 50mm BLOW OFF UNLESS OTHERWISE NOTED.
13. ALL DUCTILE IRON FITTINGS SHALL BE CATHODICALLY PROTECTED WITH A 5.4kg MAGNESIUM ANODE.
14. ALL WATER WORKS SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF LONDON ENVIRONMENTAL ENGINEERING SERVICE DEPARTMENT.

STORM AND SANITARY SEWERS

1. ALL MANHOLES TO BE AS PER OPSD 701.01, 701.011, 701.012, OR 701.013 WITH FRAME AND COVER AS PER 400.01, UNLESS OTHERWISE SPECIFIED. SAFETY PLATFORM TO BE INSTALLED IN ALL MANHOLES WHERE DEPTH EXCEEDS 5.0m.
2. ALL CATCH BASINS TO BE PRECAST AS PER OPSD 705.010 WITH FRAME AND GRATE AS PER DETAIL PSOC-CB-01 ON THIS DRAWING. ALL ACCESS ROAD AND TEMPORARY CATHCBASIN FRAME AND GRATES SHALL BE AS PER OPSD 400.10.
3. CONCRETE PIPE SEWER BEDDING SHALL BE AS PER CITY OF LONDON STANDARDS, PVC OR RIBBED PIPE SEWER BEDDING SHALL BE AS PER CITY OF LONDON STANDARDS TO TOP OF SEWER. NATIVE BACKFILL TO BE COMPACTED TO A MIN. 98% STANDARD PROCTOR DENSITY, WITH A MINIMUM 300mm SAND COVER OVER PIPE.
4. ALL STORM SEWER PIPES UP TO 450mm DIA. SHALL BE PVC SDR-35 OR APPROVED EQUIVALENT. ALL STORM SEWER PIPES 525mm DIA. AND LARGER SHALL BE CONCRETE AND EQUAL TO C.S.A. SPECIFICATIONS A257.2 REINFORCED CLASSES AS SPECIFIED 65-D OR LATEST AMENDMENT UNLESS OTHERWISE SPECIFIED.
5. ALL SANITARY PVC SEWER PIPES SHALL BE SDR-35 EQUAL CSA SPECIFICATIONS B182.2-M1990 OR LATEST AMENDMENT UNLESS OTHERWISE NOTED.
6. ALL MANHOLE AND CATCH BASIN EXCAVATIONS TO BE BACKFILLED WITH GRANULAR MATERIAL COMPACTED TO 98% STANDARD PROCTOR DENSITY.
7. STORM MANHOLES SHALL BE BENCHED TO SPRING LINE UNLESS OTHERWISE SPECIFIED. SANITARY MANHOLES SHALL BE BENCHED TO OBVERT. MINIMUM WIDTH OF BENCHING TO BE 230mm OR AS SPECIFIED ON DRAWINGS.
8. "MODULOC" OR APPROVED PRE-CAST MANHOLE AND CATCH BASIN ADJUSTERS TO BE USED IN LIEU OF BRICKING. PARGE ADJUSTING UNITS ON THE OUTSIDE ONLY.
9. FOR CONSTRUCTION DETAILS NOT SHOWN ON PLANS, REFERENCE SHALL BE MADE TO THE LOCAL PROVINCIAL STANDARDS DRAWINGS AND MUNICIPAL STANDARDS.

   SERVICES TO BUILDINGS TO BE TERMINATED 1.5m FROM THE OUTSIDE FACE OF BUILDING, UNLESS OTHERWISE NOTED.

   ALL SINGLE CATCH BASIN LEADS TO BE 200mmø PVC. SDR-35 OR APPROVED EQUIVALENT UNLESS OTHERWISE SPECIFIED. ALL DOUBLE CATCH BASIN LEADS TO BE 250mmø PVC. SDR-35 OR APPROVED EQUIVALENT UNLESS OTHERWISE SPECIFIED.
12. ALL CB LEAD INVERTS TO BE 1.5m BELOW FINISHED GRADE UNLESS OTHERWISE SPECIFIED.
13. THE CONTRACTOR IS TO PROVIDE CCTV CAMERA INSPECTIONS OF ALL SANITARY AND STORM SEWERS, INCLUDING PICTORIAL REPORT, ONE (1) CD COPY AND TWO (2) VIDEO TAPES IN A FORMAT SATISFACTORY TO THE ENGINEER. ALL SEWERS ARE TO BE FLUSHED PRIOR TO CAMERA INSPECTION.
14. LASER ALIGNMENT CONTROL TO BE UTILIZED ON ALL SEWER INSTALLATIONS.
15. WHERE THE SANITARY MANHOLES HAVE LATERALS WITH A DROP AT THE INVERT GREATER THAN 0.5m, A PRECAST DROP STRUCTURE IS TO BE INCORPORATED INTO THE MANUFACTURING OF THE MANHOLE.
16. ALL SANITARY DROPS TO BE ONE SIZE SMALLER THAN INCOMING PIPES TO A MINIMUM OF 150mmø.
17. WHERE 1.5m OF COVER IS NOT ACHIEVED OVER SEWER OR WATERMAIN, INSULATION IS REQUIRED. REFER TO CITY OF LONDON STANDARD DWG. W-CS-6B.

Stantec Consulting Ltd.
800-171 Queens Avenue
London ON Canada
N6A 5J7
Tel. 519.645.2007
Fax. 519.645.6575
www.stantec.com

Consultants

Notes

Legend

PROPOSED		EXISTING
○	STORM MANHOLE	○
◉	STORM CATCHBASIN MANHOLE	◌
□	CATCHBASIN	▥
○	SANITARY MANHOLE	○
⋈	VALVE & BOX	⋈
⊕	HYDRANT	⊕
----	STORM SEWER	----
————	SANITARY SEWER	————
————	WATERMAIN	- - - -
(S)	SUMP LOCATION	
(M)	WATER METER	

(R) DENOTES SIDEWALK RAMP AS PER MUNICIPALITY OF CHATHAM-KENT

HEAVY DUTY ASPALT AREA AS PER SITE PLAN

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
File Name: 161401102-Servicing	JBH	DWH	DWH	11.02.08
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
Feb 28/11
D.W. HEDD
100077831
PROVINCE OF ONTARIO

Client/Project

MEDD DEVELOPMENT GROUP LTD.

COMMERCIAL - ST. CLAIR AVENUE

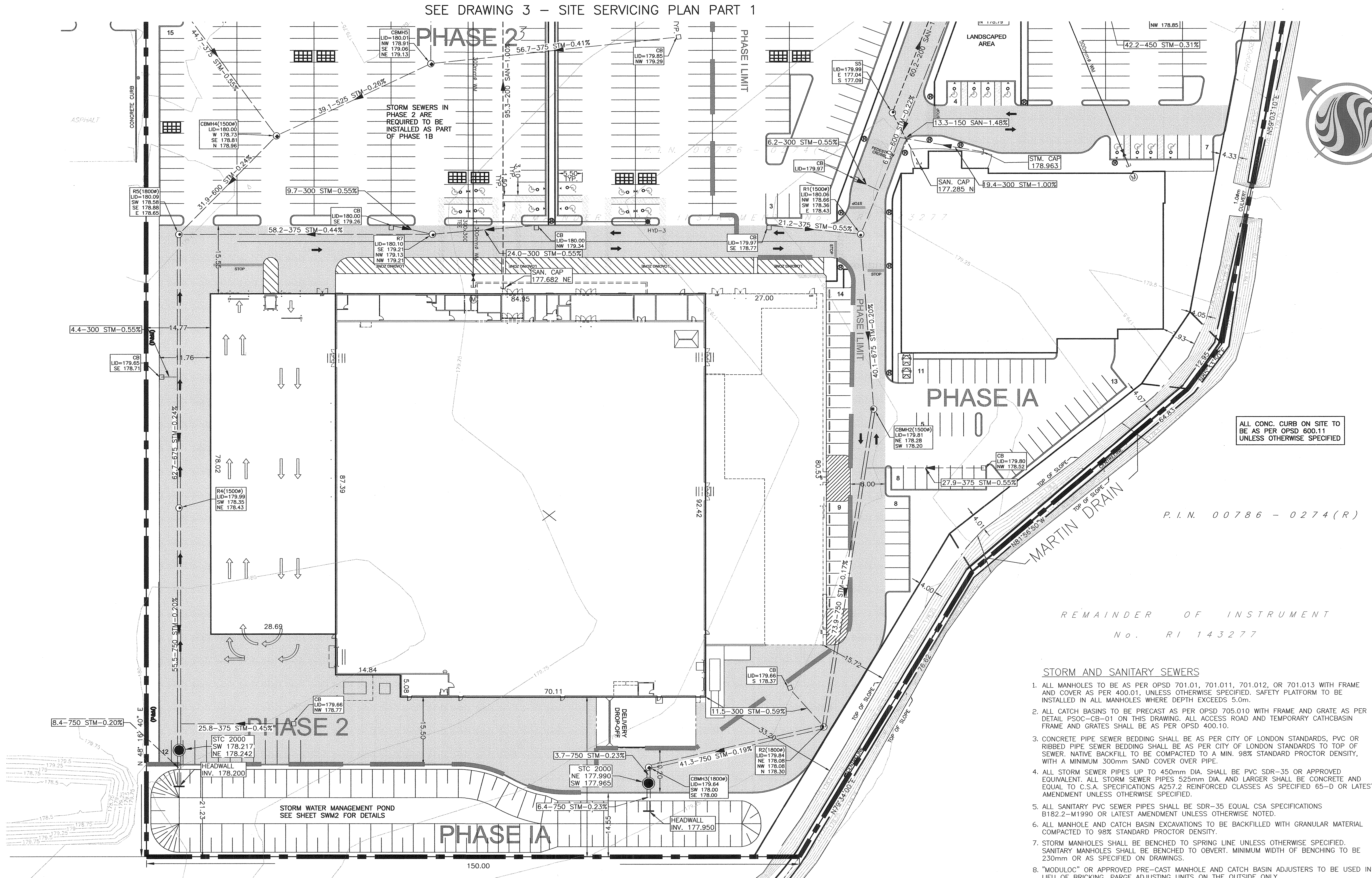
CHATHAM-KENT ON Canada

Title

SITE SERVICING PLAN

Project No.	Scale	
1614-01102	1:500	0 5 15 25m
Drawing No.	Sheet	Revision
3	3 of 4	0

ORIGINAL SHEET - ANSI D



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STORM AND SANITARY SEWERS

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2. ALL CATCH BASINS TO BE PRECAST AS PER OPSD 705.010 WITH FRAME AND GRATE AS PER DETAIL PSOC–CB–01 ON THIS DRAWING. ALL ACCESS ROAD AND TEMPORARY CATHCBASIN FRAME AND GRATES SHALL BE AS PER OPSD 400.10.
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15. WHERE THE SANITARY MANHOLES HAVE LATERALS WITH A DROP AT THE INVERT GREATER THAN 0.5m, A PRECAST DROP STRUCTURE IS TO BE INCORPORATED INTO THE MANUFACTURING OF THE MANHOLE.
16. ALL SANITARY DROPS TO BE ONE SIZE SMALLER THAN INCOMING PIPES TO A MINIMUM OF 150mmØ.
17. WHERE 1.5m OF COVER IS NOT ACHIEVED OVER SEWER OR WATERMAIN, INSULATION IS REQUIRED. REFER TO CITY OF LONDON STANDARD DWG. W–CS–68.

Stantec Consulting Ltd.
800–171 Queens Avenue
London ON Canada
N6A 5J7
Tel. 519.645.2007
Fax. 519.645.6575
www.stantec.com

Consultants

Notes

Legend

PROPOSED		EXISTING
○	STORM MANHOLE	○
◙	STORM CATCHBASIN MANHOLE	○
□	CATCHBASIN	▥
○	SANITARY MANHOLE	○
⋈	VALVE & BOX	⋈
⌖	HYDRANT	⌖
– – –◄– – –	STORM SEWER	———◄———
———◄———	SANITARY SEWER	———◄———
———	WATERMAIN	– – – – –
Ⓢ—— ——	SUMP LOCATION	
Ⓜ———	WATER METER	

® DENOTES SIDEWALK RAMP AS PER MUNICIPALITY OF CHATHAM–KENT

HEAVY DUTY ASPALT AREA AS PER SITE PLAN

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: 161401102–Servicing	JBH	DWH	DWH	11.02.08
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

LICENSED PROFESSIONAL ENGINEER
Feb 28/11
D.W. HERN
100077071
PROVINCE OF ONTARIO

Client/Project

MEDD DEVELOPMENT GROUP LTD.

COMMERCIAL - ST. CLAIR AVENUE

CHATHAM-KENT ON Canada

Title

SITE SERVICING PLAN PART 2

Project No.	Scale	
1614-01102	1:500 (0 5 15 25m)	
Drawing No.	**Sheet**	**Revision**
4	4 of 4	0

SANITARY SEWER DESIGN SHEET - Municipality of Chatham-Kent, Ontario

PROJECT TITLE: St. Clair Road Sanitary Servicing
PROJECT No:
DESCRIPTION:

DESIGNED: J.J. Trudell, P. Eng
CHECKED: J.J Trudell, P.Eng
DATE: November, 2009

COMMERCIAL AVG DAILY FLOW (L/ha / day) = 17,775
INFILTRATION RATE (L / hectare / day) = 8,600
INFILTRATION RATE (L / hectare / s) = 0.099
PEAKING FACTOR 3

Project: Charing Cross
Project No.: Nombur
Date: Nov, 2009
Dsgnd: Jams
Chkd: Trudell

LOCATION			INDIVIDUAL		CUMULATIVE		PEAKING	DESIGN FLOWS			PROPOSED SANITARY SEWER									MANHOLE INVERT	
STREET NAME	FROM MH	TO MH	Comm.Daily Flow	AREA (HECTARES)	Comm.Daily Flow	AREA (HECTARES)	FACTOR (Fp)	Peak Comm. Qp (L/s)	INFIL. Qp (L/s)	PEAK Qd (L/s)	LENGTH (m)	PIPE SIZE (mm)	PIPE MATERIAL	MANNING'S ROUGHNESS	SLOPE (%)	HYDR. RADIUS (mm)	AREA (mm^2)	CAPACITY (L/s)	VELOCITY (m/s)	LOWER END	UPPER END
St. Clair Road	1	PS	568,800	32.00	568,800	32.00	3.00	19.75	3.15	**22.90**	500	300	PVC SDR35	0.013	0.22	75	70686	**45.36**	0.64	**0.000**	**0.000**
St. Clair Road	5	Ex	231,075	13.00	799,875	45.00	3.00	27.77	4.43	**32.20**	445	300	PVC SDR35	0.013	0.22	75	70686	**45.36**	0.64	**0.000**	**0.000**

Todgham & Case Associates Inc.
Consulting Civil Engineers
131 Heritage Road Chatham, Ontario

APPENDIX "H"

MINISTRY OF THE ENVIRONMENT

ENVIRONMENTAL APPROVALS

AND

PROJECT ENGINEERING BRANCH

SEWAGE PUMPING STATION DESIGN - TABLE I

MUNICIPALITY Chatham-Kent PROJECT No. 02111

PUMPING STATION No. OR NAME : St. Clair Road

DESIGNED BY J. Trudell DATE November, 2003

DESIGN SUBJECT	UNIT	INITIAL PERIOD	10 YEARS PERIOD	20 YEARS PERIOD	ULTIMATE PERIOD
TRIBUTARY AREA A) RESIDENTIAL XX COMMERCIAL C) INDUSTRIAL	ha	26	45	45	45
POPULATION DENSITY	PERS/ha	49	49	49	49
POPULATION OR EQUIVALENT A) RESIDENTIAL XX COMMERCIAL C) INDUSTRIAL	NO.	1274	2205	2205	2205
PER CAPITA FLOW	L/cap.d	360	360	360	360
AVERAGE FLOW	L/s	5.3	9.2	9.2	9.2
PEAK FLOW FACTOR	$1 + \frac{14}{4+\sqrt{P}}$	3	3	3	3
PEAK DOMESTIC FLOW	L/s	15.9	27.6	27.6	27.6
INFILTRATION RATE	L/ha.s	0.10	0.10	0.10	0.10
INFILTRATION	L/s	2.60	4.50	4.50	4.50
DESIGN PEAK FLOW	L/s	18.5	32.10	32.10	32.10
PUMPS	NO.	2	2	2	2
PUMP DISCHARGE	L/s	25	25	25	25
FORCE MAIN DIAM.	NPS	150 mm	150 mm	150 mm	150 mm
VELOCITY	m/s	1.4	1.4	1.4	1.4

MINISTRY OF THE ENVIRONMENT

ENVIRONMENTAL APPROVALS

AND

PROJECT ENGINEERING BRANCH

SEWAGE PUMPING STATION DESIGN - TABLE II

MUNICIPALITY Chatham-Kent PROJECT No. 02111

PUMPING STATION No. OR NAME : St. Clair Road

DESIGNED BY J. Trudell DATE November, 2003

	FLOW L/s	F. MAIN DIAM	VEL. m/s	H.L. m/ 100m	DIST. m	H.L. m	FITT. H.L.m	P.S. H.L.m	TOT. H.L.m	L.W.L. W/WELL	H.W.L. W/WELL	F.MAIN END EL.	STATIC HEAD MAX.	STATIC HEAD MIN.	TOT.DYN HEAD MAX.	TOT.DYN HEAD MIN.
C = 120	25	150	1.4	1.7	56	0.94	0.3	0.5	1.74	173.52	175.00	178.27	4.75	3.27	6.49	5.01
C = 140	25	150	1.4	1.25	56	0.70	0.3	0.5	1.50	173.52	175.00	178.27	4.75	3.27	6.25	4.77

PERFORMANCE CURVE

PRODUCT	NP3102.090
TYPE	MT
CURVE NO	63-465-00-3730
ISSUE	1
DATE	2002-12-05
PROJECT	St Clair Sreet North P.S. / Chat

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS PHI	0.87	0.83	0.75
MOTOR EFFICIENCY	82.0 %	82.5 %	80.5 %
GEAR EFFICIENCY	---	---	---

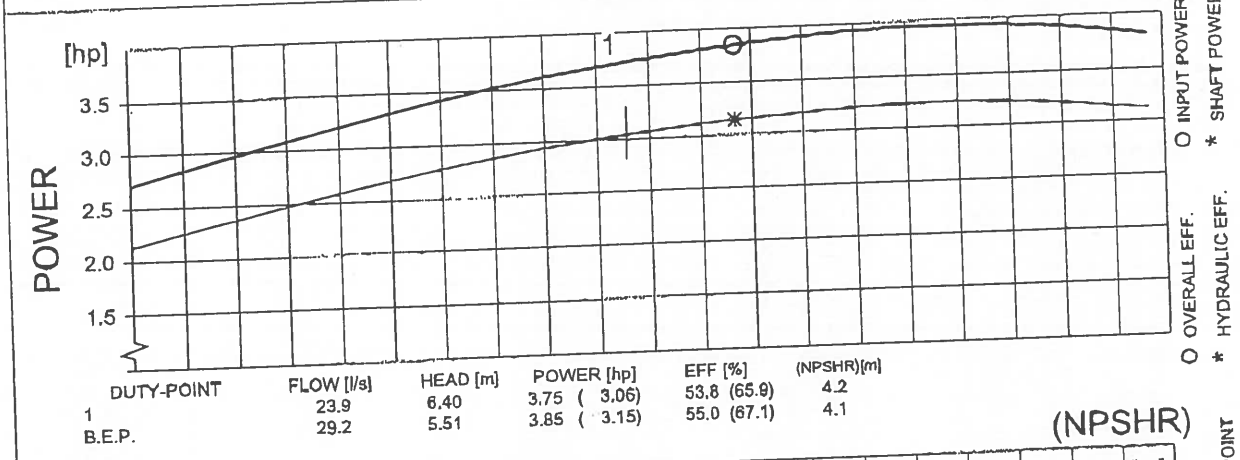
MOTOR SHAFT POWER	5	hp
STARTING CURRENT ...	31	A
RATED CURRENT ...	5.0	A
RATED SPEED	1730	rpm
TOT.MOM.OF INERTIA ...	0.027	kgm2
NO. OF BLADES	2	

IMPELLER DIAMETER	152 mm
MOTORTYPE	18-11-4AL
STATOR	52D
REV	10
FREQ.	60 Hz
PHASES	3
VOLTAGE	600 V
POLES	4
GEARTYPE	---
RATIO	---

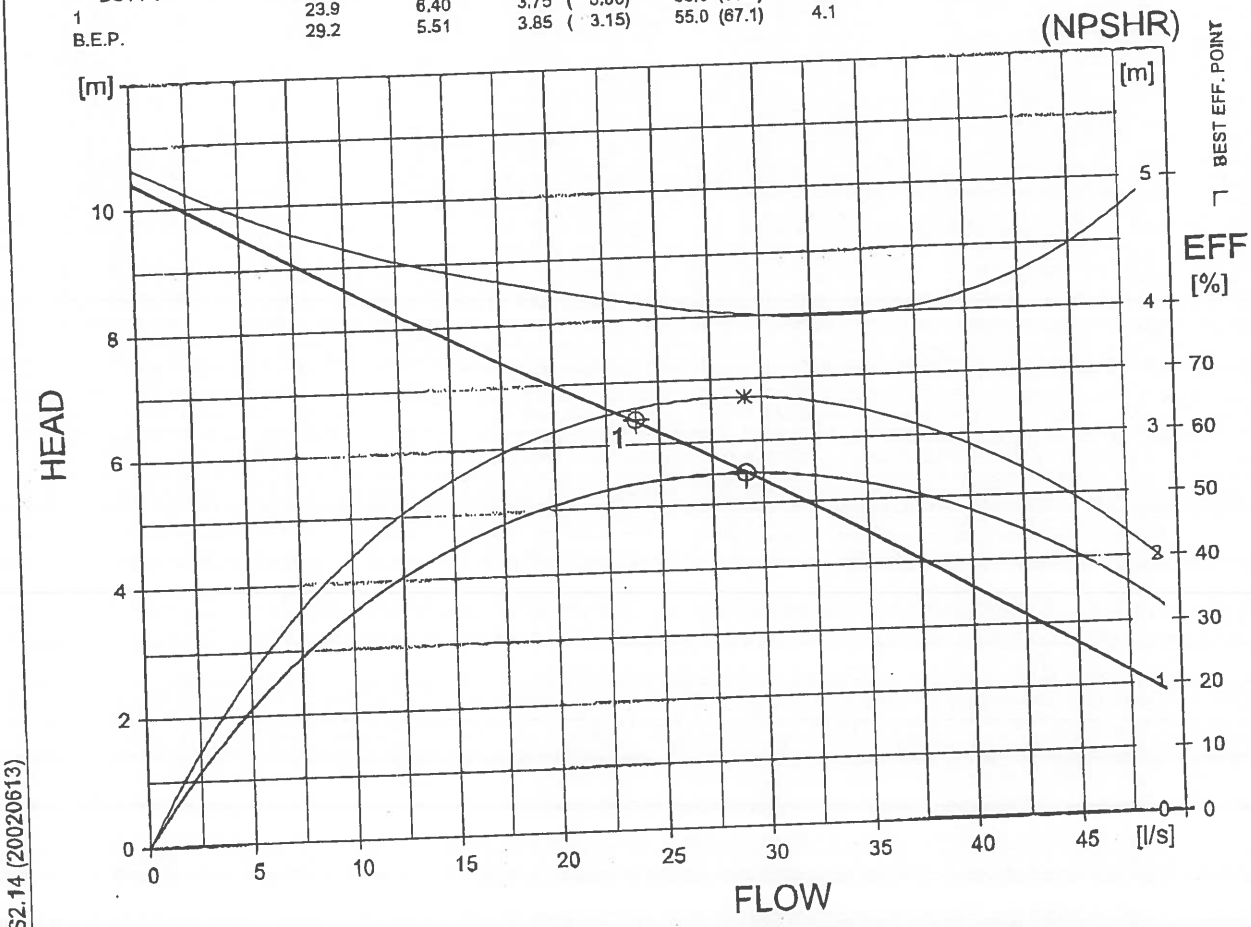
COMMENTS

INLET/OUTLET - /100 mm

IMP. THROUGHLET ---



DUTY-POINT	FLOW [l/s]	HEAD [m]	POWER [hp]	EFF [%]	(NPSHR)[m]
1	23.9	6.40	3.75 (3.06)	53.8 (65.9)	4.2
B.E.P.	29.2	5.51	3.85 (3.15)	55.0 (67.1)	4.1



FLYPS2.14 (20020613)

(NPSHR) = (NPSH3) + margins

Performance with clear water and rating data at 40 °C

FLYGT CURVE

APPENDIX B

Domestic Water Demand, and Velocity Calculations by SBM
Fire-Flow NFPA#13 Calculations by SBM
Relevant NFPA Information
Hydrant Flow Test by Northern Sprinkler Design dated January 05, 2024

STRIK BALDINELLI MONIZ
PLANNING · CIVIL · STRUCTURAL · MECHANICAL · ELECTRICAL

LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
132 Queen St. S. Unit 4
Kitchener, ON N2G 1W9
P: 519-725-8093

www.sbmltd.ca
sbm@sbmltd.ca

DOMESTIC WATER DEMAND, AND VELOCITY CALCULATIONS

DATE:	May 15, 2024
JOB No.:	SBM-23-2723

Client:	**York Developments**
Project:	**Proposed Residential Buildings**
Location:	**756 St. Clair Street, Chatham, Ontario**

DEMAND CALCULATION

Avg. Day Demand =	350	L/day/cap
Avg. Day Demand =	0.004050926	L/s/cap
Max. Day Peaking Factor =	2.00	
Max. Hour Peaking Factor =	3.00	
High Density Residential =	1.6	p/unit
*Commercial Area Allowance Average Flow= 28m3/(ha d) =	28000.0	L/day/ha

	Units/Area (ha)	Population	Avg. Day (L/s)	Max. Hour (L/s)	Max. Day (L/s)
Residential Building A	178	285	1.15	3.46	2.31
Residential Building B	178	285	1.15	3.46	2.31
Residential Building C	209	334	1.35	4.06	2.71
Residential Building D	209	334	1.35	4.06	2.71
Total			**5.02**	**15.05**	**10.03**

*Refer to MOECC "The Design Guidelines for Drinking-Water Systems" (2008)
and the Municipality of Chatham Kent Public Utilities Commission Watermain and Sanitary Design Manual dated June 2023

VELOCITY CALCULATION

Diameter (mm)	Demand (L/s)	Velocity (m/s)
300	15.05	0.21

Maximum allowable velocity of 1.5 m/s as per Section B.2.2.2 of the Municipality of Chatham Kent Public Utilities Commission Watermain and Sanitary Design Manual.

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LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
132 Queen St. S. Unit 4
Kitchener, ON N2G 1V9
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

Fire-Fighting Flow NFPA#13

Date:	May 15, 2024
Job No:	SBM-23-2723

Client:	**York Developments**
Project:	**Proposed Residential Buildings**
Location:	**756 St. Clair Street, Chatham, Ontario**

Table 1. NFPA#13 Flow Demand Requirements

Hazard	Sprinkler Flow (USGPM)	Hydrant Allowance (USGPM)	Total Flow (USGPM)
Light	175	100	275
Ordinary 1	250	250	500
Ordinary 2	350	250	600
Extra 1	750	500	1250
Extra 2	1000	500	1500

Required Supply Flow Rate, USGPM (Table 1) =	500	
Required Supply Flow Rate, L/min =	1893	
Maximum Day Demand, L/min =	10.03	L/s (Refer to attached Domestic Water Demand calculation)
	601.8	L/min
Required Supply Fire Flow + Maximum Day Demand, L/min =	**2494.80**	

Incorporate Hazen-Williams and Bernoulli's Principles: $P_{residual} = P_{static} - (Q_{required}/Q_{test})^{1.85} \times (P_{static} - P_{test})$

	65.00	*psi (448.16 kPa) =	**0.00**	L/min (0 USGPM)
Provided Supply Flow Rate @	**58.00**	*psi (399.9 kPa) =	**3865.00**	L/min (1021 USGPM)
	50.00	*psi (344.74 kPa) =	**5538.00**	L/min (1463 USGPM)
Residual pressure at hydrant =	**62.70**	psi (432.29 kPa) =	**2494.80**	L/min (659 USGPM)

Table 1. Water Velocity Calculation

Diameter (mm)	Demand (L/min)	Velocity (m/s)
300	2494.80	0.59

Therefore, velocity under Maximum Day + Fireflow Demand is 0.59 m/s which is <1.5m/s per Municipality of Chatham Kent Public Utilites Commission Watermain and Sanitary Design Manual (2023)

NFPA # 13 FLOW DEMAND REQUIREMENTS

HAZARD	SPRINKLER FLOW	HYDRANT ALLOWANCE	TOTAL FLOW
Light	175 GPM	100 GPM	275 GPM
Ordinary 1	250 GPM	250 GPM	500 GPM
Ordinary 2	350 GPM	250 GPM	600 GPM
Extra 1	750 GPM	500 GPM	1250 GPM
Extra 2	1000 GPM	500 GPM	1500 GPM
Warehousing	Varies too much to come up with a generic water demand		

The pressures range on each of these flows and would be generally be 35 PSI - 80 PSI Requirments, but this information can't truly be given until final layouts and calculations are complete

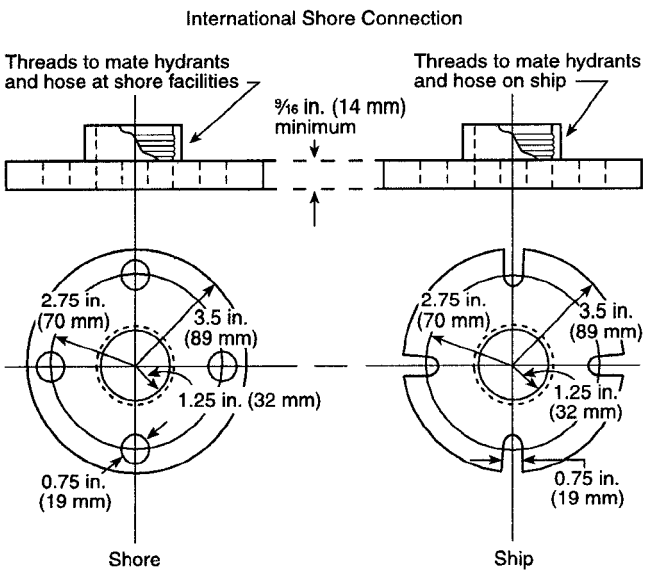

FIGURE A.3.10.7 International Shore Fire Connection.

A.5.1 Occupancy examples in the listings as shown in the various hazard classifications are intended to represent the norm for those occupancy types. Unusual or abnormal fuel loadings or combustible characteristics and susceptibility for changes in these characteristics, for a particular occupancy, are considerations that should be weighed in the selection and classification.

The light hazard classification is intended to encompass residential occupancies; however, this is not intended to preclude the use of listed residential sprinklers in residential occupancies or residential portions of other occupancies.

A.5.2 Light hazard occupancies include occupancies having uses and conditions similar to the following:

Animal shelters
Churches
Clubs
Eaves and overhangs, if of combustible construction with no combustibles beneath
Educational
Hospitals, including animal hospitals and veterinary facilities
Institutional
Kennels
Libraries, except large stack rooms
Museums
Nursing or convalescent homes
Offices, including data processing
Residential
Restaurant seating areas
Theaters and auditoriums, excluding stages and prosceniums
Unused attics

Note that it is not the committee's intent to automatically equate library bookshelves with ordinary hazard occupancies or with library stacks. Typical library bookshelves of approximately 8 ft (2.4 m) in height, containing books stored vertically on end, held in place in close association with each other, with aisles wider than 30 in. (762 mm) can be considered to be light hazard occupancies. Similarly, library stack areas, which are more akin to shelf storage or record storage, as defined in NFPA 232, *Standard for the Protection of Records*, should be considered to be ordinary hazard occupancies.

A.5.3 For purposes of these definitions, Class I, Class II, Class III, and Class IV commodities would be considered to have moderate rates of heat release, while Group A plastics would be considered to have high rates of heat release. Stockpiles are considered to include display merchandise (mercantile) and arrangements of combustibles ancillary to operations within the occupancy as opposed to dedicated storage areas where the fire loading is generally more severe.

A.5.3.1 Ordinary hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Automobile parking and showrooms
Bakeries
Beverage manufacturing
Canneries
Dairy products manufacturing and processing
Electronic plants
Glass and glass products manufacturing
Laundries
Restaurant service areas

A.5.3.2 Ordinary hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Agricultural facilities
Barns and stables
Cereal mills
Chemical plants — ordinary
Confectionery products
Distilleries
Dry cleaners
Exterior loading docks

Note that exterior loading docks only used for loading and unloading of ordinary combustibles should be classified as OH2. For the handling of flammable and combustible liquids, hazardous materials, or where utilized for storage, exterior loading docks and all interior loading docks should be protected based upon the actual occupancy and the materials handled on the dock, as if the materials were actually stored in that configuration.

Feed mills
Horse stables
Leather goods manufacturing
Libraries — large stack room areas
Machine shops
Metal working
Mercantile
Paper and pulp mills
Paper process plants
Piers and wharves

NORTHERN SPRINKLER DESIGN

FLOW TEST REPORT

Form SD-003A RevDate: Dec 01, 2021

PROJECT INFORMATION			
Project Name:	756 St Clair St. Flow Test	Design Project #:	2023-NSD-142
Site Address:	756 St Clair St. Chatham ON	Const. Project #:	NA
City Contact:	Chris Lalonde x4276	Phone #:	519-352-7354
Flow Tester:	Darren Johnston	Phone #:	519-868-2031
Technical Contact:	**Andy Coghlin**	Phone #:	**519-476-0761**

SITE INFORMATION

SITE MAP

Note: If the main is a dead end, the flowing hydrant shall be closest to the dead end

ITEMS TO LABEL ON MAP	HYDRANTS USED	MAIN SIZE
☑ Static / Residual & Flow Hydrants	☑ City Hydrant(s)	City: 12"
☐ Flow Direction (if the main is dead end)	☐ Site Hydrant(s)	Site:

SITE NOTES

445 Colborne St. London, ON N6B 2T2 northernsprinklerdesign.com 1-866-798-1154

NORTHERN SPRINKLER DESIGN

FLOW TEST REPORT

Form SD-003A RevDate: Dec 01, 2021

TEST INFORMATION			
Minimum Required Flow:	NA	Min Ports:	2
Personnel Present:	Darren Johnston	Test Date:	2024-01-05
City / External Company:	Chatham Kent Utilities	Test Time:	11:00am

TEST EQUIPMENT	
☐ Hose Monsters with built in Pitot	Hose length used:
☐ Hand held pitot gauge	☑ Pollard diffuser elbow with built in Pitot
☐ Other:	

TEST RESULTS

Number of Ports	Outlet Size (IN)	Discharge Coefficient	Pitot Reading (PSI)	Total Flow (GPM)	Static / Residual Pressure (PSI)
0 Ports					65
1 Port	2.5	0.9	37	1,021	58
2 Ports	2.5	0.9	19 / 19	1,463	50
3 Ports	2.5	0.9		0	
4 Ports	2.5	0.9		0	
0 Ports	**STATIC RE-CHECK**				65

TEST NOTES

HYDRAULIC ADJUSTMENTS (FOR OFFICE USE ONLY)

ADJUSTMENTS FOR HYDRAULIC GRADE LINE (HGL)

Reservoir HGL (m):		Site Elevation (m):	
Theoretical Static Head (PSI):	0	PSI to subtract from test pressures:	0

OTHER HYDRAULIC ADJUSTMENTS

Other adjustment as required by the City / AHJ:	

445 Colborne St. London, ON N6B 2T2 northernsprinklerdesign.com 1-866-798-1154

APPENDIX C

Sanitary Sewer Design Sheet with Flow Monitoring Results
Sanitary Sewer Design Sheet (Phase 1) with Flow Monitoring Results
Markup of Municipal's Sanitary Sewer Collection System drawing (Sanitary Pump Sation No. 11)

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PLANNING · CIVIL · STRUCTURAL · MECHANICAL · ELECTRICAL

LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

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www.sbmltd.ca

sbm@sbmltd.ca

Sanitary Sewer Design Sheet — Flow Monitoring Conditions

Design Parameters

Daily Flow (L/cap/day)	340	*
Sewage Infiltration (Litres/hectare/second)	0.25	* as per section C1.3.6
Sewage Infiltration (Litres/hectare/day)	21600	
Commercial Areas (m^3/(ha*day)	28	**
1 Bedroom Density Population (person/household)	1.5	
2 Bedroom Density Population (person/household)	2	
Medium Density Population (person/household)	2.5	*
M = (1 + 14/(4+P^0.5))		

Date: March 25, 2025
Job Number: SBM-23-2723
Client: York Developments
Project: Proposed Mixed-Use Development
Location: 756 St.Clair St, Chatham ON
Designed By: J.P.J
Reviewed By: RF/LP

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Upstream																							
*Sanitary Sewage Collection System Worksheet - Sanitary Sewer Collection System Community of Chatham																							
St. Clair St	1	2		12.69	12.69	12.69					4.50	3.17	4.11	7.28			0.013	0.22%	300	45.38	16.05		0.64
	2	3		9.15	21.84	21.84					4.50	5.46	7.08	12.54			0.013	0.22%	300	45.38	27.63		0.64
	3	4		6.42	28.26	28.26					4.50	7.07	9.16	16.23			0.013	0.22%	300	45.38	35.76		0.64
	4	PS18		4.16	32.42	32.42					4.50	8.11	10.51	18.62			0.013	0.22%	300	45.38	41.02		0.64
Proposed Development ****																							
756 St.Clair St - Mixed-Use Development	Site	PS18	3.778			3.78	374***	1.5	561	561	3.95	0.94	8.72	9.66			0.013	1.00%	200	32.82	29.44		1.04
						3.78	400***	2.0	800	800	3.86	0.95	12.15	13.10			0.013	1.00%	200	32.82	39.92		1.04
						3.78				1361	3.71	0.95	19.87	20.82			0.013	1.00%	201	33.26	62.60		1.05
Downstream																							
Forcemain	PS18	5		1.00	33.42	37.20				1361	3.71	9.30	30.70	40.00			0.013	0.22%	150				
St. Clair Street	5	6		2.28	35.70	39.48				1361	3.71	9.87	31.44	41.31			0.013	0.22%	300	45.38	91.02		0.64
	6	7		1.960	37.66	41.44				1361	3.71	10.36	32.07	42.43			0.013	0.22%	300	45.38	93.50		0.64
FM06	7	8		1.880	39.54	43.32				1361	3.71	10.83	32.68	**43.51**	**15.10**	**35.92**	0.013	0.22%	300	45.38	**95.88**	**79.15**	0.64
	8	9		1.930	41.47	43.32				1361	3.71	10.83	33.31	44.14			0.013	0.22%	300	45.38	97.26		0.64
	9	10		0.690	42.16	44.01				1361	3.71	11.00	33.53	44.53			0.013	0.22%	300	45.38	98.13		0.64
	10	11		0.560	42.72	44.57				1361	3.71	11.14	33.71	44.85	—	37.26+	0.013	0.40%	250	37.63	119.19	99.01+	0.77
FM01	11	12		2.500	45.22	47.07				1361	3.71	11.77	34.52	**46.29**	**22.20**	**43.02**	0.013	0.36%	250	35.70	**129.67**	**120.50**	0.73
	12	13		1.500	46.72	48.57				1361	3.71	12.14	35.01	47.15	—	43.88++	0.013	0.41%	250	38.10	123.75	115.16++	0.78
Northern Pine Place	81	82	0.77	0.00	0.00	0.77	11	2.5	28	28	4.36	0.19	0.47	0.66			0.013	0.07%	375	46.42	1.42		0.42
	82	83	0.56	0.00	0.00	1.33	6	2.5	15	43	4.33	0.33	0.72	1.05			0.013	0.11%	450	94.62	1.11		0.59
	84B	84	0.36	0.00	0.00	0.36	4	2.5	10	10	4.41	0.09	0.17	0.26			0.013	0.09%	450	85.58	0.30		0.54
	84	83	0.53	0.00	0.00	0.89	7	2.5	18	28	4.36	0.22	0.47	0.69			0.013	0.09%	450	85.58	0.81		0.54
	83	85	0.76	0.00	0.00	2.98	11	2.5	28	98	4.25	0.75	1.63	2.38			0.013	0.23%	525	206.37	1.15		0.95
	85	86	0.07	0.00	0.00	3.05				98	4.25	0.76	1.63	2.39			0.013	0.22%	525	201.84	1.18		0.93

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Gregory Drive East	88	87	0.68	0.00	0.00	0.68	6	2.5	15	15	4.40	0.17	0.26	0.43			0.013	0.42%	250	38.56	1.12		0.79
	87	86	0.72	0.00	0.00	1.40	4	2.5	10	25	4.37	0.35	0.43	0.78			0.013	0.35%	250	35.20	2.22		0.72
	86	89	1.36	0.00	0.00	5.81	6	2.5	15	138	4.20	1.45	2.27	3.72			0.013	0.33%	250	34.18	10.88		0.70
	89	90	0.83	0.00	0.00	6.64	4	2.5	10	148	4.19	1.66	2.43	4.09			0.013	0.28%	250	31.49	12.99		0.64
Christina Place	110	109	1.19	0.00	0.00	1.19	15	2.5	38	38	4.34	0.30	0.64	0.94			0.013	0.40%	250	37.63	2.50		0.77
	109	108	0.72	0.00	0.00	1.91	8	2.5	20	58	4.30	0.48	0.97	1.45			0.013	0.40%	250	37.63	3.85		0.77
London Drive	113	114	0.87	0.00	0.00	0.87	11	2.5	28	28	4.36	0.22	0.47	0.69			0.013	0.30%	250	32.59	2.12		0.66
	114	115	0.65	0.00	0.00	1.52	8	2.5	20	48	4.32	0.38	0.81	1.19			0.013	0.30%	250	32.59	3.65		0.66
	115	116	0.15	0.00	0.00	1.67	2	2.5	5	53	4.31	0.42	0.89	1.31			0.013	0.30%	250	32.59	4.02		0.66
	117	116	0.52	0.00	0.00	0.52	7	2.5	18	18	4.39	0.13	0.30	0.43			0.013	0.30%	250	32.59	1.32		0.66
	116	122	0.28	0.00	0.00	2.47	4	2.5	10	80	4.27	0.62	1.34	1.96			0.013	0.30%	250	32.59	6.01		0.66
	122	121B	0.34	0.00	0.00	2.81	5	2.5	13	93	4.25	0.70	1.55	2.25			0.013	0.30%	250	32.59	6.90		0.66
	121B	121	0.15	0.00	0.00	2.96	3	2.5	8	100	4.24	0.74	1.67	2.41			0.013	0.30%	250	32.59	7.39		0.66
	121	120	0.18	0.00	0.00	3.14	2	2.5	5	105	4.24	0.79	1.75	2.54			0.013	0.30%	250	32.59	7.79		0.66
	117	118	1.19	0.00	0.00	1.19	15	2.5	38	38	4.34	0.30	0.64	0.94			0.013	0.30%	250	32.59	2.88		0.66
	118	119	0.72	0.00	0.00	1.91	8	2.5	20	58	4.30	0.48	0.97	1.45			0.013	0.30%	250	32.59	4.45		0.66
	119	120	0.47	0.00	0.00	2.38	3	2.5	8	65	4.29	0.60	1.10	1.70			0.013	0.30%	250	32.59	5.22		0.66
	120	112	0.00	0.00	0.00	5.52				170	4.17	1.38	2.79	4.17			0.013	0.30%	250	32.59	12.79		0.66
Victoria Ave	112	111	0.49	0.00	0.00	6.01	3	2.5	8	178	4.17	1.50	2.91	4.41			0.013	0.22%	250	27.91	15.80		0.57
	111	108	0.47	0.00	0.00	6.48	3	2.5	8	185	4.16	1.62	3.03	4.65			0.013	0.18%	250	25.24	18.42		0.51
	108	107	0.94	0.00	0.00	7.42	7	2.5	18	260	4.10	1.86	4.20	6.06			0.013	0.19%	250	25.94	23.36		0.53
	107	90	0.39	0.00	0.00	7.81	3.0	2.5	8	268	4.10	1.86	4.32	6.18			0.013	0.27%	250	30.92	19.99		0.63
Gregory Drive East	90	92	2.17	0.00	0.00	9.98	3	2.5	8	423	4.01	2.50	6.67	9.17			0.013	0.27%	250	30.92	29.66		0.63
	92	93	0.92	0.00	0.00	10.90	5	2.5	13	435	4.00	2.73	6.86	9.59			0.013	0.20%	250	26.61	36.04		0.54
	93	94	0.00	0.00	0.00	10.90				435	4.00	2.73	6.86	9.59			0.013	0.27%	250	30.92	31.02		0.63
Carney Place	98	97	0.90	0.00	0.00	0.90	9	2.5	23	23	4.37	0.23	0.39	0.62			0.013	0.36%	250	35.70	1.74		0.73
	97	96	0.41	0.00	0.00	1.31	5	2.5	13	35	4.34	0.33	0.60	0.93			0.013	0.36%	250	35.70	2.60		0.73
	96	95	0.20	0.00	0.00	1.51	2	2.5	5	40	4.33	0.38	0.68	1.06			0.013	0.36%	250	35.70	2.97		0.73
	95	94	0.13	0.00	0.00	1.64	1	2.5	3	43	4.33	0.41	0.72	1.13			0.013	0.36%	250	35.70	3.17		0.73
Lawson Drive	106	105	1.03	0.00	0.00	1.03	6	2.5	15	15	4.40	0.26	0.26	0.52			0.013	0.31%	250	33.13	1.57		0.67
	105	104	0.75	0.00	0.00	1.78	5	2.5	13	28	4.36	0.45	0.47	0.92			0.013	0.28%	250	31.49	2.92		0.64
	104	103	0.81	0.00	0.00	2.59	3	2.5	8	35	4.34	0.65	0.60	1.25			0.013	0.30%	250	32.59	3.84		0.66
	103	94	0.22	0.00	0.00	2.81	2	2.5	5	40	4.33	0.70	0.68	1.38			0.013	0.38%	250	36.68	3.76		0.75
Gregory Drive East	94	99	0.85	0.00	0.00	16.20	5	2.5	13	530	3.96	4.05	8.26	12.31			0.013	0.27%	250	30.92	39.81		0.63
FM03	99	100	0.75	0.00	0.00	16.95	5	2.5	13	543	3.96	4.24	8.44	**12.68**	**4.99**	**4.99**	0.013	0.33%	250	34.18	**37.10**	**14.60**	0.70
St Clair St South	102	101	1.26	0.00	0.00	1.26	7	2.5	18	18	4.39	0.32	0.30	0.62			0.013	0.29%	250	32.04	1.93		0.65
	101	100	0.27	0.00	0.00	1.53	1	2.5	3	44	4.33	0.38	0.74	1.12			0.013	0.29%	250	32.04	3.50		0.65
Gregory Drive East	100	13	0.05	0.00	0.00	18.53				586	3.94	4.63	9.08	13.71			0.013	0.40%	250	37.63	36.43		0.77
	13	14	0.38	0.29	47.01	67.76	4	2.5	10	1957	3.59	0.27	42.90	43.17			0.013	0.22%	375	82.29	52.47		0.75
FM02	14	15	1.00	0.00	47.01	68.76	8	2.5	20	1977	3.59	17.19	43.16	**60.35**	**24.42**	**45.24**	0.013	0.20%	375	78.46	**76.93**	**57.66**	0.71
	15	16	1.02	0.00	47.01	69.78	10	2.5	25	2002	3.59	17.45	43.48	60.93			0.013	0.25%	375	87.72	69.47		0.79

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Maryknoll Road	17	18	0.70	0.00	0.00	0.70	7	2.5	18	18	4.39	0.18	0.30	0.48			0.013	0.43%	250	39.02	1.23		0.79
	18	19	0.89	0.00	0.00	1.59	10	2.5	25	43	4.33	0.40	0.72	1.12			0.013	0.38%	250	36.68	3.05		0.75
	19	20	1.10	0.00	0.00	2.69	12	2.5	30	73	4.28	0.67	1.22	1.89			0.013	0.37%	250	36.19	5.22		0.74
	22	21	1.06	0.00	0.00	1.06	12	2.5	30	30	4.35	0.27	0.51	0.78			0.013	0.37%	250	36.19	2.16		0.74
	21	20	0.70	0.00	0.00	1.76	8	2.5	20	50	4.31	0.44	0.85	1.29			0.013	0.31%	250	32.92	3.92		0.67
	20	28	0.18	0.00	0.00	4.63				123	4.22	1.16	2.03	3.19			0.013	0.40%	250	37.63	8.48		0.77
Lancefield Place	31	31B	0.85	0.00	0.00	0.85	8	2.5	20	20	4.38	0.21	0.34	0.55			0.013	0.36%	250	35.70	1.54		0.73
	31B	31C	0.40	0.00	0.00	1.25	3	2.5	8	28	4.36	0.31	0.47	0.78			0.013	0.49%	250	41.65	1.87		0.85
	31C	30	0.77	0.00	0.00	2.02	8	2.5	20	48	4.32	0.51	0.81	1.32			0.013	0.39%	250	37.16	3.55		0.76
	30	29	0.33	0.00	0.00	2.35	4	2.5	10	58	4.30	0.59	0.97	1.56			0.013	0.47%	250	40.79	3.82		0.83
	29	28	0.22	0.00	0.00	2.57	3	2.5	8	65	4.29	0.64	1.10	1.74			0.013	0.35%	250	35.20	4.94		0.72
	28	27	0.48	0.00	0.00	3.05	4	2.5	10	198	4.15	0.76	3.23	3.99			0.013	0.27%	250	30.92	12.90		0.63
Romheath Road	23	24	0.47	0.00	0.00	0.47	5	2.5	13	13	4.40	0.12	0.22	0.34			0.013	0.29%	250	32.04	1.06		0.65
	24	25	0.15	0.00	0.00	0.62	2	2.5	5	18	4.39	0.16	0.30	0.46			0.013	0.29%	250	32.04	1.44		0.65
	25	26	1.13	0.00	0.00	1.75	9	2.5	23	40	4.33	0.44	0.68	1.12			0.013	0.31%	250	33.13	3.38		0.67
	26	27	0.49	0.00	0.00	2.24	8	2.5	20	60	4.30	0.56	1.01	1.57			0.013	0.32%	250	33.66	4.66		0.69
Helen Street	27	34	0.29	0.00	0.00	5.58	2	2.5	5	263	4.10	1.40	4.24	5.64			0.013	0.24%	250	29.15	19.35		0.59
Ellis Street	38	37	0.72	0.17	0.17	0.89	8	2.5	20	20	4.38	0.22	0.40	0.62			0.013	0.44%	250	39.47	1.56		0.80
	37	36	0.77	0.00	0.17	1.66	8	2.5	20	40	4.33	0.42	0.74	1.16			0.013	0.39%	250	37.16	3.11		0.76
	36	35	0.57	0.00	0.17	2.23	5	2.5	13	53	4.31	0.56	0.95	1.51			0.013	0.39%	250	37.16	4.05		0.76
	35	34	0.56	0.00	0.17	2.79	5	2.5	13	65	4.29	0.70	1.16	1.86			0.013	0.39%	250	37.16	4.99		0.76
								.															
	32	33	1.06	0.00	0.00	1.06	10	2.5	25	25	4.37	0.27	0.43	0.70			0.013	0.45%	250	39.92	1.75		0.81
	33	34	0.93	0.00	0.00	1.99	10	2.5	25	50	4.31	0.50	0.85	1.35			0.013	0.40%	250	37.63	3.59		0.77
Helen Street	34	42	0.16	0.00	0.17	10.52	2	2.5	5	383	4.03	2.63	6.13	8.76			0.013	0.25%	250	29.75	29.43		0.61
Gregory Drive West	39	40	0.00	1.86	1.86	1.86					4.50	0.47	0.60	1.07			0.013	0.43%	250	39.02	2.75		0.79
	40	41	3.94	0.00	1.86	5.80			300*****	300	4.08	1.45	5.41	6.86									
			0.50	0.00	1.86	6.30	5	2.5	13	313	4.07	1.58	5.61	7.19			0.013	0.37%	250	36.19	19.87		0.74
	41	42	0.85	0.00	1.86	7.15	8	2.5	20	333	4.06	1.79	5.91	7.70			0.013	0.39%	250	37.16	20.73		0.76
	42	16	0.95	0.00	2.03	18.62	8	2.5	20	735	3.88	4.66	11.89	16.55			0.013	0.25%	250	29.75	55.62		0.61
	16	43	0.33	0.00	49.04	88.73	3	2.5	7.5	2745	3.47	22.18	53.42	75.60			0.013	0.18%	450	121.03	62.46		0.76
Norway Maple Drive	45	44	0.91	0.00	0.00	0.91	11	2.5	28	28	4.36	0.23	0.47	0.70			0.013	0.39%	250	37.16	1.88		0.76
	44	43	0.89	0.00	0.00	1.80	12	2.5	30	58	4.30	0.45	0.97	1.42			0.013	0.46%	250	40.36	3.52		0.82
	45	46	0.68	0.00	0.00	0.68	8	2.5	20	20	4.38	0.17	0.34	0.51			0.013	0.41%	250	38.10	1.34		0.78
	46	49	0.49	0.00	0.00	1.17	5	2.5	13	33	4.35	0.29	0.56	0.85			0.013	0.46%	250	40.36	2.11		0.82
	48	49	0.78	0.00	0.00	0.78	8	2.5	20	20	4.38	0.20	0.34	0.54			0.013	0.45%	250	39.92	1.35		0.81
	49	49B	0.26	0.00	0.00	2.21	3	2.5	8	60	4.30	0.55	1.01	1.56			0.013	0.82%	250	53.88	2.90		1.10
	49B	50	0.25	0.00	0.00	2.46	3	2.5	8	68	4.29	0.62	1.14	1.76			0.013	0.50%	250	42.07	4.18		0.86

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
	55	54	0.89	0.00	0.00	0.89	11	2.5	28	28	4.36	0.22	0.47	0.69			0.013	0.39%	250	37.16	1.86		0.76
	54	53	0.92	0.00	0.00	1.81	11	2.5	28	55	4.31	0.45	0.93	1.38			0.013	0.40%	250	37.63	3.67		0.77
	53	50	1.07	0.00	0.00	2.88	13	2.5	33	88	4.26	0.72	1.47	2.19			0.013	0.40%	250	37.63	5.82		0.77
	50	51	0.49	0.00	0.00	5.83	6	2.5	15	170	4.17	1.46	2.79	4.25			0.013	0.39%	250	37.16	11.44		0.76
	51	52	0.89	0.00	0.00	6.72	12	2.5	30	200	4.15	1.68	3.26	4.94			0.013	0.51%	250	42.49	11.63		0.87
	43	52	0.43	0.00	49.04	90.96	5	2.5	13	2815	3.47	22.74	54.28	77.02			0.013	0.18%	450	121.03	63.64		0.76
FM04	52	56	0.80	0.00	49.04	98.48	10	2.5	25	3040	3.44	24.62	57.01	**81.63**	**30.14**	**50.96**	0.013	0.47%	450	195.58	**41.74**	**26.06**	1.23
	56	57	0.36	0.00	49.04	98.84	4	2.5	10	3050	3.44	24.71	57.13	81.84			0.013	0.24%	450	139.76	58.56		0.88
	57	58	0.35	0.00	49.04	99.19	4	2.5	10	3060	3.44	24.80	57.25	82.05			0.013	0.16%	450	114.11	71.91		0.72
	59	58	0.77	0.00	0.00	0.77	8	2.5	20	20	4.38	0.19	0.34	0.53			0.013	0.19%	450	124.35	0.43		0.78
	58	60	0.27	0.00	49.04	100.23	3	2.5	8	3087	3.43	25.06	57.58	82.64			0.013	0.39%	450	178.15	46.39		1.12
	60	61	0.00	0.00	49.04	100.23	0	2.5	0	3087	3.43	25.06	57.58	82.64			0.013	0.21%	450	130.73	63.22		0.82
	61	62	0.00	0.00	49.04	100.23	0	2.5	0	3087	3.43	25.06	57.58	82.64			0.013	0.17%	450	117.62	70.26		0.74
	64	63	0.94	0.00	0.00	0.94	8	2.5	20	20	4.38	0.24	0.34	0.58			0.013	0.40%	250	37.63	1.54		0.77
	63	62	0.28	0.00	0.00	1.22	2	2.5	5	25	4.37	0.31	0.43	0.74			0.013	0.40%	250	37.63	1.97		0.77
	62	65	0.95	0.00	49.04	102.40	4	2.5	10	3122	3.43	25.60	58.00	83.60			0.013	0.40%	450	180.42	46.34		1.13
	65	66	0.35	0.00	49.04	102.75	2	2.5	5	3127	3.43	25.69	58.06	83.75			0.013	0.40%	450	180.42	46.42		1.13
Paxton Drive	74	73	0.46	0.00	0.00	0.46	3	2.5	8	8	4.43	0.12	0.13	0.25			0.013	0.40%	250	37.63	0.66		0.77
	73	72	0.56	0.00	0.00	1.02	5	2.5	13	20	4.38	0.26	0.34	0.60			0.013	0.40%	250	37.63	1.59		0.77
	72	71	0.98	0.00	0.00	2.00	8	2.5	20	40	4.33	0.50	0.68	1.18			0.013	0.40%	250	37.63	3.14		0.77
	71	70	1.01	0.00	0.00	3.01	8	2.5	20	60	4.30	0.75	1.01	1.76			0.013	0.40%	250	37.63	4.68		0.77
	70	69	0.88	0.00	0.00	3.89	7	2.5	18	78	4.27	0.97	1.30	2.27			0.013	0.40%	250	37.63	6.03		0.77
Aspen Crescent	68	69	1.44	0.00	0.00	1.44	6	2.5	15	15	4.40	0.36	0.26	0.62			0.013	0.40%	250	37.63	1.65		0.77
	69	67	0.43	0.00	0.00	5.76	4	2.5	10	103	4.24	1.44	1.71	3.15			0.013	0.40%	250	37.63	8.37		0.77
	67	66	0.25	0.00	0.00	6.01	2	2.5	5	108	4.23	1.50	1.79	3.29			0.013	0.40%	250	37.63	8.74		0.77
Orangewood Boulevard (FM05)	66	77	0.46	0.00	49.04	109.22	5	2.5	13	3247	3.41	27.31	59.50	**86.81**	**28.62**	**49.44**	0.013	0.40%	450	180.42	**48.12**	**26.43**	1.13
			0.00	1.30	50.34	110.52					4.50	27.63	16.31	43.94			0.013	0.43%	450	187.07	23.49		1.18
	77	78	1.35	0.00	50.34	111.87	12	2.5	30	3277	3.41	27.97	60.28	88.25	—	50.88^{+++}	0.013	0.16%	450	114.11	77.34	44.59^{+++}	0.72
Irene Crescent	80	79	1.10	0.00	0.00	1.10	14	2.5	35	35	4.34	0.28	0.60	0.88			0.013	0.40%	250	37.63	2.34		0.77
	79	78	0.75	0.00	0.00	1.85	9	2.5	23	58	4.30	0.46	0.97	1.43			0.013	0.40%	250	37.63	3.80		0.77
Orangewood Boulevard	78	78B	0.50	0.00	50.34	114.22	5	2.5	13	3347	3.40	28.56	61.12	89.68	—	52.31^{+++}	0.013	0.13%	450	103.25	86.86	50.66^{+++}	0.65

* Design Parameters obtained from Table B.2 from the Chatam-Kent Watermain and Sanitary Design Manual (2023)
** Design Parameters obtained from 5.5.2.2 MOE Design Guidelines for Sewage Works (2008)
*** Number of Units obtained from Site Plan by Patrick David Trottier Architect dated October 23, 2023
**** Private drain connection of subject site assumed to be 200 mm at 1.0%. Pipe design subject to change at detailed design.
***** Population of 300 students based on the average size class of 30 students and grades JK-8.
$^{+}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM06, and as applied to the sewer sections MH8 to 11.
$^{++}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM01, and as applied to the sewer section MH11 to MH13.
$^{+++}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM05, and as applied to the sewer section MH77 to MH78B.

Notes:
1. Please refer to "Figure 1: Study Area and Monitoring Locations" from the Flow Monitoring Report by Civica Infrastructure Inc. dated February 18, 2025, provided in Appendix C, for flow monitor locations.
2. Please refer to the Sanitary Layout Sheet (Markup of Municipal's Sanitary Sewer Collection System drawing), provided in Appendix C, for the catchment areas and associated manholes.
3. The Capacity of PS11 &PS18 to be confirmed by the Municipality prior to detailed design.

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LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
132 Queen St. S. Unit 4
Kitchener, ON N2G 1V9
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

Sanitary Sewer Design Sheet (Phase 1) — Flow Monitoring Conditions

Design Parameters

Daily Flow (L/cap/day)	340	*
Sewage Infiltration (Litres/hectare/second)	0.25	* as per section C1.3.6
Sewage Infiltration (Litres/hectare/day)	21600	
Commercial Areas (m^3/(ha*day)	28	**
1 Bedroom Density Population (person/household)	1.5	
2 Bedroom Density Population (person/household)	2	
Medium Density Population (person/household)	2.5	*
M = (1 + 14/(4+P^0.5))		

Date: March 25, 2025
Job Number: SBM-23-2723
Client: York Developments
Project: Proposed Mixed-Use Development — Phase 1 Tower 'D'
Location: 756 St.Clair St, Chatham ON
Designed By: J.P.J
Reviewed By: RF/LP

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Upstream																							
*Sanitary Sewage Collection System Worksheet - Sanitary Sewer Collection System Community of Chatham																							
St. Clair St	1	2		12.69	12.69	12.69					4.50	3.17	4.11	7.28			0.013	0.22%	300	45.38	16.05		0.64
	2	3		9.15	21.84	21.84					4.50	5.46	7.08	12.54			0.013	0.22%	300	45.38	27.63		0.64
	3	4		6.42	28.26	28.26					4.50	7.07	9.16	16.23			0.013	0.22%	300	45.38	35.76		0.64
	4	PS18		4.16	32.42	32.42					4.50	8.11	10.51	18.62			0.013	0.22%	300	45.38	41.02		0.64
Proposed Development ****																							
756 St.Clair St - Tower 'D' Development (Phase 1)	Site	PS18	3.778			3.78	105***	1.5	157	157	4.18	0.94	2.58	3.52			0.013	1.00%	200	32.82	10.73		1.04
						3.78	104***	2.0	208	208	4.14	0.95	3.39	4.34			0.013	1.00%	200	32.82	13.22		1.04
						3.78				365	4.04	0.95	5.80	6.75			0.013	1.00%	201	33.26	20.30		1.05
Downstream																							
Forcemain	PS18	5		1.00	33.42	37.20				365	4.04	9.30	16.63	25.93			0.013	0.22%	150				
St. Clair Street	5	6		2.28	35.70	39.48				365	4.04	9.87	17.37	27.24			0.013	0.22%	300	45.38	60.02		0.64
	6	7		1.960	37.66	41.44				365	4.04	10.36	18.00	28.36			0.013	0.22%	300	45.38	62.50		0.64
FM06	7	8		1.880	39.54	43.32				365	4.04	10.83	18.61	**29.44**	**15.10**	**21.85**	0.013	0.22%	300	45.38	**64.88**	**48.15**	0.64
	8	9		1.930	41.47	43.32				365	4.04	10.83	19.24	30.07	—	**22.48**[+]	0.013	0.22%	300	45.38	66.26	**49.52**[+]	0.64
	9	10		0.690	42.16	44.01				365	4.04	11.00	19.46	30.46	—	**22.87**[+]	0.013	0.22%	300	45.38	67.12	**50.39**[+]	0.64
	10	11		0.560	42.72	44.57				365	4.04	11.14	19.64	30.78	—	**23.19**[+]	0.013	0.40%	250	37.63	81.80	**61.62**[+]	0.77
FM01	11	12		2.500	45.22	47.07				365	4.04	11.77	20.45	**32.22**	**22.20**	**28.95**	0.013	0.36%	250	35.70	**90.26**	**81.09**	0.73
	12	13		1.500	46.72	48.57				365	4.04	12.14	20.94	33.08	—	**29.81**[++]	0.013	0.41%	250	38.10	86.83	**78.23**[++]	0.78
Northern Pine Place	81	82	0.77	0.00	0.00	0.77	11	2.5	28	28	4.36	0.19	0.47	0.66			0.013	0.07%	375	46.42	1.42		0.42
	82	83	0.56	0.00	0.00	1.33	6	2.5	15	43	4.33	0.33	0.72	1.05			0.013	0.11%	450	94.62	1.11		0.59
	84B	84	0.36	0.00	0.00	0.36	4	2.5	10	10	4.41	0.09	0.17	0.26			0.013	0.09%	450	85.58	0.30		0.54
	84	83	0.53	0.00	0.00	0.89	7	2.5	18	28	4.36	0.22	0.47	0.69			0.013	0.09%	450	85.58	0.81		0.54
	83	85	0.76	0.00	0.00	2.98	11	2.5	28	98	4.25	0.75	1.63	2.38			0.013	0.23%	525	206.37	1.15		0.95
	85	86	0.07	0.00	0.00	3.05				98	4.25	0.76	1.63	2.39			0.013	0.22%	525	201.84	1.18		0.93

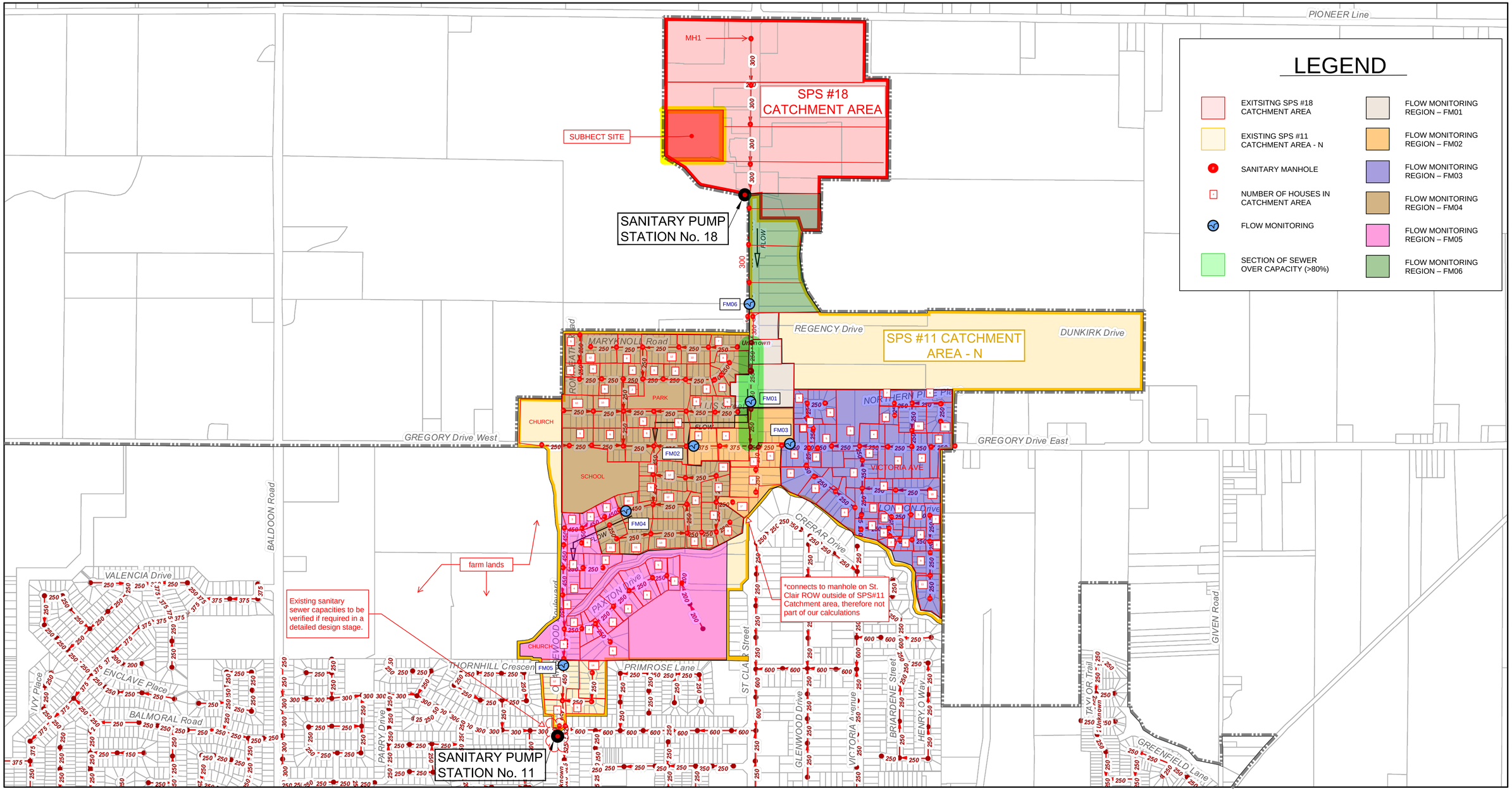
Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Gregory Drive East	88	87	0.68	0.00	0.00	0.68	6	2.5	15	15	4.40	0.17	0.26	0.43			0.013	0.42%	250	38.56	1.12		0.79
	87	86	0.72	0.00	0.00	1.40	4	2.5	10	25	4.37	0.35	0.43	0.78			0.013	0.35%	250	35.20	2.22		0.72
	86	89	1.36	0.00	0.00	5.81	6	2.5	15	138	4.20	1.45	2.27	3.72			0.013	0.33%	250	34.18	10.88		0.70
	89	90	0.83	0.00	0.00	6.64	4	2.5	10	148	4.19	1.66	2.43	4.09			0.013	0.28%	250	31.49	12.99		0.64
Christina Place	110	109	1.19	0.00	0.00	1.19	15	2.5	38	38	4.34	0.30	0.64	0.94			0.013	0.40%	250	37.63	2.50		0.77
	109	108	0.72	0.00	0.00	1.91	8	2.5	20	58	4.30	0.48	0.97	1.45			0.013	0.40%	250	37.63	3.85		0.77
London Drive	113	114	0.87	0.00	0.00	0.87	11	2.5	28	28	4.36	0.22	0.47	0.69			0.013	0.30%	250	32.59	2.12		0.66
	114	115	0.65	0.00	0.00	1.52	8	2.5	20	48	4.32	0.38	0.81	1.19			0.013	0.30%	250	32.59	3.65		0.66
	115	116	0.15	0.00	0.00	1.67	2	2.5	5	53	4.31	0.42	0.89	1.31			0.013	0.30%	250	32.59	4.02		0.66
	117	116	0.52	0.00	0.00	0.52	7	2.5	18	18	4.39	0.13	0.30	0.43			0.013	0.30%	250	32.59	1.32		0.66
	116	122	0.28	0.00	0.00	2.47	4	2.5	10	80	4.27	0.62	1.34	1.96			0.013	0.30%	250	32.59	6.01		0.66
	122	121B	0.34	0.00	0.00	2.81	5	2.5	13	93	4.25	0.70	1.55	2.25			0.013	0.30%	250	32.59	6.90		0.66
	121B	121	0.15	0.00	0.00	2.96	3	2.5	8	100	4.24	0.74	1.67	2.41			0.013	0.30%	250	32.59	7.39		0.66
	121	120	0.18	0.00	0.00	3.14	2	2.5	5	105	4.24	0.79	1.75	2.54			0.013	0.30%	250	32.59	7.79		0.66
	117	118	1.19	0.00	0.00	1.19	15	2.5	38	38	4.34	0.30	0.64	0.94			0.013	0.30%	250	32.59	2.88		0.66
	118	119	0.72	0.00	0.00	1.91	8	2.5	20	58	4.30	0.48	0.97	1.45			0.013	0.30%	250	32.59	4.45		0.66
	119	120	0.47	0.00	0.00	2.38	3	2.5	8	65	4.29	0.60	1.10	1.70			0.013	0.30%	250	32.59	5.22		0.66
	120	112	0.00	0.00	0.00	5.52				170	4.17	1.38	2.79	4.17			0.013	0.30%	250	32.59	12.79		0.66
Victoria Ave	112	111	0.49	0.00	0.00	6.01	3	2.5	8	178	4.17	1.50	2.91	4.41			0.013	0.22%	250	27.91	15.80		0.57
	111	108	0.47	0.00	0.00	6.48	3	2.5	8	185	4.16	1.62	3.03	4.65			0.013	0.18%	250	25.24	18.42		0.51
	108	107	0.94	0.00	0.00	7.42	7	2.5	18	260	4.10	1.86	4.20	6.06			0.013	0.19%	250	25.94	23.36		0.53
	107	90	0.39	0.00	0.00	7.81	3.0	2.5	8	268	4.10	1.86	4.32	6.18			0.013	0.27%	250	30.92	19.99		0.63
Gregory Drive East	90	92	2.17	0.00	0.00	9.98	3	2.5	8	423	4.01	2.50	6.67	9.17			0.013	0.27%	250	30.92	29.66		0.63
	92	93	0.92	0.00	0.00	10.90	5	2.5	13	435	4.00	2.73	6.86	9.59			0.013	0.20%	250	26.61	36.04		0.54
	93	94	0.00	0.00	0.00	10.90				435	4.00	2.73	6.86	9.59			0.013	0.27%	250	30.92	31.02		0.63
Carney Place	98	97	0.90	0.00	0.00	0.90	9	2.5	23	23	4.37	0.23	0.39	0.62			0.013	0.36%	250	35.70	1.74		0.73
	97	96	0.41	0.00	0.00	1.31	5	2.5	13	35	4.34	0.33	0.60	0.93			0.013	0.36%	250	35.70	2.60		0.73
	96	95	0.20	0.00	0.00	1.51	2	2.5	5	40	4.33	0.38	0.68	1.06			0.013	0.36%	250	35.70	2.97		0.73
	95	94	0.13	0.00	0.00	1.64	1	2.5	3	43	4.33	0.41	0.72	1.13			0.013	0.36%	250	35.70	3.17		0.73
Lawson Drive	106	105	1.03	0.00	0.00	1.03	6	2.5	15	15	4.40	0.26	0.26	0.52			0.013	0.31%	250	33.13	1.57		0.67
	105	104	0.75	0.00	0.00	1.78	5	2.5	13	28	4.36	0.45	0.47	0.92			0.013	0.28%	250	31.49	2.92		0.64
	104	103	0.81	0.00	0.00	2.59	3	2.5	8	35	4.34	0.65	0.60	1.25			0.013	0.30%	250	32.59	3.84		0.66
	103	94	0.22	0.00	0.00	2.81	2	2.5	5	40	4.33	0.70	0.68	1.38			0.013	0.38%	250	36.68	3.76		0.75
Gregory Drive East	94	99	0.85	0.00	0.00	16.20	5	2.5	13	530	3.96	4.05	8.26	12.31			0.013	0.27%	250	30.92	39.81		0.63
FM03	99	100	0.75	0.00	0.00	16.95	5	2.5	13	543	3.96	4.24	8.44	**12.68**	**4.99**	**4.99**	0.013	0.33%	250	34.18	**37.10**	**14.60**	0.70
St Clair St South	102	101	1.26	0.00	0.00	1.26	7	2.5	18	18	4.39	0.32	0.30	0.62			0.013	0.29%	250	32.04	1.93		0.65
	101	100	0.27	0.00	0.00	1.53	1	2.5	3	44	4.33	0.38	0.74	1.12			0.013	0.29%	250	32.04	3.50		0.65
Gregory Drive East	100	13	0.05	0.00	0.00	18.53				586	3.94	4.63	9.08	13.71			0.013	0.40%	250	37.63	36.43		0.77
	13	14	0.38	0.29	47.01	67.76	4	2.5	10	961	3.81	0.27	29.64	29.91			0.013	0.22%	375	82.29	36.35		0.75
FM02	14	15	1.00	0.00	47.01	68.76	8	2.5	20	981	3.81	17.19	29.92	**47.11**	**24.42**	**31.17**	0.013	0.20%	375	78.46	**60.05**	**39.73**	0.71
	15	16	1.02	0.00	47.01	69.78	10	2.5	25	1006	3.80	17.45	30.27	47.72			0.013	0.25%	375	87.72	54.41		0.79

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
Maryknoll Road	17	18	0.70	0.00	0.00	0.70	7	2.5	18	18	4.39	0.18	0.30	0.48			0.013	0.43%	250	39.02	1.23		0.79
	18	19	0.89	0.00	0.00	1.59	10	2.5	25	43	4.33	0.40	0.72	1.12			0.013	0.38%	250	36.68	3.05		0.75
	19	20	1.10	0.00	0.00	2.69	12	2.5	30	73	4.28	0.67	1.22	1.89			0.013	0.37%	250	36.19	5.22		0.74
	22	21	1.06	0.00	0.00	1.06	12	2.5	30	30	4.35	0.27	0.51	0.78			0.013	0.37%	250	36.19	2.16		0.74
	21	20	0.70	0.00	0.00	1.76	8	2.5	20	50	4.31	0.44	0.85	1.29			0.013	0.31%	250	32.92	3.92		0.67
	20	28	0.18	0.00	0.00	4.63				123	4.22	1.16	2.03	3.19			0.013	0.40%	250	37.63	8.48		0.77
Lancefield Place	31	31B	0.85	0.00	0.00	0.85	8	2.5	20	20	4.38	0.21	0.34	0.55			0.013	0.36%	250	35.70	1.54		0.73
	31B	31C	0.40	0.00	0.00	1.25	3	2.5	8	28	4.36	0.31	0.47	0.78			0.013	0.49%	250	41.65	1.87		0.85
	31C	30	0.77	0.00	0.00	2.02	8	2.5	20	48	4.32	0.51	0.81	1.32			0.013	0.39%	250	37.16	3.55		0.76
	30	29	0.33	0.00	0.00	2.35	4	2.5	10	58	4.30	0.59	0.97	1.56			0.013	0.47%	250	40.79	3.82		0.83
	29	28	0.22	0.00	0.00	2.57	3	2.5	8	65	4.29	0.64	1.10	1.74			0.013	0.35%	250	35.20	4.94		0.72
	28	27	0.48	0.00	0.00	3.05	4	2.5	10	198	4.15	0.76	3.23	3.99			0.013	0.27%	250	30.92	12.90		0.63
Romheath Road	23	24	0.47	0.00	0.00	0.47	5	2.5	13	13	4.40	0.12	0.22	0.34			0.013	0.29%	250	32.04	1.06		0.65
	24	25	0.15	0.00	0.00	0.62	2	2.5	5	18	4.39	0.16	0.30	0.46			0.013	0.29%	250	32.04	1.44		0.65
	25	26	1.13	0.00	0.00	1.75	9	2.5	23	40	4.33	0.44	0.68	1.12			0.013	0.31%	250	33.13	3.38		0.67
	26	27	0.49	0.00	0.00	2.24	8	2.5	20	60	4.30	0.56	1.01	1.57			0.013	0.32%	250	33.66	4.66		0.69
Helen Street	27	34	0.29	0.00	0.00	5.58	2	2.5	5	263	4.10	1.40	4.24	5.64			0.013	0.24%	250	29.15	19.35		0.59
Ellis Street	38	37	0.72	0.17	0.17	0.89	8	2.5	20	20	4.38	0.22	0.40	0.62			0.013	0.44%	250	39.47	1.56		0.80
	37	36	0.77	0.00	0.17	1.66	8	2.5	20	40	4.33	0.42	0.74	1.16			0.013	0.39%	250	37.16	3.11		0.76
	36	35	0.57	0.00	0.17	2.23	5	2.5	13	53	4.31	0.56	0.95	1.51			0.013	0.39%	250	37.16	4.05		0.76
	35	34	0.56	0.00	0.17	2.79	5	2.5	13	65	4.29	0.70	1.16	1.86			0.013	0.39%	250	37.16	4.99		0.76
								.															
	32	33	1.06	0.00	0.00	1.06	10	2.5	25	25	4.37	0.27	0.43	0.70			0.013	0.45%	250	39.92	1.75		0.81
	33	34	0.93	0.00	0.00	1.99	10	2.5	25	50	4.31	0.50	0.85	1.35			0.013	0.40%	250	37.63	3.59		0.77
Helen Street	34	42	0.16	0.00	0.17	10.52	2	2.5	5	383	4.03	2.63	6.13	8.76			0.013	0.25%	250	29.75	29.43		0.61
Gregory Drive West	39	40	0.00	1.86	1.86	1.86					4.50	0.47	0.60	1.07			0.013	0.43%	250	39.02	2.75		0.79
	40	41	3.94	0.00	1.86	5.80			300*****	300	4.08	1.45	5.41	6.86									
			0.50	0.00	1.86	6.30	5	2.5	13	313	4.07	1.58	5.61	7.19			0.013	0.37%	250	36.19	19.87		0.74
	41	42	0.85	0.00	1.86	7.15	8	2.5	20	333	4.06	1.79	5.91	7.70			0.013	0.39%	250	37.16	20.73		0.76
	42	16	0.95	0.00	2.03	18.62	8	2.5	20	735	3.88	4.66	11.89	16.55			0.013	0.25%	250	29.75	55.62		0.61
	16	43	0.33	0.00	49.04	88.73	3	2.5	7.5	1749	3.63	22.18	40.87	63.05			0.013	0.18%	450	121.03	52.09		0.76
Norway Maple Drive	45	44	0.91	0.00	0.00	0.91	11	2.5	28	28	4.36	0.23	0.47	0.70			0.013	0.39%	250	37.16	1.88		0.76
	44	43	0.89	0.00	0.00	1.80	12	2.5	30	58	4.30	0.45	0.97	1.42			0.013	0.46%	250	40.36	3.52		0.82
	45	46	0.68	0.00	0.00	0.68	8	2.5	20	20	4.38	0.17	0.34	0.51			0.013	0.41%	250	38.10	1.34		0.78
	46	49	0.49	0.00	0.00	1.17	5	2.5	13	33	4.35	0.29	0.56	0.85			0.013	0.46%	250	40.36	2.11		0.82
	48	49	0.78	0.00	0.00	0.78	8	2.5	20	20	4.38	0.20	0.34	0.54			0.013	0.45%	250	39.92	1.35		0.81
	49	49B	0.26	0.00	0.00	2.21	3	2.5	8	60	4.30	0.55	1.01	1.56			0.013	0.82%	250	53.88	2.90		1.10
	49B	50	0.25	0.00	0.00	2.46	3	2.5	8	68	4.29	0.62	1.14	1.76			0.013	0.50%	250	42.07	4.18		0.86

Location			Area				Population				Sewage Flows						Sewer design						
Area No.	From MH	To MH	Residential Hectare	Commercial Hectare	Total Commercial Area	Total Hectare (Comm. + Res.)	No. of Units/Lots	People Per Unit/Lots	Delta Pop.	Total Pop. (340 L/day)	Harmon Peaking Factor	Infilt L/S	Sewage L/S	Total L/S	Flow Monitoring Total (L/s)	Flow Monitoring + Subject Site Total (L/s)	n	Pipe Slope %	Dia. mm	Capacity L/S	Percentage Full %	Flow Monitoring + Subject Site Percent Full %	Velocity m/s
	55	54	0.89	0.00	0.00	0.89	11	2.5	28	28	4.36	0.22	0.47	0.69			0.013	0.39%	250	37.16	1.86		0.76
	54	53	0.92	0.00	0.00	1.81	11	2.5	28	55	4.31	0.45	0.93	1.38			0.013	0.40%	250	37.63	3.67		0.77
	53	50	1.07	0.00	0.00	2.88	13	2.5	33	88	4.26	0.72	1.47	2.19			0.013	0.40%	250	37.63	5.82		0.77
	50	51	0.49	0.00	0.00	5.83	6	2.5	15	170	4.17	1.46	2.79	4.25			0.013	0.39%	250	37.16	11.44		0.76
	51	52	0.89	0.00	0.00	6.72	12	2.5	30	200	4.15	1.68	3.26	4.94			0.013	0.51%	250	42.49	11.63		0.87
	43	52	0.43	0.00	49.04	90.96	5	2.5	13	1819	3.62	22.74	41.78	64.52			0.013	0.18%	450	121.03	53.31		0.76
FM04	52	56	0.80	0.00	49.04	98.48	10	2.5	25	2044	3.58	24.62	44.67	**69.29**	**30.14**	**36.89**	0.013	0.47%	450	195.58	**35.43**	**18.86**	1.23
	56	57	0.36	0.00	49.04	98.84	4	2.5	10	2054	3.58	24.71	44.79	69.50			0.013	0.24%	450	139.76	49.73		0.88
	57	58	0.35	0.00	49.04	99.19	4	2.5	10	2064	3.58	24.80	44.92	69.72			0.013	0.16%	450	114.11	61.10		0.72
	59	58	0.77	0.00	0.00	0.77	8	2.5	20	20	4.38	0.19	0.34	0.53			0.013	0.19%	450	124.35	0.43		0.78
	58	60	0.27	0.00	49.04	100.23	3	2.5	8	2091	3.57	25.06	45.27	70.33			0.013	0.39%	450	178.15	39.48		1.12
	60	61	0.00	0.00	49.04	100.23	0	2.5	0	2091	3.57	25.06	45.27	70.33			0.013	0.21%	450	130.73	53.80		0.82
	61	62	0.00	0.00	49.04	100.23	0	2.5	0	2091	3.57	25.06	45.27	70.33			0.013	0.17%	450	117.62	59.79		0.74
	64	63	0.94	0.00	0.00	0.94	8	2.5	20	20	4.38	0.24	0.34	0.58			0.013	0.40%	250	37.63	1.54		0.77
	63	62	0.28	0.00	0.00	1.22	2	2.5	5	25	4.37	0.31	0.43	0.74			0.013	0.40%	250	37.63	1.97		0.77
	62	65	0.95	0.00	49.04	102.40	4	2.5	10	2126	3.57	25.60	45.72	71.32			0.013	0.40%	450	180.42	39.53		1.13
	65	66	0.35	0.00	49.04	102.75	2	2.5	5	2131	3.56	25.69	45.78	71.47			0.013	0.40%	450	180.42	39.61		1.13
Paxton Drive	74	73	0.46	0.00	0.00	0.46	3	2.5	8	8	4.43	0.12	0.13	0.25			0.013	0.40%	250	37.63	0.66		0.77
	73	72	0.56	0.00	0.00	1.02	5	2.5	13	20	4.38	0.26	0.34	0.60			0.013	0.40%	250	37.63	1.59		0.77
	72	71	0.98	0.00	0.00	2.00	8	2.5	20	40	4.33	0.50	0.68	1.18			0.013	0.40%	250	37.63	3.14		0.77
	71	70	1.01	0.00	0.00	3.01	8	2.5	20	60	4.30	0.75	1.01	1.76			0.013	0.40%	250	37.63	4.68		0.77
	70	69	0.88	0.00	0.00	3.89	7	2.5	18	78	4.27	0.97	1.30	2.27			0.013	0.40%	250	37.63	6.03		0.77
Aspen Crescent	68	69	1.44	0.00	0.00	1.44	6	2.5	15	15	4.40	0.36	0.26	0.62			0.013	0.40%	250	37.63	1.65		0.77
	69	67	0.43	0.00	0.00	5.76	4	2.5	10	103	4.24	1.44	1.71	3.15			0.013	0.40%	250	37.63	8.37		0.77
	67	66	0.25	0.00	0.00	6.01	2	2.5	5	108	4.23	1.50	1.79	3.29			0.013	0.40%	250	37.63	8.74		0.77
Orangewood Boulevard (FM05)	66	77	0.46	0.00	49.04	109.22	5	2.5	13	2251	3.55	27.31	47.29	**74.60**	**28.62**	**35.37**	0.013	0.40%	450	180.42	**41.35**	**18.91**	1.13
			0.00	1.30	50.34	110.52					4.50	27.63	16.31	43.94			0.013	0.43%	450	187.07	23.49		1.18
	77	78	1.35	0.00	50.34	111.87	12	2.5	30	2281	3.54	27.97	48.09	76.06	—	36.83^{+++}	0.013	0.16%	450	114.11	66.66	32.28^{+++}	0.72
Irene Crescent	80	79	1.10	0.00	0.00	1.10	14	2.5	35	35	4.34	0.28	0.60	0.88			0.013	0.40%	250	37.63	2.34		0.77
	79	78	0.75	0.00	0.00	1.85	9	2.5	23	58	4.30	0.46	0.97	1.43			0.013	0.40%	250	37.63	3.80		0.77
Orangewood Boulevard	78	78B	0.50	0.00	50.34	114.22	5	2.5	13	2351	3.53	28.56	48.97	77.53	—	38.30^{+++}	0.013	0.13%	450	103.25	75.09	37.09^{+++}	0.65

* Design Parameters obtained from Table B.2 from the Chatam-Kent Watermain and Sanitary Design Manual (2023)
** Design Parameters obtained from 5.5.2.2 MOE Design Guidelines for Sewage Works (2008)
*** Number of Units obtained from Site Plan by Patrick David Trottier Architect dated October 23, 2023
**** Private drain connection of subject site assumed to be 200 mm at 1.0%. Pipe design subject to change at detailed design.
***** Population of 300 students based on the average size class of 30 students and grades JK-8.
$^{+}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM06, and as applied to the sewer sections MH8 to 11.
$^{++}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM01, and as applied to the sewer section MH11 to MH13.
$^{+++}$ Extrapolated data point using the difference between the theoretical design flow and PWWF + Subject Site flow at FM05, and as applied to the sewer section MH77 to MH78B.

Notes:
1. Please refer to "Figure 1: Study Area and Monitoring Locations" from the Flow Monitoring Report by Civica Infrastructure Inc. dated February 18, 2025, provided in Appendix C, for flow monitor locations.
2. Please refer to the Sanitary Layout Sheet (Markup of Municipal's Sanitary Sewer Collection System drawing), provided in Appendix C, for the catchment areas and associated manholes.
3. The Capacity of PS11 &PS18 to be confirmed by the Municipality prior to detailed design.



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N W E S

Sanitary Pump Station No.11
Sanitary Sewer Collection System
Community of Chatham

Chatham-Kent
Cultivating Growth, Shore to Shore

APPENDIX D

Flow Monitoring Report prepared by Civica dated February 18, 2025

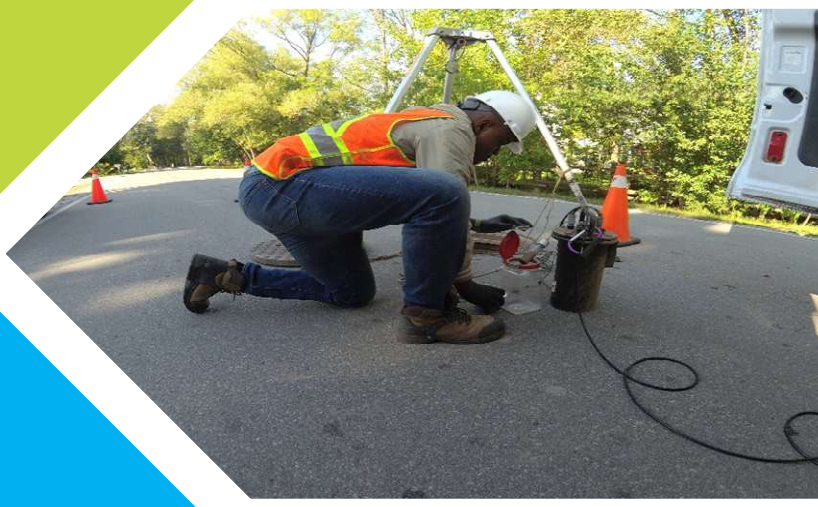
CIVICA
Water Management Solutions

Prepared for

Chatham-Kent

Report for

Measure Sewer flow rates at 6 locations in Chatham-Kent



February 18, 2025

155 Winges Road, Unit 8/9
Vaughan, Ontario, Canada L6A 4P5

(905) 417-9792

www.civi.ca

STATEMENT OF QUALIFICATIONS AND LIMITATIONS

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February 18, 2025 **CIVICA Ref: SBM24-0001**

Strik, Baldinelli, Moniz Ltd. (SBM)
Louis Pinsonneault, P.Eng.
Civil Project Lead, Eng II
P: 519-471-6667 x 158
E: lpinsonneault@sbmltd.ca

Attention: Mr. Louis Pinsonneault

RE: Measure Sewer flow rates at 6 locations- Chatham-Kent

Dear Mr. Louis Pinsonneault:

Civica Infrastructure Inc. (Civica) is pleased to submit the report on the sanitary flow monitoring conducted within the Chatham-Kent development located in the Town of Chatham. This document outlines the methodologies and results of the monitoring conducted and details the dry and wet-weather flows measured during the monitoring period.

Please let me know if you have any comments or questions.

Sincerely,

CIVICA INFRASTRUCTURE INC.

Muhammad Umer Gill
Project Manager, Field Services

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Objective 1
1.2 Study Area 1

2.0 Methodology 1

2.1 Rainfall Monitoring 1
2.2 Flow Monitoring 1

2.2.1 Data QA/QC and Process 4

2.2.2 Analysis of Flow Monitoring Data 4

3.0 Monitoring Data Analysis 6

3.1 Dry-Weather Flow Analysis 6
3.2 Rainfall Data Analysis 7
3.3 Wet-Weather Flow Analysis 7

4.0 Conclusions 9

List of Figures

Figure 1: Study Area and Monitoring Locations 3
Figure 2: Sanitary Flow Components 5

List of Tables

Table 1. Dry-Weather Flow Results 6
Table 2: Rainfall Event Characteristics 7
Table 3: Wet Weather Flow Analysis 7
Table 4: FM02 Wet Weather Flow Analysis 8
Table 5: FM03 Wet Weather Flow Analysis 8
Table 6: FM04 Wet Weather Flow Analysis 8
Table 7: FM05 Wet Weather Flow Analysis 9
Table 8: FM06 Wet Weather Flow Analysis 9

1.0 Introduction

1.1 Objective

The primary objective of the flow monitoring was to measure the wet weather flows within a sanitary sewer located on Chatham-Kent during at least two (2) rainfall events of 20 mm or greater precipitation over a 24-hour period.

1.2 Study Area

The project study area consisted of the catchment area upstream of the monitored sanitary sewer on Chatam-Kent. **Figure 1** shows the study area.

2.0 Methodology

Six (6) flow monitor was installed within the study area, and the monitoring equipment was installed for a duration of approximately 3 months from September 19, 2024 to January 08, 2025. The data collected during the study was hosted and analyzed by Civica's DataCurrent software system. During the monitoring period, automated alarming was setup to alert Civica staff of any potential data quality issues.

2.1 Rainfall Monitoring

The frequency and magnitude of storms are crucial for assessing the suitability of data for model calibration. Increased storm frequency and greater magnitude enhance the reliability and accuracy of RDII analysis. Storm events exceeding 15 mm are generally considered significant and were used as the minimum threshold for inclusion in the RDII analysis.

Detectronic Rain Gauge Data Loggers, connected to Novalynx Tipping Buckets, were used in this project to monitor precipitation. The rain gauge collected data at 5-minute intervals and transmitted it daily via telemetry to Civica's servers. The gauge was calibrated after installation according to the manufacturer's specifications and inspected as needed to prevent the accumulation of leaves or debris in the funnel over the course of the study.

Data from the rain gauge supported the flow monitoring data analysis. An Intensity-Duration-Frequency (IDF) analysis was conducted to classify and compare the measured storms with the Stratford WWTP IDF design storm.

2.2 Flow Monitoring

Area-velocity (A/V) flow meters and mounting rings were used at all sites to quantify flow in the catchment area and capture high-resolution data. The flow meters recorded data at 5-minute intervals to ensure accurate and detailed measurements. They were calibrated on-site after installation, then monthly for regular maintenance and quality assurance.

The data collected during this project was managed and analyzed using the DataCurrent software system. Data from the meters was transmitted daily via telemetry and uploaded to DataCurrent. This

system provided automated alarms to alert Civica staff of potential flow meter issues (e.g., low battery, debris buildup, surcharge).

One of the six flow meters used in this study was the Detectronic MSFM Ultrasonic Flow Monitor, which monitored flow in the sanitary sewer system. This monitor collected depth data at 5-minute intervals and transmitted it daily to Civica's servers. It was calibrated in situ after installation and biweekly for regular maintenance and quality assurance. **Figure 1.**

Figure 1: Study Area and Monitoring Locations

2.2.1 Data QA/QC and Process

The data retrieved remotely from the on-site data loggers is immediately sent through a comprehensive data screening and QA/QC process and stored in a database on the cloud. The real-time data will be organized and presented through Civica's DataCurrent software. The data screening applies real-time verification of the data by testing values of velocities, levels, and flow against:

- Trend analysis for identifying debris build up.
- Dry weather flow confidence limits
- Dry weather flow trends for average, peak, and minimum
- Manning's value of velocity (scatter-point analysis)
- Response during wet weather conditions (rainfall and snowmelt)

Confidence limits and trend analysis will incorporate statistics previously collected by Civica. These verification tests ensure that data which measures outside of normal limits can be evaluated prior to data certification and application to further analysis. This methodology ensures the best data reliability and accuracy of coverage. Quality Assurance and Quality Control (QA/QC) of monitoring data is critical to ensure accurate and reliable analysis results.

2.2.2 Analysis of Flow Monitoring Data

A sanitary sewer system receives two flow components that have been analyzed during this project:

1) Dry-Weather Flow (DWF); and,

2) Wet-Weather Flow (WWF)

The DWF component is separated into population generated sewage flow and groundwater infiltration (GWI). Population sewage flow is produced by routine water usage in the residential, commercial, and industrial areas of a given sanitary collection system. Dry-weather GWI will enter the collection system when the relative depth of the groundwater table is higher than the elevation of the sewer, and when the condition of the sanitary sewer pipe allows infiltration through defects, such as cracks, misaligned joints, and broken pipelines. GWI is not specific to a single rainfall event. Instead, it affects the collection system over an entire year (including the dry-weather season).

Peak I&I per area is the main metric used to assess the overall I&I condition of a catchment and is based off of the peak I&I flow measured at a flow monitoring station divided by the area upstream. The wet-weather analysis separates the dry and wet-weather contributions.

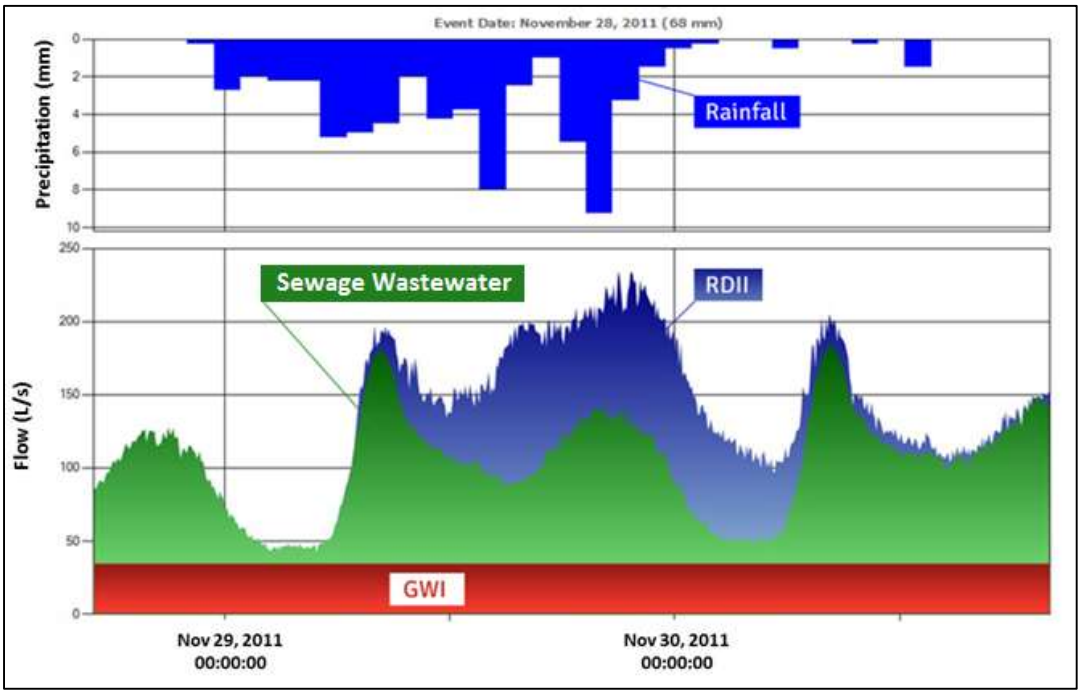

Figure 2: Sanitary Flow Components

3.0 Monitoring Data Analysis

3.1 Dry-Weather Flow Analysis

The following DWF parameters were calculated:

- Average DWF (L/s)
- Average Daily Maximum DWF (L/s)
- Average Daily Minimum DWF (L/s)
- Measured Peaking Factor
- Dry-Weather Groundwater Infiltration (L/s)

The average DWF is a combination of sewage and groundwater infiltration, with sewage typically being the largest proportion. The Minimum DWF typically occurs at night-time (between 1:00 am and 3:00 am), and for smaller sewersheds it is typically 70-90% GWI. (The percentage of GWI is typically less in large sewersheds, due to a larger proportion of the customer sewage flow arriving at the basin outlet after a longer delay in transit).

For the purposes of this study, the GWI is considered to be 85% of the minimum DWF. Dry-weather GWI will enter the sewer system when the depth of the groundwater table is higher than the elevation of the pipeline, and reaches joint, or pipe defects; as well as, when the condition of the sewer pipe allows for infiltration (e.g. water level outside of the pipe is higher than inside). Seasonal variations of GWI occur due to changes in groundwater table elevations and soil saturation. Typically, rates increase during springtime after snowmelt, and can remain relatively constant over weeks, and months thereafter.

The DWF results for the monitoring period are summarized below in **Table 1**..

Table 1. Dry-Weather Flow Results

Station	Avg DWF	Avg Daily Max DWF	Avg Daily Min DWF	Peaking Factor	GWI	
	L/s	L/s	L/s	N/A	L/s	%
FM01	3.68	13.33	0.01	3.63	0.01	0.25%
FM02	5.41	15.35	0.04	2.84	0.03	0.63%
FM03	1.08	2.95	0.12	2.75	0.10	9.16%
FM04	9.30	20.01	2.05	2.15	1.74	18.74%
FM05	9.30	18.64	0.19	2.01	0.16	1.72%
FM06	0.39	11.97	0.01	30.42	0.01	1.25

(1) Average DWF = Average measured flow during a period of dry weather condition (no rain events or a maximum rain event of 2.5 mm).
(2) Measured Peaking Factor = Daily Average Peak DWF ÷ Average DWF
(3) Ground Water Infiltration (GWI) = 85% of Average Daily Minimum Flow

3.2 Rainfall Data Analysis

A summary of the rainfall amounts and intensities for all events greater than 15 mm that were recorded during the monitoring period are presented in **Table 2** below.

Table 2: Rainfall Event Characteristics

Date	Total Rainfall (mm)	Duration (hr)	Peak Hourly Intensity (mm/hr)
Oct 01, 2024	18.50	7.00	11.20
Oct 12, 2024	42.25	34.25	7.00
Nov 10, 2024	17.25	4.75	8.20
Dec 29, 2024	42.50	27.50	4.00

An Intensity-Duration-Frequency (IDF) analysis was performed to classify and compare the measured storms with Environment and Climate Change Canada IDF curves for the area.

3.3 Wet-Weather Flow Analysis

WWF includes stormwater inflow, trench infiltration, and groundwater infiltration, and is generally a response to a rain event within the study area. Analysis of the peak flows and I&I responses recorded during the flow monitoring period was completed for all rain events greater than 15 mm. The results are summarized in **Table 3.**

Table 3: FM01 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	14.68	10.75
Oct 12, 2024	42.25	34.25	7.00	16.21	15.03
Nov 10, 2024	17.25	4.75	8.20	22.20	17.41
Dec 29, 2024	42.50	27.50	4.00	18.85	17.19

Table 4: FM02 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	19.93	13.88
Oct 12, 2024	42.25	34.25	7.00	17.75	15.84
Nov 10, 2024	17.25	4.75	8.20	24.42	16.66
Dec 29, 2024	42.50	27.50	4.00	22.13	19.59

Table 5: FM03 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	4.50	2.64
Oct 12, 2024	42.25	34.25	7.00	3.72	2.58
Nov 10, 2024	17.25	4.75	8.20	4.56	2.90
Dec 29, 2024	42.50	27.50	4.00	4.99	3.38

Table 6: FM04 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	24.01	12.48
Oct 12, 2024	42.25	34.25	7.00	20.28	14.46
Nov 10, 2024	17.25	4.75	8.20	30.14	15.26
Dec 29, 2024	42.50	27.50	4.00	27.71	21.56

Table 7: FM05 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	24.86	12.02
Oct 12, 2024	42.25	34.25	7.00	22.55	17.03
Nov 10, 2024	17.25	4.75	8.20	26.31	13.35
Dec 29, 2024	42.50	27.50	4.00	26.82	21.62

Table 8: FM06 Wet Weather Flow Analysis

Rainfall Event				Observed Flow Characteristics	
Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
	(mm)	(hr)	(mm/hr	L/s	L/s
Oct 01, 2024	18.50	7.00	11.20	13.22	12.50
Oct 12, 2024	42.25	34.25	7.00	15.10	14.32
Nov 10, 2024	17.25	4.75	8.25	N/A [2]	N/A [2]
Dec 29, 2024	42.50	27.50	4.00	12.96	12.94

[1] An event is a storm with a minimum volume of 15mm and a minimum inter-event dry period of 12 hours
[2] I/I event analysis unable to be completed due to missing flow monitoring data during event

4.0 Conclusions

Based on the data collected during the monitoring period, the following conclusions are made:

1. Here's a table summarizing the average daily dry weather flow rates and other related data:

Flow Monitoring ID	Average Daily Dry Weather Flow (L/s)	Estimated Average Daily Peak Dry Weather Flow (L/s)	Groundwater Infiltration Rate (L/s)
FM01	3.68	13.33	0.01
FM02	5.41	15.35	0.03
FM03	1.08	2.95	0.12
FM04	9.30	20.01	1.74
FM05	9.30	18.64	0.16
FM06	0.39	11.97	0.01

FM01 and FM02: These have relatively high average daily flow rates and groundwater infiltration values compared to the others, with FM02 showing the highest peak dry weather flow.

FM03: Shows the lowest flow rate, with a significant difference between the average daily flow and the peak dry weather flow.

FM04 and FM05: Both meters have higher average flow rates, and FM04 also has a notably high groundwater infiltration rate, suggesting more groundwater entering the system in this area.

FM06: Has the lowest average flow rate but still shows a relatively high estimated peak dry weather flow compared to its average.

2. Four (4) rainfall events of 15 mm or greater over a 24-hour period were recorded on October 1st, 2024, October 12th, 2024, November 10th, 2024, and December 29th, 2024.
3. The highest measured flow for each flow meter during the rain events is summarized below:

Flow Monitoring ID	Rainfall Event				Observed Flow Characteristics	
	Date	Total Rainfall	Duration	Peak Hourly Intensity (mm/hr)	Peak Flow	Peak I&I Flow
		(mm)	(hr)	(mm/hr	L/s	L/s
FM01	Nov 10, 2024	17.25	4.75	8.20	22.20	17.41
FM02	Nov 10, 2024	17.25	4.75	8.20	24.42	16.66
FM03	Dec 29, 2024	42.50	27.50	4.00	4.99	3.38
FM04	Nov 10, 2024	17.25	4.75	8.20	30.14	15.26
FM05	Dec 29, 2024	42.50	27.50	4.00	26.82	21.62
FM06	Oct 12, 2024	42.25	34.25	7.00	15.10	14.32

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APPENDIX E

Runoff Coefficient Calculations by SBM

STRIK BALDINELLI MONIZ
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LONDON LOCATION
1599 Adelaide St. N., Unit 301
London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
132 Queen St. S. Unit 4
Kitchener, ON N2G 1V9
P: 519-725-8093

www.sbmltd.ca

sbm@sbmltd.ca

C' Coefficient Calculations

DATE:	February 21, 2024
JOB N0.:	SBM-23-2723

Client:	**York Developments**
Project:	**Proposed Residential Buildings**
Location:	**756 St. Clair Street, Chatham, ON**

PRE-DEVELOPMENT CONDITIONS*

PRE-DEVELOPMENT OVERALL SITE:

	Area (m^2)	C	A*C
Total Site Area:	37,782.00		
Building/Conc./Asphalt:	34,062.00	0.9	30655.8
Gravel	0.00	0.7	0
Landscaped/Open:	3,720.00	0.25	930
Totals:	37,782.00		31585.8
C_{eq} = Sum(A*C)/Sum(A) =	0.84		

POST-DEVELOPMENT CONDITIONS**

POST-DEVELOPMENT OVERALL SITE:

	Area (m^2)	C	A*C
Total Site Area:	37,782.00		
Building Area:	6,755.60	0.9	6080.04
Concrete/Asphalt:	17,604.50	0.9	15844.05
Gravel	0.00	0.7	0
Landscaped/Open:	13,421.90	0.25	3355.475
Totals:	37,782.00		25279.565
C_{eq} = Sum(A*C)/Sum(A) =	0.67		

*Pre-Development Conditions were obtained from the Stantec Servicing File No. 161401102 dated February 28, 2011
**Post-Development Conditions were obtained from the Site Plan and Zoning Chart prepared by Patrick David Trottier Architect dated October 10, 2023