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

April 24, 2024

SBM-24-0147

South London Investments Inc.
52 Song Bird Drive
Markham, Ontario

Attn: Siju Mathew

Re: Servicing Feasibility Study
Proposed 46 Unit Apartment Building
539 & 543 Topping Lane, London, ON

1. INTRODUCTION

This Servicing Feasibility Study (Study) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) for South London Investments Inc. to address the servicing feasibility for the proposed 46-unit apartment building located at 539 & 543 Topping Lane in London, Ontario.

The subject site is approximately 0.29 ha in size. The property borders the Topping Lane Right-of-Way (ROW) to the east, Eaton Park Drive ROW to the south and residential properties to the north and west. The proposed building is 4 storeys with a total of 46 residential units for a building footprint area of 1380 m^2. Please refer to the proposed Conceptual Site Plan prepared by Siv-ik Planning and Design, January 24, 2024, attached to this Study.

This Study is to determine the adequacy of the existing municipal services in support of a Zoning By-Law Amendment (ZBA) for the proposed development as specified in the Record of Pre-Application Consultation dated October 26, 2023.

Design requirements have been based on the City of London Design Specifications & Requirements Manual (DS&RM), updated March 2022.

2. SANITARY SERVICING

As per the City's as-constructed drawing No. 16,925, appended to this Study, the site is tributary to the 200mm diameter sanitary sewer on Eaton Park Drive ROW and an existing sanitary PDC is shown (size/slope/elevation not identified).

The sanitary peak flow for the proposed development was calculated by multiplying the proposed 46 units by the high-density zoning of 1.6 people/unit as per the DS&RM Section 3.8.1. The resulting population of about 74 people was then multiplied by the design usage of 230 L/cap/day as per Section 8.3.1 of the DS&RM, the Harmon peaking factor "M", and the development uncertainty factor of 1.1. The resulting sewage flow of 0.92 L/s was then added to the site infiltration allowance of 0.03 L/s/ha for a resulting peak sanitary flow of 0.95 L/s. Please refer to the Sanitary Sewer Design Sheet provided in this. A new sanitary PDC will be designed as part of Site Plan Approval.

3. STORM SERVICING

Pre-development conditions were obtained from Topographical Plan of Survey prepared by Callon Dietz, appended to this Study. Under pre-development conditions, the approximately 0.29 ha site is comprised of 2 existing buildings, landscaped/open space, and asphalt driveways. As per the City's record drawings No. 16,925 and No. 3275, appended to this Study, there is no existing stormwater infrastructure within the ROW immediately fronting the subject site. It is proposed to either extend the sewer within the Topping Lane ROW or the Eaton Park Drive ROW to the proposed development. This will be evaluated in more detail as part of the Site Plan Approval process. Based on the Record of Pre-Application Consultation, we understand the City is amenable to either option in principle.

Runoff coefficient calculations were prepared based on the Conceptual Site Plan, which result in a runoff coefficient (C-value) of 0.61. Stormwater management quantity controls will be implemented to restrict development flows to predevelopment levels for the 2–100-year return period storms. The existing topography directs overland flows from the proposed site through 427 Eaton Park Drive. Overland flows will be reduced/eliminated through the adjacent private property and directed towards the adjacent municipal ROW. Stormwater management quality controls will be implemented during the detailed design for Site Plan Approval.

An erosion/sediment control plan, site servicing plan, and detailed site grading plan will be provided as part of the detailed design for Site Plan Approval.

4. WATER SERVICING

As specified in the Record of Pre-Application Consultation, water modelling was undertaken to ensure capacity in the 150mm diameter existing main to service the proposed development. The EPANET model extends from Commissioners Road West to Berkshire Drive as well as along Eaton Drive to Westmorland Rd and north to Berkshire Drive and includes all demands along Topping Lane. The Eaton Drive watermain west of Westmorland Rd was conservatively ignored. Nodes were specified based on the locations of existing water services, and demands calculated based on the number of high, medium, or low residential units. Node elevations were determined using as-built drawings. The reservoir HGL was determined through the fire-fighting flow calculations.

The proposed building will include a sprinkler system; therefore, the fire-fighting demand was determined as per NFPA-13. The proposed building will have 'Light Occupancy' (for residential occupancy) (refer to Annex A - Section A.5.3.1 of the NFPA-13). As per the attached NFPA-13 Flow Demand Requirements Table and the attached fire flow calculations, the required flow (including both the sprinkler flow and hydrant allowance) is estimated to be 17.35 L/s. When combined with the maximum day demand, the resulting demand used for modelling is 18.12 L/s.

As per the NFPA-13 and the OBC Part 3 requirements, the fire hydrant(s) shall be located 45m from the building's Siamese connection. There are two fire hydrants within the Eaton Park Drive ROW and Topping Lane ROW that are further than 45m from the proposed building. Therefore, a private hydrant is required. The location and calculations for the private site hydrant will be provided during the detailed phase of design.

Three (3) scenarios were modelled:

1. The maximum hourly flow results show that the minimum pressure in the system is 35.76m (50.84 psi), which is greater than the 275 kPa (40 psi), required by the DS&RM. The maximum velocity during the maximum hour demand is 0.39 m/s, which is less than the maximum velocity of 1.5 m/s, required by the DS&RM.
2. A maximum day plus fire flow scenario was undertaken considering the fire demand of the subject site. The results show that the lowest pressure is 35.60m (50.62 psi), which is higher than the minimum required pressure of 140 kPa (20psi) during maximum day demand plus fire flow as per DS&RM. The maximum velocity in the system during the maximum day plus firefighting demand is 0.50 m/s which is less than the maximum velocity of 2.4 m/s required per DS&RM section 7.3.6.
3. A maximum day flow plus fire flow demand scenario was undertaken assuming 76 L/s at the existing fire hydrant located in front of Mun No. 561 Topping Lane which connects directly to a 150mm watermain. The hydrant in front of Mun No. 524 Topping Lane was not modelled since it connects to the existing 300mm watermain directly so is anticipated to be less critical than the modelled hydrant. The results show that the lowest pressure is 28.18 m (40.07 psi), which is higher than minimum required pressure of 140 kPa (20psi) during maximum day demand plus fire flow as per DS&RM. The maximum velocity in the system during the maximum day plus firefighting demand is 2.31 m/s which is less than the maximum velocity of 2.4 m/s required as per DS&RM section 7.3.6.

5. LIMITATIONS

This Study was prepared by SBM for South London Investments Inc. and the City of London. 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.

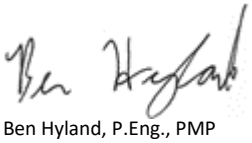
6. CLOSURE

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



Ben Hyland, P.Eng., PMP
Civil Project & Team Lead, Eng III
Associate I

Mariana Rodriguez Chiquiza
Civil Engineering Intern

List of Appendices

Appendix A: City of London Record Drawing 16925 prepared by Eaton Park Drive prepared by Archibald, Gray & McKay Engineering Ltd. dated November 2001.
City of London Record Drawing 3275 prepared by R.C Dunn Associates Ltd. dated September 1991
City of London Record Drawing 17028 prepared by Earth Tech. dated July 18, 2002
City of London Record Drawing W.D.-68 prepared by the City of London dated July 13
Concept Plan prepared by Siv-ik Planning & Design dated January 24, 2024

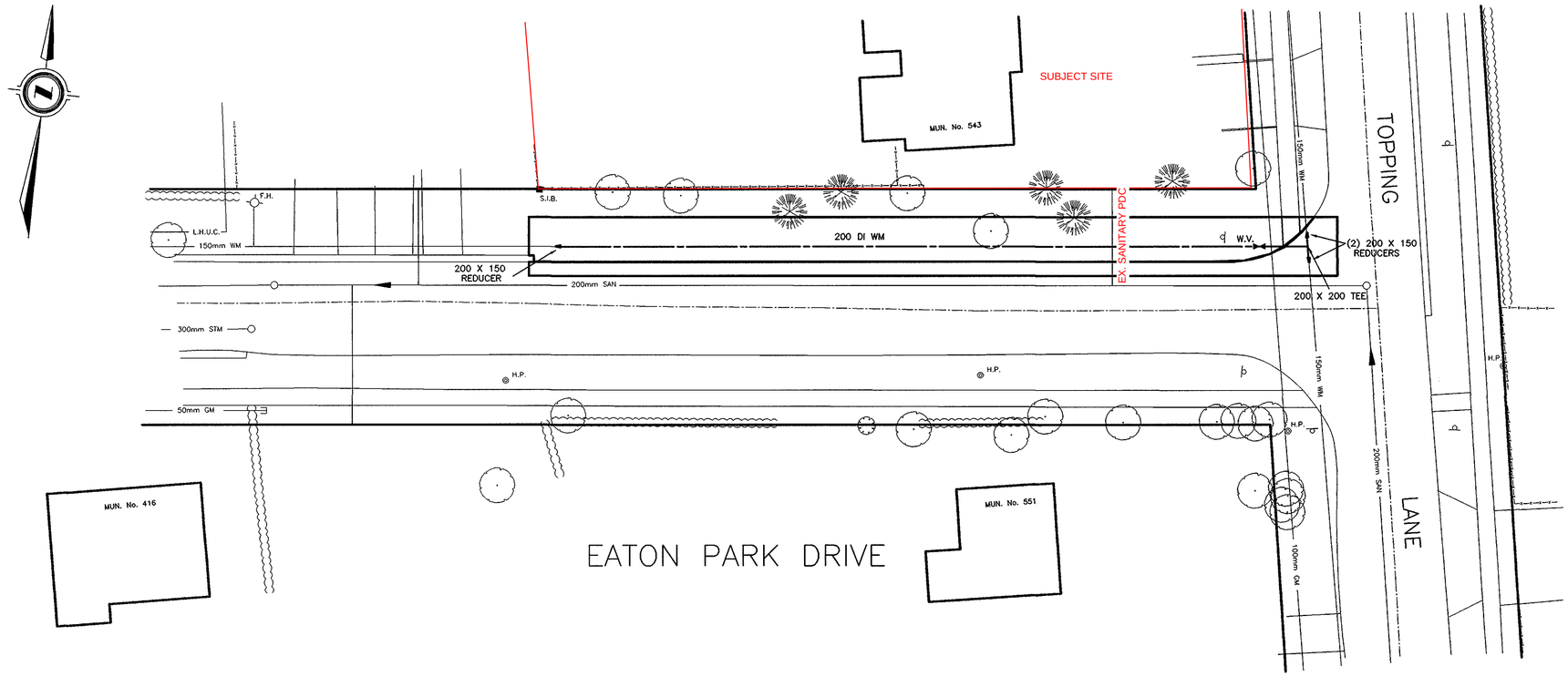
Appendix B: Sanitary Sewer Design Sheet by SBM

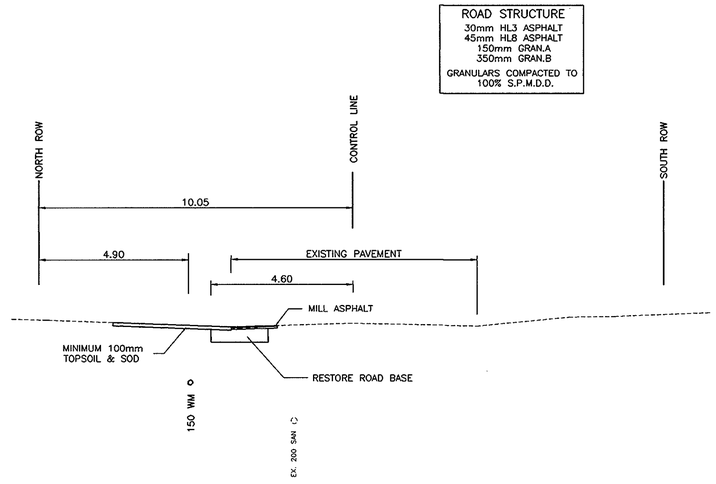
Appendix C: Runoff Coefficient Calculations by SBM

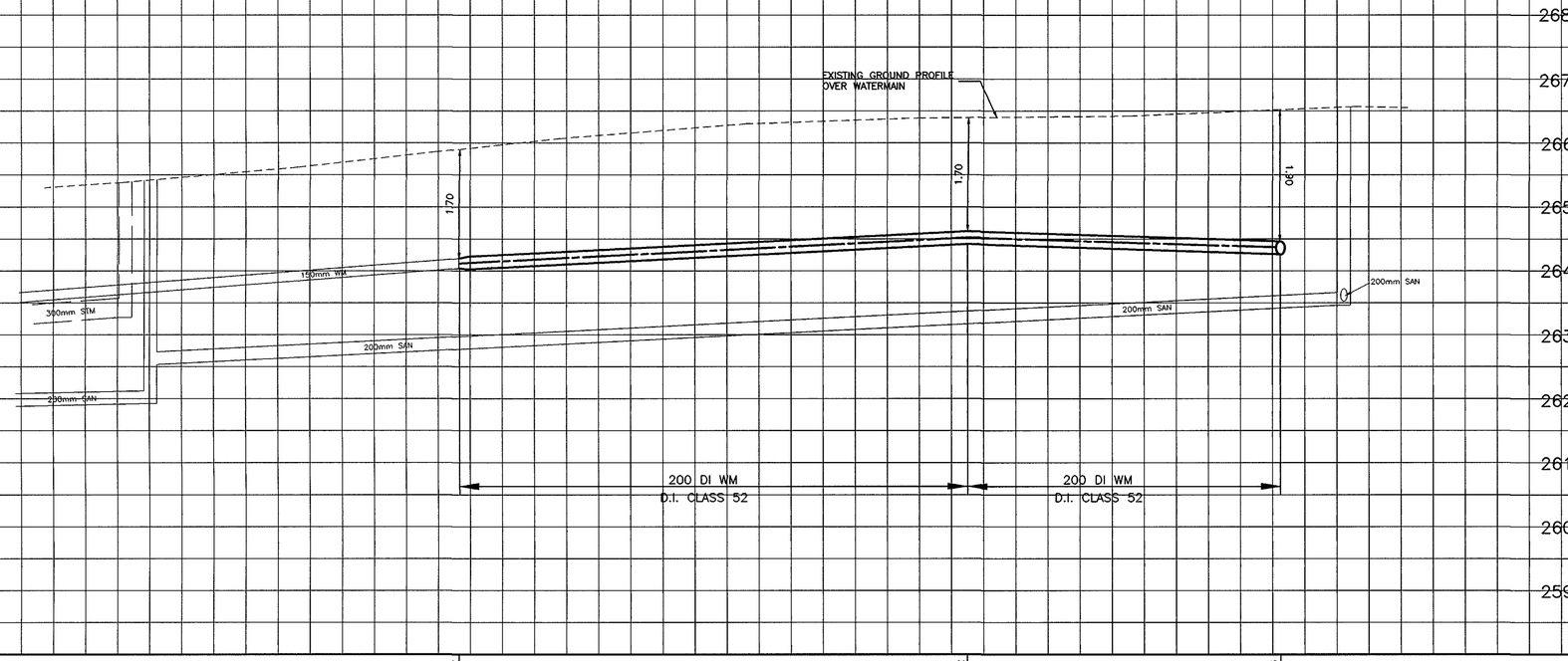
Appendix D: Hydrant Flow test No. 16-47 prepared by City of London dated October 12, 2016
Domestic Water Demand & EPANET Node Demand Calculations by SBM
Fire-Fighting Flow Demand Calculations (NFPA#13) by SBM
NFPA13 Guidelines
EPANET Model Layout Max Hour Demand prepared by SBM
EPANET Model Layout Max Day + Fire Flow Demand (Site) prepared by SBM
EPANET Model Layout Max Day + Fire Flow Demand (FH2) prepared by SBM
EPANET Hydraulic and Water Quality Analysis for Max Hour Demand by SBM
EPANET Hydraulic and Water Quality Analysis for Max Day + Fire Flow Demand (Site) by SBM
EPANET Hydraulic and Water Quality Analysis for Max Day + Fire Flow Demand (FH2) by SBM

APPENDIX A

City of London Record Drawing 16925 prepared by Eaton Park Drive prepared by Archibald, Gray & McKay Engineering Ltd. dated November 2001.
City of London Record Drawing 3275 prepared by R.C Dunn Associates Ltd. dated September 1991
City of London Record Drawing 17028 prepared by Earth Tech. dated July 18, 2002
City of London Record Drawing W.D.-68 prepared by the City of London dated July 13
Concept Plan prepared by Siv-ik Planning & Design dated January 24, 2024







STATION	0+895	0+910	0+925	0+930.3	0+940	0+955	0+970	0+985	0+994.3	1+000
C/L WATERMAIN ELEVATION				264.14			264.52		264.36	
STORM SEWER INVERT										
SANITARY SEWER INVERT										

AS CONSTRUCTED NOTES
1 SEE DRAWING No. FOR FURTHER DETAILS.
2 SEWER DESIGN:TRANSITION WIDTH OR AS NOTED.
3 REFERENCE B.M. TBM 19 ELEVATION 268.520
4 SAN.P.D.C.'s 100mm DIA. UNLESS OTHERWISE NOTED

AS CONSTRUCTED SERVICES	COMPLETION
WATERMAIN, SERVICES	JULY 2001
GRANULAR BASE	JULY 2001
PAVEMENT – BASE	JULY 2001
– SURFACE	JULY 2001

DESIGN	HES,JHD
DRAWN	JHD
CHECKED	HES,DTW
APPROVED	HES
DATE	FEB'2001

No.	REVISIONS	DATE	BY
1	AS CONSTRUCTED	NOV. 2001	JHD

CONSULTANT OR DIVISION

AGM SURVEYING • ENGINEERING

ARCHIBALD, GRAY & McKAY ENGINEERING LTD.
LONDON 685-5300

ENGINEER'S SEAL — LICENSED PROFESSIONAL ENGINEER — H. E. SCHUURMANS — PROVINCE OF ONTARIO

CORPORATION OF THE CITY OF LONDON

DIVISION HEAD _____ CITY ENGINEER _____

HORZ 1 : 250 (2,5 0 5m)

VERT 1 : 50 (0,5 0 1m)

TITLE

CITY OF LONDON
SEWER AND WATER CONTRACT 2

EATON PARK DRIVE

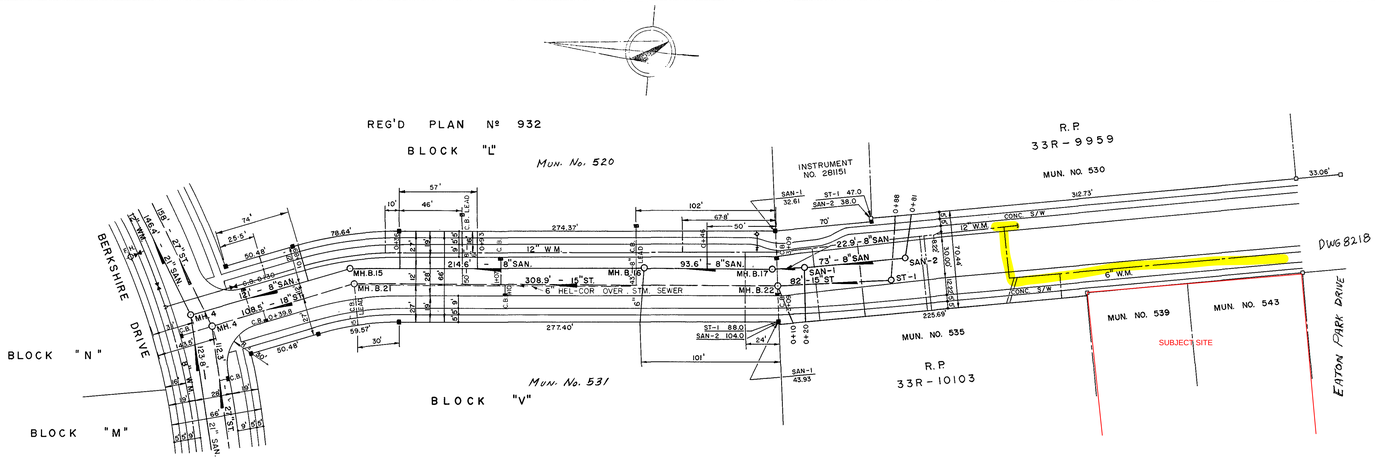
EAST OF WESTMORLAND TO TOPPING LANE

PROJECT No. 1099-01-2

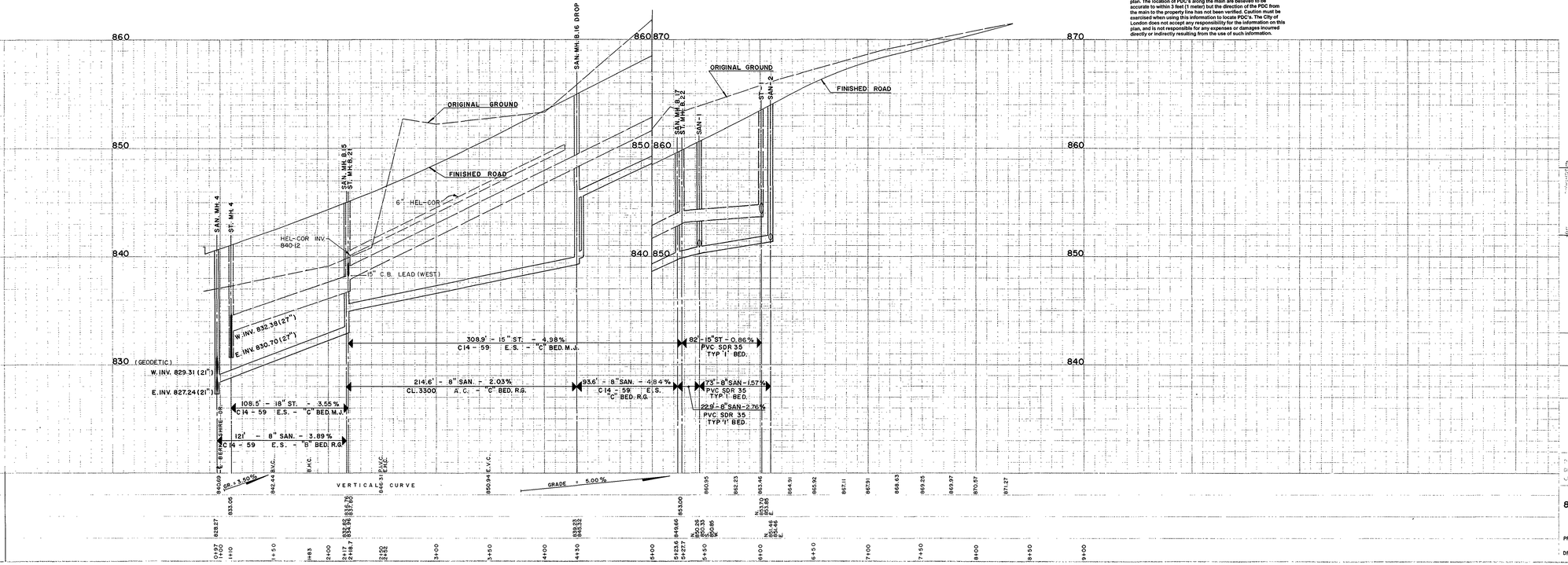
SHEET No. 15

PLAN FILE No. 16,925

\ AS-BUILTS \ EATON PARK \ AS-EATONPRO.DWG



T O P P I N G L A N D



℄ FINISHED ROAD
STORM INVERT
SANITARY INVERT
℄ STATION

Caution:
Private Drain Connection (PDC) information has been added to this plan. The location of PDC's along the main are believed to be accurate to within 3 feet (1 meter) but the direction of the PDC from the main to the property line has not been verified. Caution must be exercised when using this information to locate PDC's. The City of London does not accept any responsibility for the information on this plan, and is not responsible for any expenses or damages incurred directly or indirectly resulting from the use of such information.

NOTES

1 WATERMAIN COVER REQUIREMENT WAS 6 FEET TO 7 FEET
2 ALL CURB AND GUTTER RADII ARE 25 FEET UNLESS OTHERWISE NOTED
3 CATCH BASINS AT INTERSECTIONS ARE LOCATED 2 FEET FROM THE TANGENTS OF CURVES UNLESS OTHERWISE SHOWN
4 FOR DETAILS SEE DRAWING Nº 2
5 SEWER SERVICES AT MAINS ARE MEASURED FROM ℄ OF MANHOLE

	SIZE	STRENGTH	MAT'L	JOINT	BEDDING	COMPLETION
SAN. P.D.C.'s	4"	1500	A.C.	R.G.	C	DEC. 1967
STM. P.D.C.'s	4"	1500	A.C.	R.G.	C	FEB. 1968
C.B. LEADS	8"	E.S.	CONC.	R.G.	C	" "

THE ABOVE TABLE APPLIES UNLESS OTHERWISE NOTED

SERVICES	COMPLETION
SANITARY SEWERS & MH.'s	DEC. 1967
STORM SEWERS & MH.'s	FEB. 1968
WATERMAINS & WATER SERVICES	MAR. "
GRANULAR ROAD BASE	MAY "
CURB & GUTTER	AUG "
SIDEWALKS	SEPT. "
PAVING	SEPT. "

LICENCED PROFESSIONAL ENGINEER K.P. GRABOWSKI PROVINCE OF ONTARIO

"AS CONSTRUCTED" FROM 5+20 TO 9+00

SERVICES	COMPLETION
SANITARY SEWERS, MH.s & PDC.s	JULY 1991
STORM SEWERS, M.H.s & PDC.s	JULY 1991
WATERMAINS	JULY 1991
CURB & GUTTER	SEPT. 1991
SIDEWALKS	SEPT. 1991
GRANULAR ROAD BASE	SEPT. 1991
PAVING - I BASE	JULY 1991
II SURFACE	SEPT. 1991

REGISTERED PROFESSIONAL ENGINEER CIVIL H. F. LAWSON PROVINCE OF ONTARIO

"AS CONSTRUCTED"

NO.	REVISIONS	DATE	BY

CITY OF LONDON

BERKSHIRE VILLAGE SUBDIVISION — R. P. Nº 932
SIFTON CONST. CO. LTD. — SUBDIVIDER

TOPPING LANE

FROM BERKSHIRE DR. TO ±700' S. OF BERKSHIRE DR.

DESIGN BY H. F. LAWSON
DRAWN BY G.M. ROBERT
CHECKED BY H. F. L.

FIELD BOOK
SCALE : HOR. 1" = 40' VERT. 1" = 4'
DATE : AUG. 1970

R.C. DUNN & ASSOCIATES LTD.
CONSULTING ENGINEERS
LONDON ONTARIO

PROJECT NO. : 66 - 108
DRAWING NO. : 4

APPROVED BY :
SECTION HEAD
CITY ENGINEER

CITY ENGINEER'S DEPARTMENT
PROJECT NO. :
DRAWING NO. :
3275

3275

LEGEND

A1=36.987ha / 14189 P — AREA 1 IN HECTARES / POPULATION

BOUNDARY AREA

SANITARY SEWER

AREA 4 SHADED

SANITARY DRAINAGE AREA PLAN

SCALE 1:10 000

0m 500m 1000m

POPULATION DENSITIES

A) HIGH DENSITY RESIDENTIAL
- MAX.: 150 u/ha.(60 u/acre) @ 3 ppu.= 450 pphs
- (1 BEDROOM = 2.5 PPU., 2 BEDROOM = 3.5 PPU.)
- AVG.: 100 u/ha.(40 u/acre) @ 3 ppu.= 300 pphs
- MIN.: 75 u/ha. (30 u/acre) @ 3 ppu.= 225 pphs

B) MEDIUM DENSITY RESIDENTIAL
- MAX.: 50 u/ha.(20 u/acre) @ 3 ppu.= 150 pphs
- AVG.: 35 u/ha (15 u/acre) @ 4 ppu.= 140 pphs

C) SINGLE FAMILY
- 25 u/ha.(10 u/acre) @ 4 ppu.= 100 pphs

SANITARY SEWER DESIGN SHEET

CITY OF LONDON

FLOW Q = PqM/86.4 + IA

where P = Design population in thousands
q = Average daily per capita flow in l/cap.d
M = Harmon Factor = 1 + 14/(4+P^0.5)
I = Unit of peak extraneous flow in l/ha.s.
A = Gross tributary area in hectares

q = 295 l/cap.d (New growth)
q = 295 l/cap.d (Post 96)
q = 346 l/cap.d (Pre 96)

I = 0.117 l/ha.s(Pre 96)
I = 0.1 l/ha.s(Post 96 & new growth)

DATE: June 27, 2001
DESIGNED BY
CHECKED BY

SHEET 1 of 1

AREA #	LOCATION STREET	FROM MH	TO MH	AREA (HECTARES) NET OR GROSS	(A) ha	TOTAL ha	POPULATION PER Ha	(P) POP.	TOTAL POP.	SEWAGE FLOW INFILT l/s	SEWAGE l/s	TOTAL l/s	SEWER DESIGN SIZE mm	SLOPE %	n	VEL. m/s	CAP. l/s	LOSSES IN MH	PROFILE Fall in Sewer (m)	LENGTH m	INVERT ELEV. U.S.	D.S.
A1-A	Commissioners(new Growth)		WT1002	G	3.38	3.38	55.0	186	186	0.3	2.9	3.2	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
A1-B	Commissioners(Post 96)		WT1002	G	75.19	78.57	32.9	3529	3715	7.5	44.8	55.6	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
A1-C	Commissioners		WT1002	G	291.30	369.87		10474	14189	34.1	135.4	225.1	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
	Easement	WT1002	24			369.87		0	14189			225.1	750	0.60	0.013	1.94	657	0.000	0.246	41.1	264.856	264.610
	Easement	24	23			369.87		0	14189			225.1	750	0.60	0.013	1.94	656	0.086	0.272	45.5	264.460	264.188
	Easement	23	22			369.87		0	14189			225.1	750	0.60	0.013	1.94	658	0.237	0.351	58.4	263.806	263.455
	Easement	22	21			369.87		0	14189			225.1	750	0.60	0.013	1.94	658	0.000	0.480	80.0	263.405	262.925
	Easement	21	20			369.87		0	14189			225.1	750	0.60	0.013	1.94	658	0.000	0.480	80.0	262.863	262.383
	Easet'l/Old Wonderland	20	19			369.87		0	14189			225.1	750	0.60	0.013	1.94	658	0.173	0.437	72.8	261.734	261.357
A2	Old Wonderland	19	18		33.34	403.21	15.0	500	14689	3.9	6.8	237.7	750	1.00	0.013	2.51	1107	0.000	0.600	60.0	261.300	260.500
	Old Wonderland	18	17			403.21		0	14689			237.7	750	0.70	0.013	2.10	926	0.000	0.700	100.0	260.440	259.740
	Old Wonderland	17	16			403.21		0	14689			237.7	750	0.60	0.013	1.94	856	0.000	0.600	100.0	259.690	259.090
	Old Wonderland	16	15			403.21		0	14689			237.7	750	0.80	0.013	2.24	990	0.000	0.640	80.0	259.040	258.400
	Old Wonderland	15	14			403.21		0	14689			237.7	750	0.80	0.013	2.24	990	0.000	0.400	50.0	258.350	257.950
	Old Wonderland	14	13			403.21		0	14689			237.7	750	3.50	0.013	4.69	2071	0.000	3.500	100.0	257.350	253.850
	Old Wonderland	13	12			403.21		0	14689			237.7	750	5.60	0.013	5.93	2620	0.000	1.400	25.0	253.550	252.150
	Old Wonderland	12	11			403.21		0	14689			237.7	750	5.60	0.013	5.93	2620	0.000	1.400	25.0	251.550	250.150
	Old Wonderland	11	10			403.21		0	14689			237.7	750	4.20	0.013	5.13	2269	1.621	2.466	58.7	249.812	247.346
	Old Wonderland	10	9			403.21		0	14689			237.7	750	1.00	0.013	2.51	1109	0.361	0.281	28.0	246.846	246.565
	Old to New Wonderlan	9	8			403.21		0	14689			237.7	750	2.50	0.013	3.96	1749	0.600	0.206	8.3	246.406	246.200
	Wonderland	8	7			403.21		0	14689			237.7	750	2.00	0.013	3.54	1565	0.096	0.843	42.2	245.900	245.057
	Wonderland	7	6			403.21		0	14689			237.7	750	2.45	0.013	3.92	1733	0.035	2.029	82.8	244.854	242.825
	Wonderland/Spring	6	5			403.21			14689	0.0	0.0	237.7	750	2.00	0.013	3.54	1566	0.224	1.600	80.0	242.525	240.925
	Wonderland	5	4			403.21		0	14689			237.7	750	5.60	0.013	5.93	2620	0.000	5.320	95.0	240.325	235.005
*A3-A	Wonderland/Spring(NEW GROWTH)	4	3		85.46	488.67	55.0	5264	19953	8.5	63.7	310.0	750	1.00	0.013	2.51	1107	0.112	1.000	100.0	234.405	233.405
*A3-B	Wonderland/Spring	4	3		54.28	542.95		3745	23698	6.4	55.4	371.8	750	1.00	0.013	2.51	1107	0.112	1.000	100.0	234.405	233.405
A4	Wonderland/Overflow	4	3		254.79	797.74	44.6	11366	35064	23.8	145.2	546.7	825	1.00	0.013	2.67	1428	0.273	1.000	100.0	234.405	233.405
	Wonderland	3	2			797.74		0	35064			546.7	825	1.00	0.013	2.67	1428	0.027	0.650	65.0	233.350	232.700
	Wonderland	2	1			797.74		0	35064			546.7	825	1.00	0.013	2.67	1428	0.033	0.450	45.0	232.650	232.200
	Wonderland	1	EX MH			797.74		0	35064			546.7	825	0.65	0.013	2.15	1151	0.099	0.130	20.0	231.999	231.869

FILE No. P:\PROJECTS\01377\[SANSHEET.XLS]SANSHEET (2)

POPULATION DENSITIES

A) HIGH DENSITY RESIDENTIAL
- MAX.: 150 u/ha.(60 u/acre) @ 3 ppu.= 450 pphs
- (1 BEDROOM = 2.5 PPU., 2 BEDROOM = 3.5 PPU.)
- AVG.: 100 u/ha.(40 u/acre) @ 3 ppu.= 300 pphs
- MIN.: 75 u/ha. (30 u/acre) @ 3 ppu.= 225 pphs

B) MEDIUM DENSITY RESIDENTIAL
- MAX.: 50 u/ha.(20 u/acre) @ 3 ppu.= 150 pphs
- AVG.: 35 u/ha (15 u/acre) @ 4 ppu.= 140 pphs

C) SINGLE FAMILY
- 25 u/ha.(10 u/acre) @ 4 ppu.= 100 pphs

SANITARY SEWER DESIGN SHEET

JUNE 2000 STORM

CITY OF LONDON

FLOW Q = PqM/86.4 + IA

where P = Design population in thousands
q = Average daily per capita flow in l/cap.d
M = Harmon Factor = 1 + 14/(4+P^0.5)
I = Unit of peak extraneous flow in l/ha.s.
A = Gross tributary area in hectares

q = 295 l/cap.d (New growth)
q = 295 l/cap.d (Post 96)
q = 346 l/cap.d (Pre 96)

I = 0.117 l/ha.s(Pre 96)
I = 0.1 l/ha.s(Post 96 & new growth)

DATE: June 27, 2001
DESIGNED BY
CHECKED BY

SHEET 1 of 1

AREA #	LOCATION STREET	FROM MH	TO MH	AREA (HECTARES) NET OR GROSS	(A) ha	TOTAL ha	POPULATION PER Ha	(P) POP.	TOTAL POP.	SEWAGE FLOW INFILT l/s	SEWAGE l/s	TOTAL l/s	SEWER DESIGN SIZE mm	SLOPE %	n	VEL. m/s	CAP. l/s	LOSSES IN MH	PROFILE Fall in Sewer (m)	LENGTH m	INVERT ELEV. U.S.	D.S.
A1-A	Commissioners(new Growth)		WT1002	G	3.38	3.38	55.0	186	186	0.3	2.9	3.2	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
A1-B	Commissioners(Post 96)		WT1002	G	75.19	78.57	32.9	3529	3715	7.5	44.8	55.6	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
A1-C	Commissioners		WT1002	G	291.30	369.87		10474	14189	497.0	135.4	687.9	675	0.15	0.013	0.91	324	0.000	0.107	71.0	265.027	264.920
	Easement	WT1002	24			369.87		0	14189			687.9	750	0.60	0.013	1.94	657	0.000	0.246	41.0	264.656	264.610
	Easement	24	23			369.87		0	14189			687.9	750	0.60	0.013	1.94	656	0.066	0.272	45.5	264.460	264.188
	Easement	23	22			369.87		0	14189			687.9	750	0.60	0.013	1.94	658	0.237	0.351	58.4	263.806	263.455
	Easement	22	21			369.87		0	14189			687.9	750	0.60	0.013	1.94	658	0.000	0.480	80.0	263.405	262.925
	Easement	21	20			369.87		0	14189			687.9	750	0.60	0.013	1.94	658	0.000	0.480	80.0	262.863	262.383
	Easet'l/Old Wonderland	20	19			369.87		0	14189			687.9	750	0.60	0.013	1.94	658	0.188	0.437	72.8	261.734	261.357
A2	Old Wonderland	19	18		33.34	403.21	15.0	500	14689	3.9	6.8	700.6	750	1.00	0.013	2.51	1107	0.000	0.600	60.0	261.100	260.500
	Old Wonderland	18	17			403.21		0	14689			700.6	750	0.70	0.013	2.10	926	0.000	0.700	100.0	260.440	259.740
	Old Wonderland	17	16			403.21		0	14689			700.6	750	0.60	0.013	1.94	856	0.000	0.600	100.0	259.690	259.090
	Old Wonderland	16	15			403.21		0	14689			700.6	750	0.80	0.013	2.24	990	0.000	0.640	80.0	259.040	258.400
	Old Wonderland	15	14			403.21		0	14689			700.6	750	0.80	0.013	2.24	990	0.000	0.400	50.0	258.350	257.950
	Old Wonderland	14	13			403.21		0	14689			700.6	750	3.50	0.013	4.69	2071	0.000	3.500	100.0	257.350	253.850
	Old Wonderland	13	12			403.21		0	14689			700.6	750	5.60	0.013	5.93	2620	0.000	1.400	25.0	253.550	252.150
	Old Wonderland	12	11			403.21		0	14689			700.6	750	5.60	0.013	5.93	2620	0.000	1.400	25.0	251.550	250.150
	Old Wonderland	11	10			403.21		0	14689			700.6	750	4.20	0.013	5.13	2269	1.513	2.466	58.7	249.812	247.346
	Old Wonderland	10	9			403.21		0	14689			700.6	750	1.00	0.013	2.51	1109	0.361	0.281	28.0	246.846	246.565
	Old to New Wonderlan	9	8			403.21		0	14689			700.6	750	2.50	0.013	3.96	1749	0.600	0.206	8.3	246.406	246.200
	Wonderland	8	7			403.21		0	14689			700.6	750	2.00	0.013	3.54	1565	0.096	0.843	42.2	245.900	245.057
	Wonderland	7	6			403.21		0	14689			700.6	750	2.45	0.013	3.92	1733	0.035	2.029	82.8	244.854	242.825
	Wonderland/Spring	6	5			403.21			14689	0.0	0.0	700.6	750	2.00	0.013	3.54	1566	0.224	1.600	80.0	242.525	240.925
	Wonderland	5	4			403.21		0	14689			700.6	750	5.60	0.013	5.93	2620	0.000	5.320	95.0	240.325	235.005
*A3-A	Wonderland/Spring(NEW GROWTH)	4	3		85.46	488.67	55.0	5264	19953	61.9	63.7	626.2	750	1.00	0.013	2.51	1107	0.112	1.000	100.0	234.405	233.405
*A3-B	Wonderland/Spring	4	3		54.28	542.95		3745	23698	6.4	55.4	688.0	750	1.00	0.013	2.51	1107	0.112	1.000	100.0	234.405	233.405
A4	Wonderland/Overflow	4	3		254.79	797.74	44.6	11366	35064	180.3	145.2	1213.4	825	1.00	0.013	2.67	1428	0.273	1.000	100.0	234.405	233.405
	Wonderland	3	2			797.74		0	35064			1213.4	825	1.00	0.013	2.67	1428	0.027	0.650	65.0	233.350	232.700
	Wonderland	2	1			797.74		0	35064			1213.4	825	1.00	0.013	2.67	1428	0.033	0.450	45.0	232.650	232.200
	Wonderland	1	EX MH			797.74		0	35064			1213.4	825	0.65	0.013	2.15	1151	0.099	0.130	20.0	231.999	231.869

AS CONSTRUCTED NOTES	AS CONSTRUCTED SERVICES	COMPLETION

DESIGN	PDC
DRAWN	SJD/TG
CHECKED	PDC
APPROVED	JHH
DATE	JUNE /01

No.	REVISIONS	DATE	BY
A	ISSUED FOR CLIENT REVIEW	06/18/01	PDC
0	ISSUED FOR TENDER	07/03/01	PDC
1	RECORD DRAWING	07/18/02	PDC

CONSULTANT OR DIVISION

EARTH TECH

Earth Tech (Canada) Inc. London, Ontario 519.673.0510

PROJECT ENGINEER

ENGINEER'S STAMP

LICENSED PROFESSIONAL ENGINEER — P.D. CHOMA — PROVINCE OF ONTARIO

London CANADA

CORPORATION OF THE CITY OF LONDON

DIVISION MANAGER

CITY ENGINEER

SCALE: AS NOTED

TITLE: WESTMOUNT SANITARY RELIEF SEWER

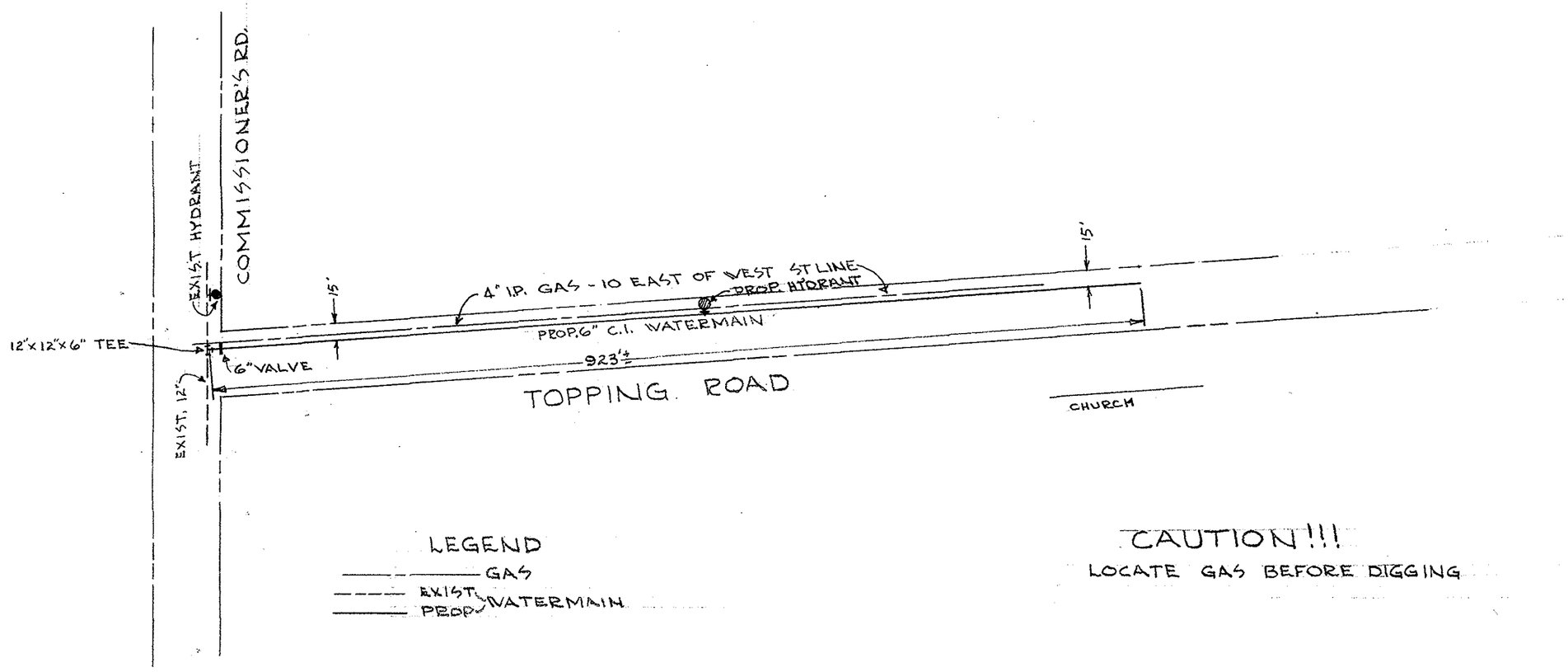
SANITARY AREA DRAINAGE PLAN AND DESIGN SHEETS

PROJECT No. 610/W/70

SHEET No. G5

PLAN FILE No. 17,028

Drawing File: P:\PROJECTS\01377(4773)\Dwg\Asbuilt\GENERAL\01377-GS.DWG
Time: 11:24 A.M.
Date: JUL. 21,2002



LEGEND

GAS

EXIST. WATERMAIN

PROP. WATERMAIN

CAUTION!!!

LOCATE GAS BEFORE DIGGING

M. E. Mathers Fire Chief.

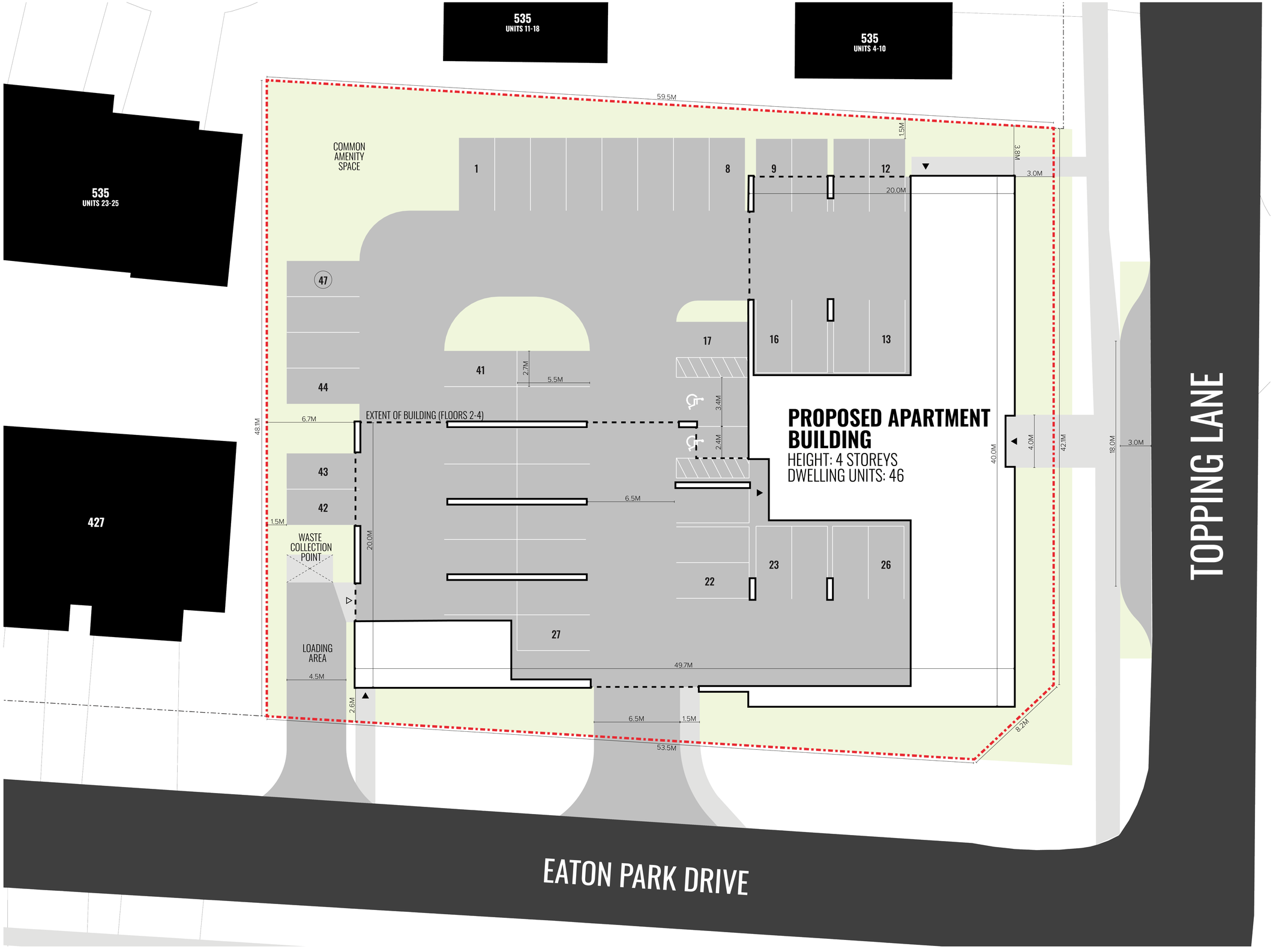
THE PUBLIC UTILITIES COMMISSION
CITY OF LONDON

PROP. 6" MAIN. TOPPING RD.

DRAWN	TRACED	DATE	WORK ORDER	SCALE
GBN		JULY 13		1" = 100'

APPROVED — MANAGER OF ENGINEERING

DWG W.D.-68

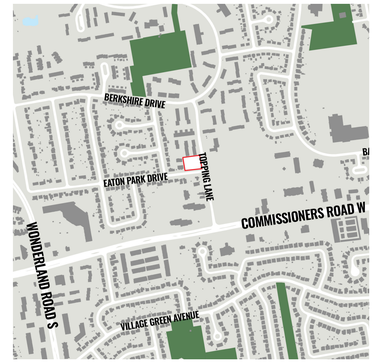


Lot Boundary Disclaimer: *Site dimensions have been assumed based on data provided by the City of London. Siv-ik planning and design inc. makes no warranties or guarantees regarding the accuracy of the lot boundaries.*

CONCEPT PLAN

01 DWG

PROJECT SITE
539 & 543 Topping Lane



SITE DATA

R8-4 ZONE

Regulations	Required	Proposed
Permitted Uses:	Section 12.2	Apartment Building
Lot Area:	1,000m² (min.)	2,924.4m²
Lot Frontage:	30.0m (min.)	42.1m
Front and Exterior Side Yard:	6 metres (19.7 feet) plus 1 metre (3.3 feet) per 10 metres (32.8 feet) of main building height or fraction thereof above the first 3.0 metres (9.8 feet).	Front: 3.0m* Exterior Side: 2.6m*
Interior Side and Rear Yard:	1.2 metres (3.9 feet) per 3 metres (9.8 feet) of main building height or fraction thereof above 3 metres (9.8 feet), but in no case less than 4.5 metres (14.8 feet).	Rear: 6.7m Interior Side: 3.8m*
Landscaped Open Space:	30% (min.)	27.5%*
Lot Coverage:	40% (max.)	47.3%*
Height:	13.0m (max.)	17.0m*
Density:	75uph (max.) Apartment: 0.5/unit	157.3uph*
Parking:	23 required	47 provided

* Requires Special Provision

Client:	South London Investments Inc.
Date:	[01.24.2024]
Drawn By:	D. Murphy
Plan Scale:	nts
File No:	539T
Version	1.0

N

[siv-ik] PLANNING / DESIGN

Contact Us
www.siv-ik.ca
info@siv-ik.ca
519.852.9983

APPENDIX B

Sanitary Sewer Design Sheet by SBM

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

Sanitary Sewer Design Sheet

Residential Population Densities

(A) Area Basis

Date: February 12, 2024
Job Number: SBM-24-0147
Client: South London Investments Inc
Project: Proposed 4 Storey Apartment Building
Location: 539 & 543 Topping Lane, London, Ontario
Designed By: MR
Reviewed By: CM/BH

Low Density Residential (Single Family/Semi-Detached) = 30 Units/hectare @ 3 people/unit
Medium Density Residential (Multi-Family/Townhouse) =75 Units/hectare @ 2.4 people/unt
High Density Residential (Apartment Buildings) =150-300 Units/hectare @ 1.6 people/unit
Commercial = 100 people/hectare

Daily Flow (L/cap/day) (2022) 230
Sewage Infiltration (Litres/hectare/day) 8640
Harmon Formula (Peaking Factor)
M = (1 + 14/(4+P^0.5))
Uncertainty Factor 1.1

Location			Area		Population						Sewage Flows		
Area No.	From MH	To MH	Delta Hectare	Total Hectare	Residential Units	Population Per Hectare	Res Pop Per Unit/Lot	Comm People Per Hectare	Delta Pop.	Total Pop.	Infilt L/S	Sewage L/S	Total L/S
Proposed Conditions													
539-543 Topping Lane	Site	Sewer	0.290	0.290	46*		1.6		73.60	74	0.03	0.92	0.95

*Based on Conceptual Site Plan by Siv-ik dated January 24, 2024

APPENDIX C

Runoff Coefficient Calculations by SBM

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

Runoff Coefficient Calculations

DATE:	February 29, 2024
JOB No.:	SBM-24-0147
Client:	**South London Investments Inc.**
Project:	**4 Storey Apartment Building Development**
Location:	**539-543 Topping Lane, London, ON**

PRE-DEVELOPMENT CONDITIONS*

	Area (m^2)	C	A*C
Total Area:	2924.40		
Building Area:	296.29	0.9	266.661
Concrete/Asphalt:	349.70	0.9	314.73
Gravel:	0.00	0.7	0
Landscaped/Open:	2278.41	0.2	455.682
Totals:	2924.40		1037.073
$C_{eq} = \sum(A*C)/\sum(A) =$	**0.35**		

POST-DEVELOPMENT CONDITIONS

POST-DEVELOPMENT CONDITIONS**

	Area (m^2)	C	A*C
Total Area:	2924.40		
Building Area:	1380.77	0.9	1242.693
Concrete/Asphalt:	346.56	0.9	311.904
Landscaped/Open:	1197.07	0.2	239.414
Totals:	2924.4		1794.011
$C_{eq} = \sum(A*C)/\sum(A) =$	**0.61**		

*Pre-Development Conditions were obtained from Topographical Plan of Survey prepared by Callon Dietz dated January 18, 2024

** Post-Development Conditions were obtained from the Concept Plan prepared by Siv-ik Planning & Design, dated January 24, 2024

APPENDIX D

Hydrant Flow test No. 16-47 prepared by City of London dated October 12, 2016
Domestic Water Demand & EPANET Node Demand Calculations by SBM
Fire-Fighting Flow Demand Calculations (NFPA#13) by SBM
NFPA13 Guidelines
EPANET Model Layout Max Hour Demand prepared by SBM
EPANET Model Layout Max Day + Fire Flow Demand (Site) prepared by SBM
EPANET Model Layout Max Day + Fire Flow Demand (FH2) prepared by SBM
EPANET Hydraulic and Water Quality Analysis for Max Hour Demand by SBM
EPANET Hydraulic and Water Quality Analysis for Max Day + Fire Flow Demand (Site) by SBM
EPANET Hydraulic and Water Quality Analysis for Max Day + Fire Flow Demand (FH2) by SBM

WATER SUPPLY DEPARTMENT
FLOW TESTS

DATE:	Wednesday, October 12, 2016	FLOW TEST No.			**16-47**
TIME:	9:20 AM	HYDRANT ID			H11091
OPERATOR:	Frank Zoula	CHLORINE RESIDUAL mg/L			0.65
OPERATOR:	Ian McCann	WATER QUALITY AFTER TEST	POOR	GOOD	EXCELLENT
REQUESTED BY:	Water Engineering		✔		
LOCATION:	104 Applewood Cres	TIME USED FOR FLUSHING			20 min

	FLOW HYDRANT					RESIDUAL HYDRANT	
TEST NUMBER	STATIC PRESSURE P.S.I.	OUTLET SIZE IN.	PITOT READING P.S.I.	INDIVIDUAL FLOW U.S.G.P.M	TOTAL FLOW U.S.G.P.M.	RESIDUAL PRESSURE P.S.I.	STATIC PRESSURE P.S.I.
1	49	2 1/2	33	965	965	44	51
2		2 1/2	14	630	1260	37	
		2 1/2	14	630			

Information contained in this report is representative of flows and pressure losses at the time of the test and depends on reservoir levels, pump operation and customer water demand. Results will vary throughout the day and time of year. Available pressure at other times should be based on a design hydraulic grade line for the pressure zone in which the hydrants are located. By issuing this information report, neither the City nor any of its employees makes any warranty, express or implied, concerning the location, type or extent of services described in this report. Furthermore, neither the City nor any of its employees shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this information or incomplete information.

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 & EPANET NODE DEMAND CALCULATION

DATE:	April 24, 2024
JOB N0.:	SBM-24-0147
Client:	**South London Investments Inc**
Project:	**4 Storey Apartment Building Development**
Location:	**539 & 543 Topping Lane, London, ON**

*Avg. Day Demand = 255 L/D/cap =	0.00295	L/s/cap
*Max. Day Peaking Factor =	3.50	
*Max. Hour Peaking Factor =	7.80	
Low Density Residential =	3.00	ppl/unit
Medium Density Residential =	2.40	ppl/unit
High Density Residential=	1.60	ppl/unit

Water Demand (EPANET)

Node	# Of Units	Area (Ha)	Population	Avg. Day (L/s)	Max. Hour (L/s)	Max. Day (L/s)	Fire Flow Demand (L/s)
J3 (MN743-749)	4		9.6	0.03	0.22	0.10	0.00
J4 (MN 478-492)	8		19.2	0.06	0.44	0.20	0.00
J5 (MN 377-327, 291-309, 599-619, 621-639, 641-655,657-671, 673-691, 693-711, 494-504, 506-520)	88		211.2	0.62	4.86	2.18	0.00
J6 (MN 517-531)	8		19.2	0.06	0.44	0.20	0.00
J7 (FH1)	0		0	0.00	0.00	0.00	0.00
J8 (FH1 Node)	0		0	0.00	0.00	0.00	0.00
J9 (MN535)	25		60	0.18	1.38	0.62	0.00
J10 (MN530)		1.09	81**	0.24	1.87	0.84	0.00
J22 (MN 524)		0.06	2***	0.01	0.08	0.04	0.00
J11 (MN 551)	1		3	0.01	0.07	0.03	0.00
(MN 555) (in J11)			26****	0.08	0.60	0.27	0.00
J12 (MN539/543 - **Subject Site**)	46		73.6	0.22	1.69	0.76	17.35
(MN 427) (in J12)	3		7.2	0.02	0.17	0.07	0.00
(MN 408,412,415,420,424) (in J12)	5		15	0.04	0.35	0.15	0.00
J14 (MN 559)	8		19.2	0.06	0.44	0.20	0.00
J15 (MN 1,3,5,6,12,7-33 (odd))	18		54	0.16	1.24	0.56	0.00
J16 (MN 561 & 565)	2		6.00	0.02	0.14	0.06	0.00
J17 (MN 403 & 405)	210 *		336	0.99	7.74	3.47	0.00
J18 (FH2)	0		0	0.00	0.00	0.00	76.00
J19 (FH2 Node)	0		0	0.00	0.00	0.00	0.00
J20 (MN 43-67 (odd), 16,20,24,34,35,37,38,39,41)	23		69	0.20	1.59	0.71	0.00
J21 (MN 44,48,52,58,62,69,71,73,75)	9		27	0.08	0.62	0.28	0.00
Total =	**458**		**1038.81754**	**3.07**	**23.94**	**10.74**	**93.35**

* Number of units estimated from City of London Locates Assessment Parcels for 403 & 405 Commissioners Road West

** Max units per hectare per zoning by-law for R8-4 Zone (75 units per hectare)

***Max units per hectare per zoning by-law for R5-3 Zone (35 units per hectare)

**** Based on Children per classroom, Child Care Rules by Ontario

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

Fire-Fighting Flow Demand Calculations (NFPA#13)

	For data entry
	Calculated, not for data entry

Date:	February 29, 2024
Job No:	SBM-24-0147

Client:	**South London Investments Inc.**
Project:	**4 Storey Apartment Building Development**
Location:	**539 & 543 Topping Lane, London , ON**

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

Based on NFPA#13 Guidelines A.5.2

Required Supply Flow Rate (Table 1) =	275	USGPM
Required Supply Flow Rate =	1041	L/min
Maximum Day Demand, L/min =	0.76	L/s (Refer to attached Domestic Water Demand calculation)
	45.6	L/min
Required Supply Fire Flow + Maximum Day Demand, L/min =	**1087**	
Demand at Hydrant, L/s=	6.31	(100 USGPM Hydrant Allowance)
Demand at Building, L/s=	11.80	(175 USGPM Sprinkler Flow Plus Max Day Domestic Demand)

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

	51.00	*psi (351.63 kPa) =	**0.00**	L/min (0 USGPM)
Provided Supply Flow Rate @	**44.00**	*psi (303.37 kPa) =	**3653.00**	L/min (965 USGPM)
	37.00	*psi (255.11 kPa) =	**4770.00**	L/min (1260 USGPM)
Residual Pressure in Water Service at Building =	**50.26**	psi (346.51 kPa) =	**1086.60**	L/min (287 USGPM)
Pressure Drop =	**0.74**	psi (5.12 kPa)		

Largest Pressure Drop (most conservative) =	0.74	psi
Pressure Drop =	0.52	m head
HGL from DS&RM (Low Level System) =	301.8	m head
Total Head Under Fire Flow Conditions =	301.3	m head
Approximate Elevation of Water Service at Building =	263.63	m
Pressure of Water Service at Building under Firefighting Conditions =	37.65	m head (53.54 psi, 369.13 kPa)
Approximate Elevation of Proposed Building's Fire Department Connection=	266.20	m
Water Pressure at service entrance Under Fire Fighting Conditions=	35.60	m head (50.62 psi, 349.03 kPa)

* Please refer to Hydrant Flow Test -104 Applewood Crescent Hydrant (H11091) Flow Test - 16-47

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

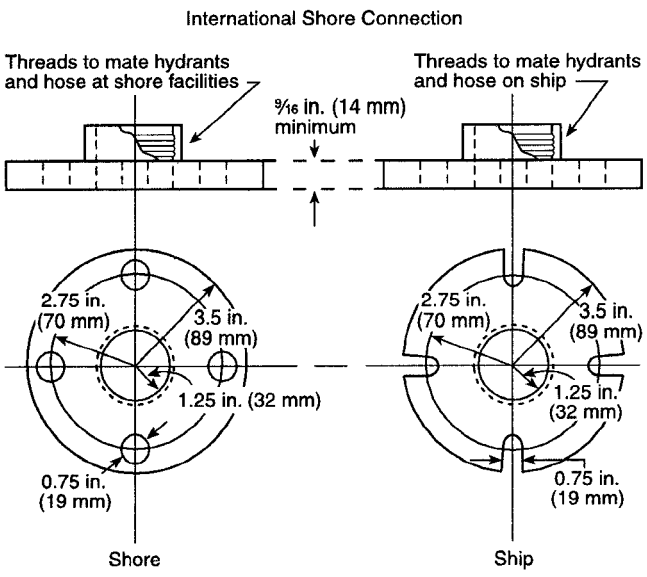


FIGURE A.3.10.7 International Shore Fire Connection.

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

Plastics fabrication, including blow molding, extruding, and machining; excluding operations using combustible hydraulic fluids

Post offices

Printing and publishing

Racetrack stable/kennel areas, including those stable/kennel areas, barns, and associated buildings at state, county, and local fairgrounds

Repair garages

Resin application area

Stages

Textile manufacturing

Tire manufacturing

Tobacco products manufacturing

Wood machining

Wood product assembly

A.5.4.1 Extra hazard occupancies (Group 1) include occupancies having uses and conditions similar to the following:

Aircraft hangars (except as governed by NFPA 409, *Standard on Aircraft Hangars*)

Combustible hydraulic fluid use areas

Die casting

Metal extruding

Plywood and particleboard manufacturing

Printing [using inks having flash points below 100°F (38°C)]

Rubber reclaiming, compounding, drying, milling, vulcanizing

Saw mills

Textile picking, opening, blending, garnetting, or carding, combining of cotton, synthetics, wool shoddy, or burlap

Upholstering with plastic foams

A.5.4.2 Extra hazard occupancies (Group 2) include occupancies having uses and conditions similar to the following:

Asphalt saturating

Flammable liquids spraying

Flow coating

Manufactured home or modular building assemblies (where finished enclosure is present and has combustible interiors)

Open oil quenching

Plastics manufacturing

Solvent cleaning

Varnish and paint dipping

A.5.5 Other NFPA standards contain design criteria for fire control or fire suppression *(see Section 5.5 and Chapter 2)*. While these can form the basis of design criteria, this standard describes the methods of design, installation, fabrication, calculation, and evaluation of water supplies that should be used for the specific design of the system.

Other NFPA standards contain sprinkler system design criteria for fire control or suppression of specific hazards. This information has been either referenced or copied into Chapter 21 using NFPA's extract policy.

A.5.6 Specification of the type, amount, and arrangement of combustibles for any commodity classification is essentially an attempt to define the potential fire severity, based on its burning characteristics, so the fire can be successfully controlled by the prescribed sprinkler protection for the commodity class. In actual storage situations, however, many storage arrays do not fit precisely into one of the fundamental classifications; therefore, the user needs to make judgments after comparing each classification to the existing storage conditions. Storage arrays consist of thousands of products, which make it impossible to specify all the acceptable variations for any class. As an alternative, a variety of common products are classified in this annex based on judgment, loss experience, and fire test results.

Table A.5.6 provides examples of commodities not addressed by the classifications in Section 5.6.

Table A.5.6.3 is an alphabetized list of commodities with corresponding classifications.

Table A.5.6.3.1 through Table A.5.6.3.4 and Table A.5.6.4.1 provide examples of commodities within a specific class.

Table A.5.6 Examples of Commodities Not Addressed by the Classifications in Section 5.6

Boat Storage
- Stored on racks
Boxes, Crates
- Empty, wood slatted*
Lighters (butane)
- Loose in large containers (Level 3 aerosol)
Storage Container
- Large container storage of household goods

*Should be treated as idle pallets.

A.5.6.1.1 Commodity classification is governed by the types and amounts of materials (e.g., metal, paper, wood, plastics) that are a part of a product and its primary packaging. However, in a storage or warehousing situation, classification is also affected by such factors as the primary storage or shipping container material, the amount of air space, and the location of the more hazardous materials within the container. For example, a Group A plastic product enclosed in a five- or six-sided metal container can be considered Class II, while a ceramic product heavily wrapped in tissue paper and placed in a corrugated carton could be Class III.

A.5.6.2.2 For example, Class III will become Class IV, and Class IV will become a cartoned unexpanded Group A plastic commodity.

A.5.6.2.3 For example, Class II will become Class IV, and Class III and Class IV will become a cartoned unexpanded Group A plastic commodity.

A.5.6.3 See Table A.5.6.3.

Table A.5.6.3 Alphabetized Listing of Commodity Classes

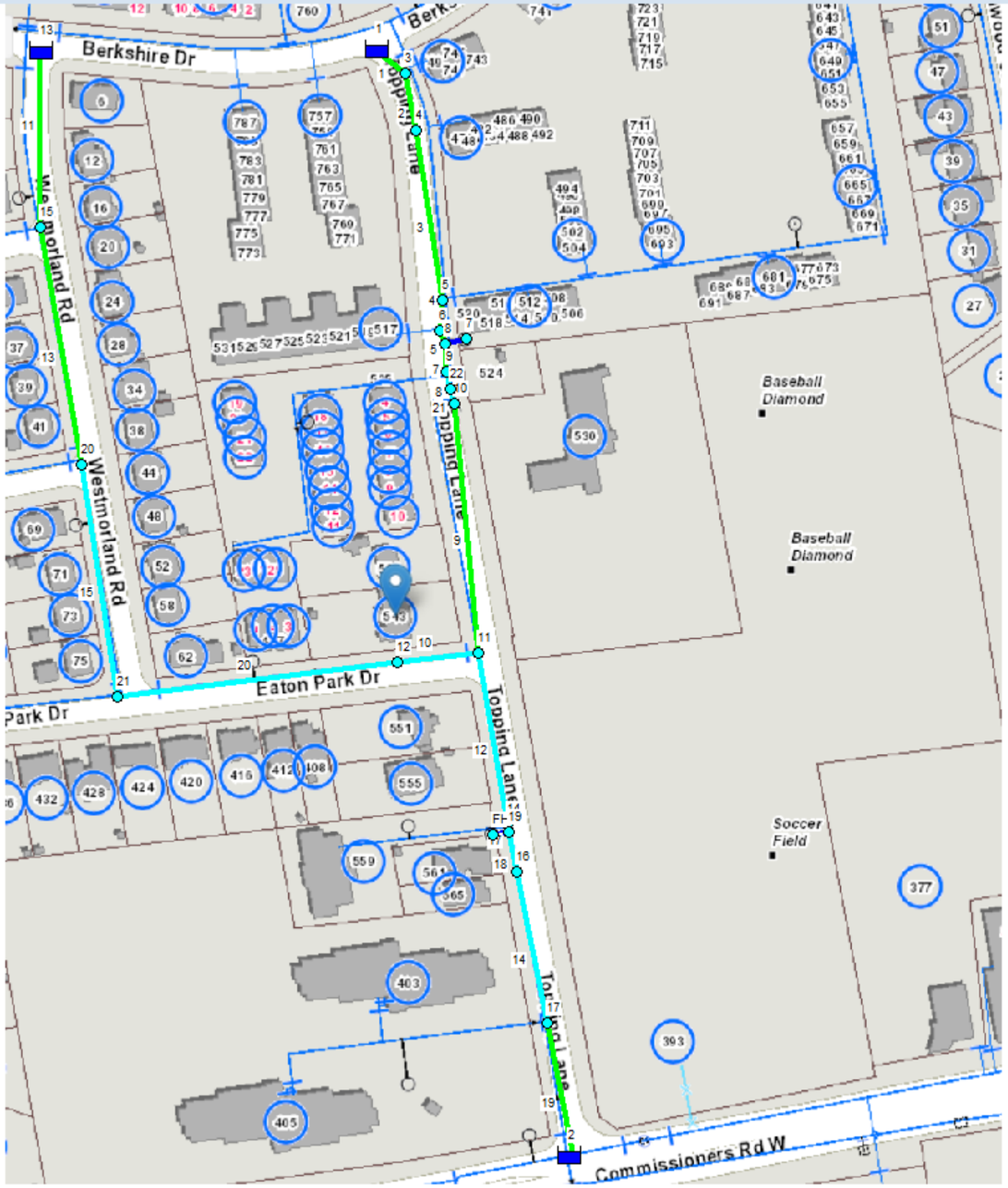
Commodity	Commodity Class
Aerosols	
Cartoned or uncartoned — Level 1	Class III
Alcoholic Beverages	
Cartoned or uncartoned	
- Up to 20 percent alcohol in metal, glass, or ceramic containers	Class I
- Up to 20 percent alcohol in wood containers	Class II

Network Map

Pressure
25.00
50.00
75.00
100.00
m

Velocity
0.01
0.10
1.00
2.40
m/s

Hydraulic and Water Quality Analysis for Max Hour Demand



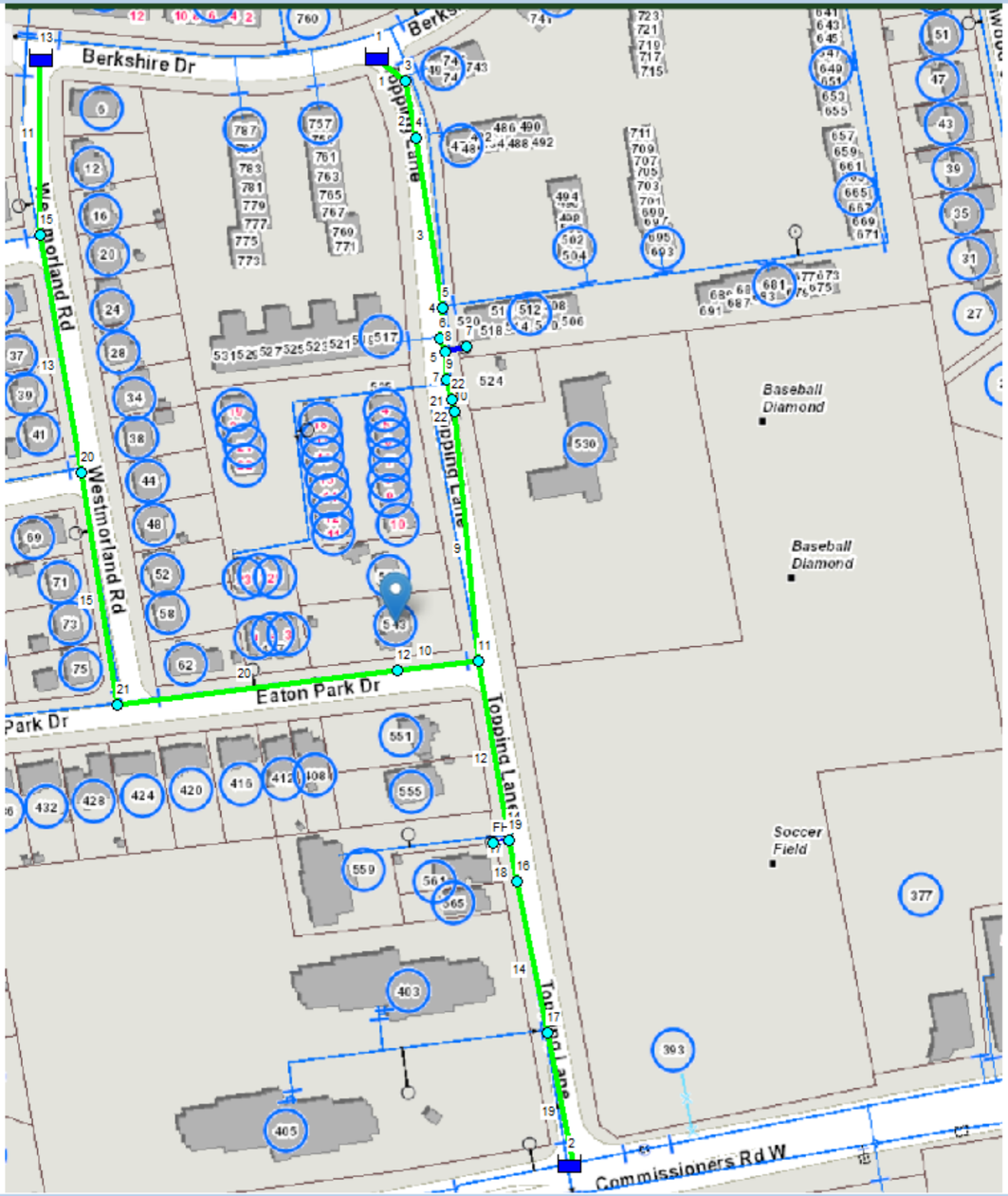
Day 1, 12:00 AM

Network Map

Pressure
25.00
50.00
75.00
100.00
m

Velocity
0.01
0.10
1.00
2.40
m/s

Hydraulic and Water Quality Analysis for Max + Fire Flow Demand (Site)



Day 1, 12:00 AM

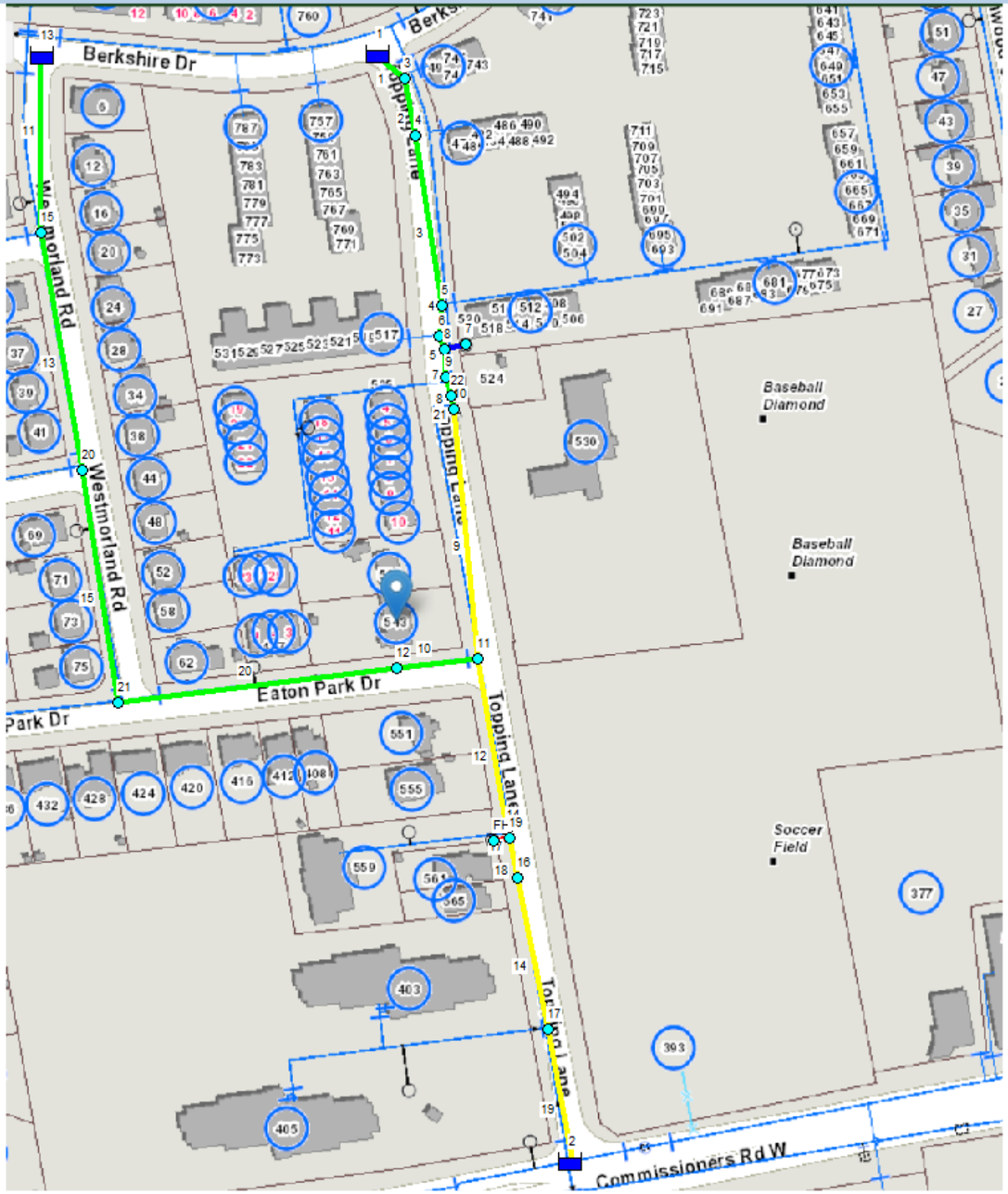
Data
Nodes
Pressu
Links
Veloci
Time
0:00 H

Network Map

Pressure
25.00
50.00
75.00
100.00
m

Velocity
0.01
0.10
1.00
2.40
m/s

Hydraulic and Water Quality Analysis for Max Day + Fire Flow Demand (FH2)



```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.2                             *
******************************************************************

Input File: SBM-24-0147 Max Hour- 2024-04-02.net
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	13.6	300
2	3	4	24.6	300
3	4	5	69	300
4	5	6	11.9	300
5	6	8	5.6	300
6	7	8	3	150
7	8	9	13.5	300
8	9	22	4.8	300
9	10	11	110.8	150
10	11	12	31.1	200
12	11	14	71.6	150
14	16	17	61.5	150
16	FH	19	4.4	150
17	14	19	2.4	150
18	19	16	16.3	150
19	17	2	55	150
11	13	15	72.76	150
13	15	20	94.72	150
15	20	21	95.5	150
20	21	12	106.92	150
21	22	10	4.8	300

Node Results at 72:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality
3	0.23	301.80	46.70	0.00
4	0.47	301.79	45.63	0.00
5	4.84	301.78	42.58	0.00
6	0.47	301.78	41.96	0.00
7	0.00	301.78	41.57	0.00

8	0.00	301.78	41.57	0.00	
9	1.40	301.78	44.04	0.00	
10	1.87	301.78	42.21	0.00	
11	0.70	301.69	36.99	0.00	
12	2.26	301.69	36.82	0.00	
14	0.47	301.68	36.07	0.00	
16	0.08	301.68	35.77	0.00	
17	7.80	301.68	35.76	0.00	
FH	0.00	301.68	35.89	0.00	
19	0.00	301.68	35.89	0.00	
15	1.48	301.73	40.94	0.00	
20	1.87	301.69	39.80	0.00	
21	0.70	301.69	38.58	0.00	
22	0.08	301.78	42.21	0.00	
1	-13.42	301.80	0.00	0.00	Reservoir
2	-6.98	301.80	0.00	0.00	Reservoir
13	-4.32	301.80	0.00	0.00	Reservoir

Link Results at 72:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	13.42	0.19	0.18	Open
2	13.19	0.19	0.17	Open
3	12.72	0.18	0.16	Open
4	7.89	0.11	0.07	Open
5	7.42	0.10	0.06	Open
6	0.00	0.00	0.00	Open
7	7.42	0.10	0.06	Open
8	6.01	0.09	0.04	Open
9	4.06	0.23	0.81	Open
10	2.00	0.06	0.04	Open
12	1.37	0.08	0.11	Open
14	0.82	0.05	0.04	Open
16	0.00	0.00	0.00	Open
17	0.90	0.05	0.05	Open
18	0.90	0.05	0.05	Open
19	-6.98	0.39	2.21	Open
11	4.32	0.24	0.91	Open
13	2.84	0.16	0.42	Open
15	0.97	0.05	0.06	Open

Link Results at 72:00 Hrs: (continued)

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
20	0.27	0.02	0.01	Open
21	5.94	0.08	0.04	Open

```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.2                             *
******************************************************************
```

Input File: SBM-24-0147 Fire + Max Day (Site) 2024-04-02.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	13.6	300
2	3	4	24.6	300
3	4	5	69	300
4	5	6	11.9	300
5	6	8	5.6	300
6	7	8	3	150
7	8	9	13.5	300
9	10	11	110.8	150
10	11	12	31.1	200
12	11	14	71.6	150
14	16	17	61.5	150
16	FH	19	4.4	150
17	14	19	2.4	150
18	19	16	16.3	150
19	17	2	55	150
11	13	15	72.76	150
13	15	20	94.72	150
15	20	21	95.5	150
20	21	12	106.92	150
21	9	22	4.8	300
22	22	10	4.8	300

Node Results at 72:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality
3	0.10	301.80	46.70	0.00
4	0.21	301.79	45.63	0.00
5	2.17	301.78	42.58	0.00
6	0.21	301.78	41.96	0.00
7	0.00	301.78	41.57	0.00

8	0.00	301.78	41.57	0.00	
9	0.63	301.78	44.04	0.00	
10	0.84	301.78	42.21	0.00	
11	0.31	301.40	36.70	0.00	
12	18.11	301.35	36.48	0.00	
14	0.21	301.49	35.88	0.00	
16	0.04	301.52	35.60	0.00	
17	3.50	301.61	35.69	0.00	
FH	0.00	301.49	35.70	0.00	
19	0.00	301.49	35.70	0.00	
15	0.66	301.67	40.88	0.00	
20	0.84	301.54	39.65	0.00	
21	0.31	301.44	38.33	0.00	
22	0.04	301.78	42.21	0.00	
1	-13.06	301.80	0.00	0.00	Reservoir
2	-9.01	301.80	0.00	0.00	Reservoir
13	-6.12	301.80	0.00	0.00	Reservoir

Link Results at 72:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	13.06	0.18	0.17	Open
2	12.95	0.18	0.17	Open
3	12.74	0.18	0.16	Open
4	10.57	0.15	0.12	Open
5	10.36	0.15	0.11	Open
6	0.00	0.00	0.00	Open
7	10.36	0.15	0.11	Open
9	8.86	0.50	3.43	Open
10	13.81	0.44	1.61	Open
12	-5.27	0.30	1.31	Open
14	-5.51	0.31	1.43	Open
16	0.00	0.00	0.00	Open
17	-5.48	0.31	1.40	Open
18	-5.48	0.31	1.41	Open
19	-9.01	0.51	3.54	Open
11	6.12	0.35	1.73	Open
13	5.46	0.31	1.40	Open
15	4.62	0.26	1.03	Open
20	4.30	0.24	0.90	Open

Link Results at 72:00 Hrs: (continued)

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
21	9.73	0.14	0.10	Open
22	9.70	0.14	0.10	Open

```
******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.2                             *
******************************************************************
```

Input File: SBM-24-0147 Fire + Max Day (FH2) 2024-04-02.net

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1	1	3	13.6	300
2	3	4	24.6	300
3	4	5	69	300
4	5	6	11.9	300
5	6	8	5.6	300
6	7	8	3	150
7	8	9	13.5	300
8	9	22	4.8	300
9	10	11	110.8	150
10	11	12	31.1	200
12	11	14	71.6	150
14	16	17	61.5	150
16	FH	19	4.4	150
17	14	19	2.4	150
18	19	16	16.3	150
19	17	2	55	150
11	13	15	72.76	150
13	15	20	94.72	150
15	20	21	95.5	150
20	21	12	106.92	150
21	22	10	4.8	300

Node Results at 72:00 Hrs:

Node ID	Demand LPS	Head m	Pressure m	Quality
3	0.10	301.79	46.69	0.00
4	0.21	301.77	45.61	0.00
5	2.17	301.71	42.51	0.00
6	0.21	301.70	41.88	0.00
7	0.00	301.70	41.49	0.00

8	0.00	301.70	41.49	0.00	
9	0.63	301.69	43.95	0.00	
10	0.84	301.68	42.11	0.00	
11	0.31	298.72	34.02	0.00	
12	1.01	298.76	33.89	0.00	
14	0.21	294.90	29.29	0.00	
16	0.04	295.58	29.66	0.00	
17	3.50	298.60	32.69	0.00	
FH	76.00	293.97	28.18	0.00	
19	0.00	294.78	28.99	0.00	
15	0.66	301.12	40.33	0.00	
20	0.84	300.30	38.41	0.00	
21	0.31	299.55	36.44	0.00	
22	0.04	301.68	42.11	0.00	
1	-31.03	301.80	0.00	0.00	Reservoir
2	-40.80	301.80	0.00	0.00	Reservoir
13	-15.26	301.80	0.00	0.00	Reservoir

Link Results at 72:00 Hrs:

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
1	31.03	0.44	0.85	Open
2	30.92	0.44	0.85	Open
3	30.71	0.43	0.84	Open
4	28.54	0.40	0.73	Open
5	28.33	0.40	0.72	Open
6	0.00	0.00	0.00	Open
7	28.33	0.40	0.72	Open
8	27.70	0.39	0.69	Open
9	26.83	1.52	26.73	Open
10	-12.43	0.40	1.33	Open
12	38.94	2.20	53.30	Open
14	-37.30	2.11	49.22	Open
16	-76.00	4.30	183.89	Open
17	38.73	2.19	52.76	Open
18	-37.27	2.11	49.14	Open
19	-40.80	2.31	58.12	Open
11	15.26	0.86	9.40	Open
13	14.60	0.83	8.66	Open
15	13.76	0.78	7.76	Open

Link Results at 72:00 Hrs: (continued)

Link ID	Flow LPS	VelocityUnit m/s	Headloss m/km	Status
20	13.44	0.76	7.43	Open
21	27.67	0.39	0.69	Open