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

LONDON LOCATION
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London, ON N5X 4E8
P: 519-471-6667

KITCHENER LOCATION
1415 Huron Rd., Unit 225
Kitchener, ON N2R 0L3
P: 519-725-8093

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sbm@sbmltd.ca

March 17, 2023

SBM-22-2780

MCI Design Build Corp
2081 Oxford St E
London, ON, N5V 2Z7

Attn: MCI Design Build Corp
Scott Masse, President

Re: Servicing Feasibility Study
Proposed Recreation Center and Medical Clinic
708 & 714 Gideon Drive, Middlesex Center, Ontario

1. INTRODUCTION

This Servicing Feasibility Study (Study) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) to address the servicing feasibility for the Proposed Buildings and Recreation Center Development located at 708 & 714 Gideon Drive, Middlesex Center, Ontario. The site area is approximately 8.1 ha.

The subject land consists of one trapezoidal parcel located on the east side of Gideon Drive, as shown on the Site Plan prepared by MCI Design Build Corp. dated May 2022, enclosed. The site abuts the Gideon Drive Right-Of-Way (ROW) to the North, and agricultural lands to the east, west, and south. The Subject Property (former "London West Raquet Club and Driving Range") is currently improved with a vacant former residential building, six (6) accessory structures (e.g., sheds and barns), tennis and racquet courts, as well as former sports (e.g., soccer) fields. It is our understanding that the proposed development includes recreational center, medical building/clinic, outdoor recreation spaces, surface parking, landscape areas, and drive aisles.

This Study is to determine the adequacy of the existing City services in support of the Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA) applicationsfor the proposed development.

Design requirements have been based on the Municipality of Middlesex Center Infrastructure DesignStandards (IDS) Document (Revision 2, January 2018) and the current edition of the Ontario Building Code (OBC).

2. WATER SERVICING

It is our understanding that there is no municipal water main in the Gideon Drive ROW fronting this property; however, there an existing municipal 600mm steel water main in the Brigham Rd. ROW and as

per preconsultation comments dated on October 19, 2022, the municipality is open to the developer extending the municipal water to the property.

2.1 Design parameters

The design parameters outlined below are based on the Municipality of Middlesex Center IDS, section 5.3, updated January 2018, and as per the Ministry of Environment Conservation and Parks (MECP) "Guidelines for the Design of Water Distribution Systems", chapter 3:

- An average domestic demand of 350 L/person per day.
- Commercial Area Allowance Average Flow= 28m3/(ha*d), as per 3.4.3, commercial and institutional Water Demand, Guidelines for the Design of Water Distribution Systems.
- Population (assumed), 500-1000 to calculate peaking factors, as per table 3-1, Guidelines for the Design of Water Distribution Systems.
- Minimum water pressures to be maintained in the distribution system of:
    - Minimum of 140 kPa (20 psi) at maximum day demand flow plus fire flow
    - Minimum of 275 kPa (40 psi) at maximum hourly demand flow
    - Minimum of 275 kPa (40 psi) at average day demand flow
- Peaking factors of 2.75 for maximum day and 4.13 for maximum hour, as per table 3-1, Guidelines for the Design of Water Distribution Systems.
- Design Hydraulic Grade line (HGL) of 301.8m as per email from City of London (Aron Rozentals) on February 24, 2023.
- 72 hr water turnover for water quality as per the Municipality of Middlesex Center IDS.

2.2 Domestic Water Demand

The water demand was determined considering the proposed development area. Only the building areas were assumed (conservative since water turnover governs the design scenarios). Additionally, the commercial areas located at 848 and 805 Gideon Dr were considered as well as the 20 Low Density Residential Units, resulting in an average day flow of 0.716 L/s and a maximum day flow of 2.15 L/s (see calculations below).

The reservoir location used for the calculations is at the intersection of Woodhull Rd. and Elviage Dr., as provided by the City of London. the existing 600mm watermain on Elviage Dr. and Brigham Rd. is proposed to be downsized to a 350mm, and a new 300mm is proposed from the intersection of Brigham Rd. and Gideon Dr. to the proposed development (see sketch below)..

2.3 Water Demand for Fire Protection

The Municipality of Middlesex Center IDS states that the fire flow requirements on private property shall be determined in accordance with the OBC.

The water supply for Fire-Fighting for the proposed project was calculated to be 9,000L/min. Combined with the maximum day domestic demand of 129.1 L/min, the total water demand for the fire-fighting scenario is 9,129 L/min. Please see enclosed the water supply for Fire-Fighting calculations.

The total pressure loss in pipes of 30.71psi was calculated considering the proposed (350mm) watermain with an approximate length of 1400m from the reference reservoir located at Elviage Dr. and Woodhull Rd. to the Gideon Dr./Brigham Rd. intersection, and the proposed watermain (300mm) with an approximate length of 621.92m from the Gideon Dr./Brigham Rd. intersection to project site. Please see enclosed the watermain pressure loss calculations per Hazen-Williams methodology.

The Water pressure at the proposed property under the max day plus fire flow scenario, accounting for losses, is 198.09 kPa (28.73psi). As per section 5.3.1 of the Municipality of Middlesex Center IDS, the minimal residual pressure in a fire flow scenario shall not be less than 140 kPa (20 psi) at any hydrant lateral or fire service connection and that the maximum residual pressure shall not exceed 550 kPa (80 psi).

Section 5.3.7. of the Municipality of Middlesex Center IDS requires that the maximum velocity shall not exceed 2.4 m/s under all flow conditions. Under fire-flow + maximum day demand with 300mm and 350mm diameter watermains, the anticipated velocity was calculated to be 2.15 m/s and 1.58 m/s respectively. Refer to the water supply for Fire-Fighting calculations enclosed in this study.

Based on the current OBC requirements, a fire hydrant shall be located within 90 m from the proposed development; therefore, a new on-site hydrant(s) will be required. Location of hydrant(s) and fire-fighters' connection will be determined at the time of detailed design for Site Plan Approval (SPA)

2.4 Capacity Review

In order to meet the velocity, pressure, and turnover requirements for the various flow scenarios (see below), the existing 600mm watermain on Elviage Dr. and Brigham Rd. is proposed to be downsized to a 350mm, and a new 300mm is proposed from the intersection of Brigham Rd. and Gideon Dr. to the proposed development.

As shown in the enclosed water supply for Fire-Fighting calculations, considering the Design Hydraulic Grade line (HGL) of 301.8m at the reservoir located in Elviage Dr., the fire flow demand requirements, and the maximum day domestic demand, the water pressure at the subject property (708 & 714 Gideon Drive) at the required flow of 9,129 L/min (fire flow + maximum day demand) will be approximately 28.73 psi. The final pressure in the sprinkler system will be calculated by the sprinkler system designer, for building permit application.

The water pressure during the the max. day plus fire flow scenario, is approximately 28.73 psi, which is larger than 20 psi and less than 80 psi, therefore the proposed water distribution system meets the Municipality of Middlesex Center IDS.

Water supply for Fire-Fighting and watermain pressure loss calculations show that the proposed water distribution system can provide the adequate fire flow protection for the proposed development.

2.5 Water Quality

The volume and Turnover calculations were determined considering 621.95m length from Gideon Dr/Brigham Rd intersection to project site and 1400m length from the reservoir located on Elviage Dr to

Gideon Dr/Brigham Rd intersection, resulting in 2.89 days turnover, and as per the Municipality of Middlesex Center IDS (water quality) the maximum allowable turnover is 3 days (72 hours). See build-drawings enclosed.

3. SANITARY SERVICING

Received record information revealed that there is no municipal sanitary sewer in the Gideon Drive ROW; therefore, an on-site septic system is required for sanitary servicing.

The design parameters outlined below are based on Sewage System Design Flows (OBC, section 8.2.1.3).

- 275 L/d per Doctor Office or Clinic was assumed one practitioner.
- 75 L/d per Doctor Office or Clinic was assumed one employee per 8 hour shift.
- 125 L/d per food Service (restaurant per seat)
- 125 L/d per Food Service (bar per seat)
- 0.75 L/d per Office Building
- 20 L/d per Stadiums (hockey Fields per seat)

Based on our preliminary Sewage System Sizing calculations enclosed, the sanitary sewage flow for the proposal development is 32,775 L/d. According to the Municipality of Middlesex Center IDS section 2.1.2., the daily flow of this development exceeds the maximum of 10,000 L/d for private wastewater system; therefore, the sewage system will be designed and constructed under the jurisdiction of the MECP. Detailed design and location will be provided at the time of detailed design for SPA.

4. STORM SERVICING AND STORMWATER MANAGEMENT

Received record information revealed that there are no municipal storm sewers in the Gideon Drive ROW and the Bridham Rd, ROW As there are not know stormwater management (SWM) features existing on the site, site runoff discharges uncontrolled to the Municipal Drain to the east and south side, neighbouring property to the west and Gideon Dr. to the North.

4.1 Pre-Development Conditions

Pre-development conditions were obtained from the Topographic Survey provided by MCI, enclosed. As per the Colledge Drain Township of Delaware drawing dated Sep 1978, enclosed, the east side of the site (approx. 5.83ha) is considered tributary to the Colledge municipal Drain. The remainder of the site (approx. 2.3ha) drains uncontrolled to the west and north.

Under pre-development conditions, the east catchment (5.83ha) of the site is currently comprised by one residential dwelling, agricultural buildings, gravel and paved driveway areas and paved courts (from the former racquet club); on the other hand, under pre-development conditions. The west catchment area (2.3ha) of the site is currently comprised of open grassed area (former driving range). The total site area (8.1ha) has a net runoff coefficient (C-value) of 0.28. Please refer to Runoff Coefficient calculations, enclosed.

4.2 Post-Development Conditions

Post-development conditions were obtained from the Site Plan prepared by MCI Design-Build Corporation dated May 2022, enclosed. Under post-development conditions the subject site will consist of two new buildings (2-storey recreation center and a medical building clinic), outdoor recreation areas, parking lot, drive aisles, and landscaping areas. The enclosed Runoff Coefficient calculations show that under post-development conditions, the subject site has a runoff coefficient (C-value) of 0.47.

Due to an increase in impervious area due to site redevelopment, an increase in overland runoff is anticipated under post-development conditions. Therefore, SWM quantity controls will be required for this development to attenuate flows to pre-development levels. Post-development flows will be restricted to match pre-development levels for the 2-year through 250-year storm events. As per the enclosed SWM calcs, the required storage volume to meet the quantity control requirements for this development is 2,932.65 m3. Based on our preliminary review of the site, this storage volume can be provided on flat roofs of the proposed buildings and/or the surface of the proposed parking lot and open/landscaped areas. Detailed SWM calculations and grading design will be prepared at the time of detailed design for SPA.

5. CONCLUSIONS AND RECOMMENDATIONS

As there is no municipal water main in the Gideon Drive ROW; it is proposed to extend municipal water servicing to the property by replacing the existing 600mm watermain on Elviage Dr. and Brigham Rd. with a 350mm watermain and extend a new 300mm watermain on Gideon Rd. to the subject property.

Based on the above, the proposed water distribution system can provide the minimum required water supply flow rate under the fire flow plus maximum day demand scenario and water quality turnover under the average day domestic demand scenario; therefore, there is adequate water supply available for the proposed development.

There is no existing sanitary sewer; therefore, on-site sewage system is proposed for sanitary servicing. Based on our preliminary design calculations, the sewage system will be designed and constructed under the jurisdiction of the Ministry of the Environment.

Due to the proposed redevelopment, there is anticipated to be an increase in runoff; therefore, SWM quantity controls will be provided to restrict runoff to the existing outlet(s) to pre-development levels.

Based on the above, the proposed redevelopment can be provided with adequate water, sanitary, and storm water servicing. Therefore, we recommend, from a site servicing perspective, that the proposed OPA and ZBA be granted.

6. LIMITATIONS

This Study was prepared by SBM for MCI Design Build Corp, the Municipality of Middlesex Centre 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.

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.

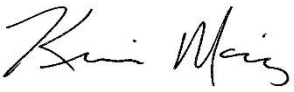
This document is deemed to be the intellectual property of SBM in accordance with Canadian copyright law.

7. CLOSURE

We trust this Brief 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



Kevin Moniz, P.Eng,
Principal

Javier Vinazco, EIT
Civil EIT

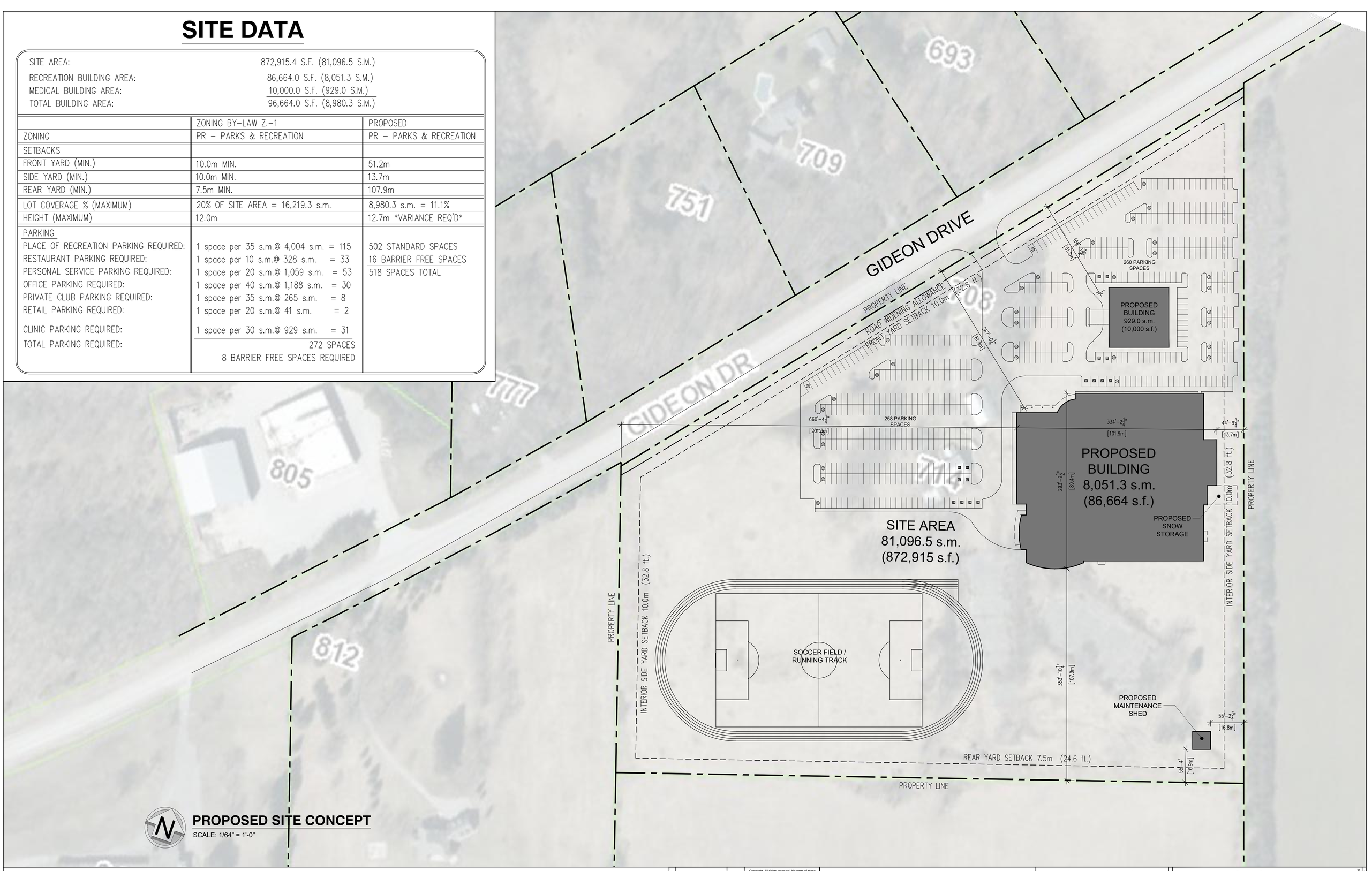
Encl: Site Plan and building drawings prepared by Design-Build Corporation, dated October 2021
Colledge Drain Township of Delaware drawing, Spriet Associates, dated Sep 1978
Sketch with proposed development and College Drain included
Topographic Survey provided by MCI
Record drawing of the watermain on Brigham Rd
Water main proposed
Domestic Water Demand Calculations
Water Supply Fire-Fighting Calculations
Watermain Pressure Loss Calculations
Sewage System Design Calculations
Preliminary SWM Calculations

Site Plan and building drawings prepared by MCI, dated October 2021 (3pages)
Colledge Drain Township of Delaware drawing, Spriet Associates, dated Sep 1978
Sketch with proposed development and College Drain included
Topographic Survey provided by MCI
Record drawing of the watermain on Brigham Rd

SITE DATA

SITE AREA:	872,915.4 S.F. (81,096.5 S.M.)
RECREATION BUILDING AREA:	86,664.0 S.F. (8,051.3 S.M.)
MEDICAL BUILDING AREA:	10,000.0 S.F. (929.0 S.M.)
TOTAL BUILDING AREA:	96,664.0 S.F. (8,980.3 S.M.)

	ZONING BY-LAW Z.-1	PROPOSED
ZONING	PR – PARKS & RECREATION	PR – PARKS & RECREATION
SETBACKS		
FRONT YARD (MIN.)	10.0m MIN.	51.2m
SIDE YARD (MIN.)	10.0m MIN.	13.7m
REAR YARD (MIN.)	7.5m MIN.	107.9m
LOT COVERAGE % (MAXIMUM)	20% OF SITE AREA = 16,219.3 s.m.	8,980.3 s.m. = 11.1%
HEIGHT (MAXIMUM)	12.0m	12.7m *VARIANCE REQ'D*
PARKING		
PLACE OF RECREATION PARKING REQUIRED:	1 space per 35 s.m.@ 4,004 s.m. = 115	502 STANDARD SPACES
RESTAURANT PARKING REQUIRED:	1 space per 10 s.m.@ 328 s.m. = 33	16 BARRIER FREE SPACES
PERSONAL SERVICE PARKING REQUIRED:	1 space per 20 s.m.@ 1,059 s.m. = 53	518 SPACES TOTAL
OFFICE PARKING REQUIRED:	1 space per 40 s.m.@ 1,188 s.m. = 30	
PRIVATE CLUB PARKING REQUIRED:	1 space per 35 s.m.@ 265 s.m. = 8	
RETAIL PARKING REQUIRED:	1 space per 20 s.m.@ 41 s.m. = 2	
CLINIC PARKING REQUIRED:	1 space per 30 s.m.@ 929 s.m. = 31	
TOTAL PARKING REQUIRED:	272 SPACES 8 BARRIER FREE SPACES REQUIRED	



PROPOSED SITE CONCEPT

SCALE: 1/64" = 1'-0"

2	REVISED PER CLIENT REQUEST	2022-10-12
1	ISSUED FOR CLIENT REVIEW	2022-08-17
No.	DESCRIPTION	DATE

REVISIONS

All contractors shall check and verify dimensions. Report any discrepancies to the Designer before proceeding with the work. Do not scale drawings.

PRELIMINARY

DESIGN-BUILD CORPORATION
2081 OXFORD STREET E., LONDON ON TEL: 519-453-3979

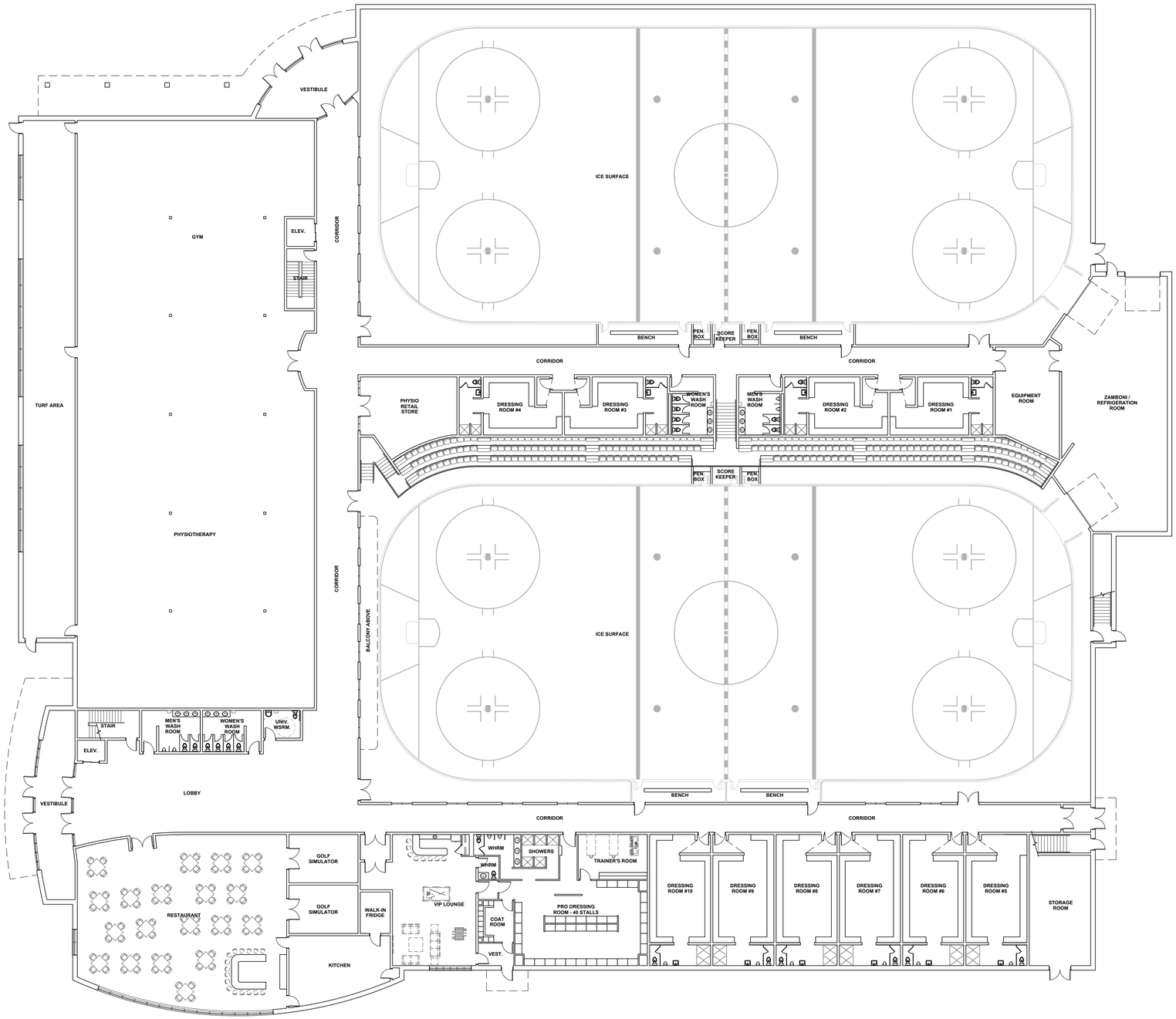
Proposed Site Concept

E19-0149

CLIENT: Proposed Building, London, ON
CLIENT: Dr. Chris Chant, London, ON

SP1

May, 2022



PROPOSED GROUND FLOOR PLAN

SCALE: 1/16" = 1'-0"

No	DESCRIPTION	DATE
5	REVISED PER CLIENT REQUEST	2022-10-06
4	REVISED PER CLIENT REQUEST	2021-09-29
3	REVISED PER CLIENT REQUEST	2019-02-14
2	REVISED PER CLIENT REQUEST	2018-08-10
1	ISSUED FOR CLIENT REVIEW	2018-07-31

REVISIONS

PRELIMINARY

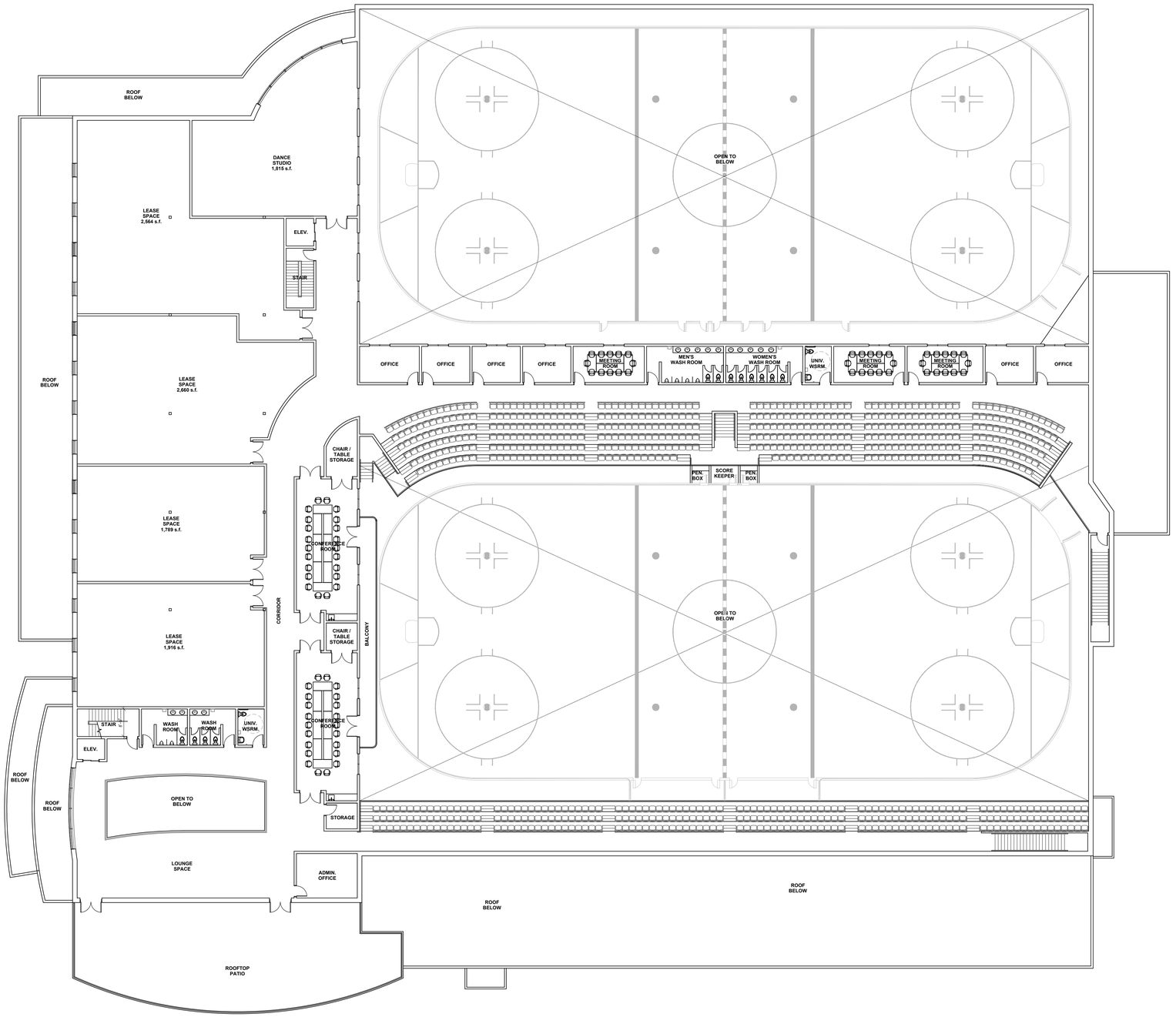
DESIGN-BUILD CORPORATION
2081 OXFORD STREET E., LONDON ON TEL: 519-453-3979

Proposed Ground Floor Plan

PROJECT: Proposed Building
London, ON
CLIENT: Dr. Chris Chant
London, ON
DATE: October, 2021

E18-0149

A1



PROPOSED SECOND FLOOR PLAN

SCALE: 1/16" = 1'-0"

NO.	DESCRIPTION	DATE
1	REVISED PER CLIENT REQUEST	2022-10-06
4	REVISED PER CLIENT REQUEST	2021-09-09
3	REVISED PER CLIENT REQUEST	2019-02-14
2	REVISED PER CLIENT REQUEST	2018-08-10
1	ISSUED FOR CLIENT REVIEW	2018-07-31

REVISIONS

PRELIMINARY

DESIGN-BUILD CORPORATION
2081 OXFORD STREET E., LONDON ON TEL: 519-453-3979

DRAWING TITLE: **Proposed Second Floor Plan**

E18-0149

PROJECT: Proposed Building, London, ON

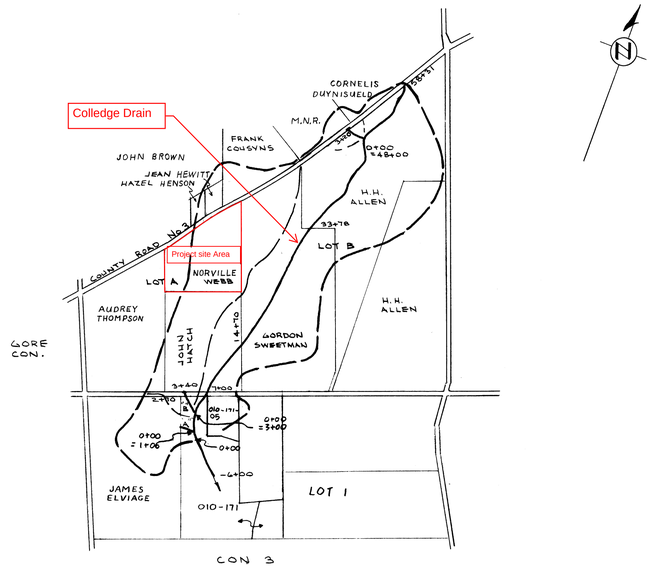
CLIENT: Dr. Chris Chant, London, ON

A2

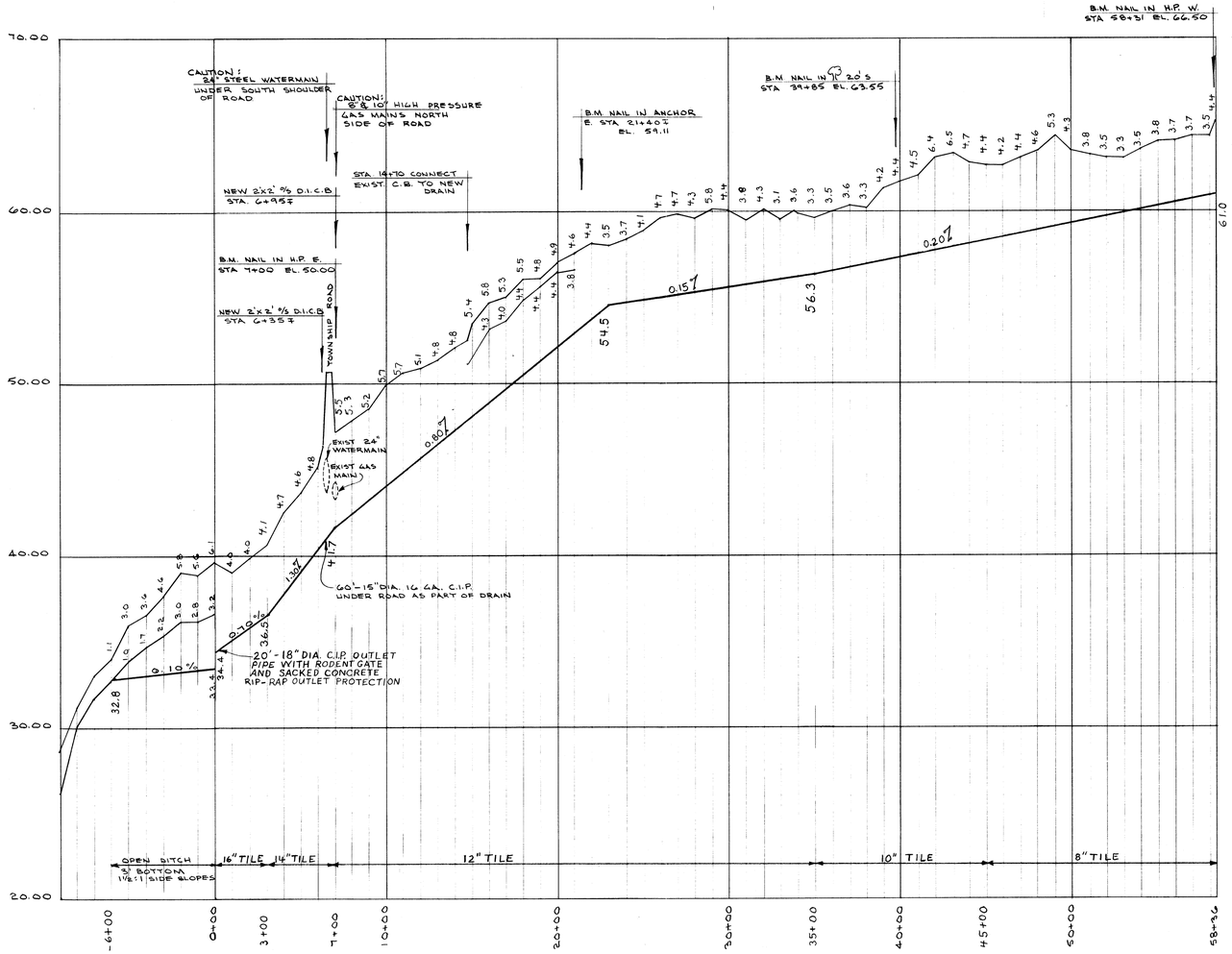
DRAWN BY: [illegible]

CHECKED BY: [illegible]

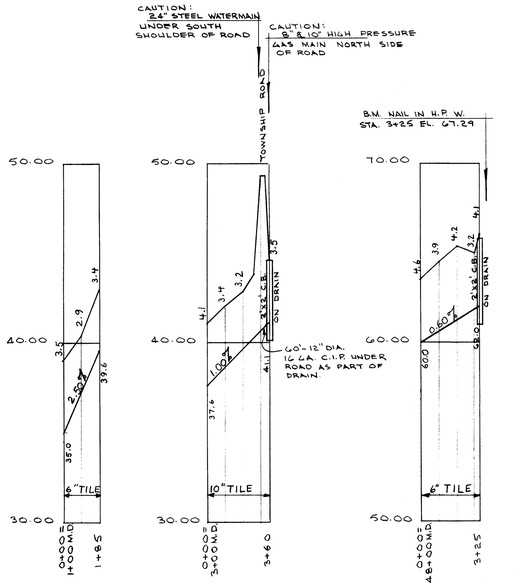
DATE: October, 2022



PLAN Scale 1"=1000'



MAIN DRAIN PROFILE Scale Hor 1"=400'
Vert 1"=4'-0"



BRANCH "A" BRANCH "B" BRANCH "C"

GENERAL NOTES

1) EXACT LOCATION OF NEW TILE DRAIN TO BE VERIFIED IN FIELD BY DRAINAGE COMMISSIONER.
2) STANDARD 2'x2' CATCHBASINS TO BE M.T.C. TYPE DD-702A WITH FRAME AND GRATE TO BE M.T.C. TYPE DD-705 OR APPROVED EQUAL.
3) STANDARD 2'x2' DITCH INLET CATCHBASIN TO BE M.T.C. TYPE DD-716-A WITH GRATE SLOPE 2:1 GRATE TO BE M.T.C. TYPE DD-710-A OR APPROVED EQUAL.
4) CONTRACTOR TO INVESTIGATE ELEVATION AND LOCATION OF WATERMAIN AND TWO GAS MAINS ON TOWNSHIP ROAD BEFORE COMMENCING WORK. NOTIFY P.U.C AND UNION GAS BEFORE DIGGING.
5) CLEARING STA. 31+70 TO 40+00 AND STA. 0+00 TO -6+00 AS PER SPECIFICATIONS.
6) DRAIN TO BE KEPT 60'± NORTH OF EXISTING RUN TO ALLOW FOR FUTURE POND AREA STA. 14+70 TO 18+00.

REVISED — ASSESSMENT SPLIT FEB 20/1997

J. R. SPRIET — REGISTERED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

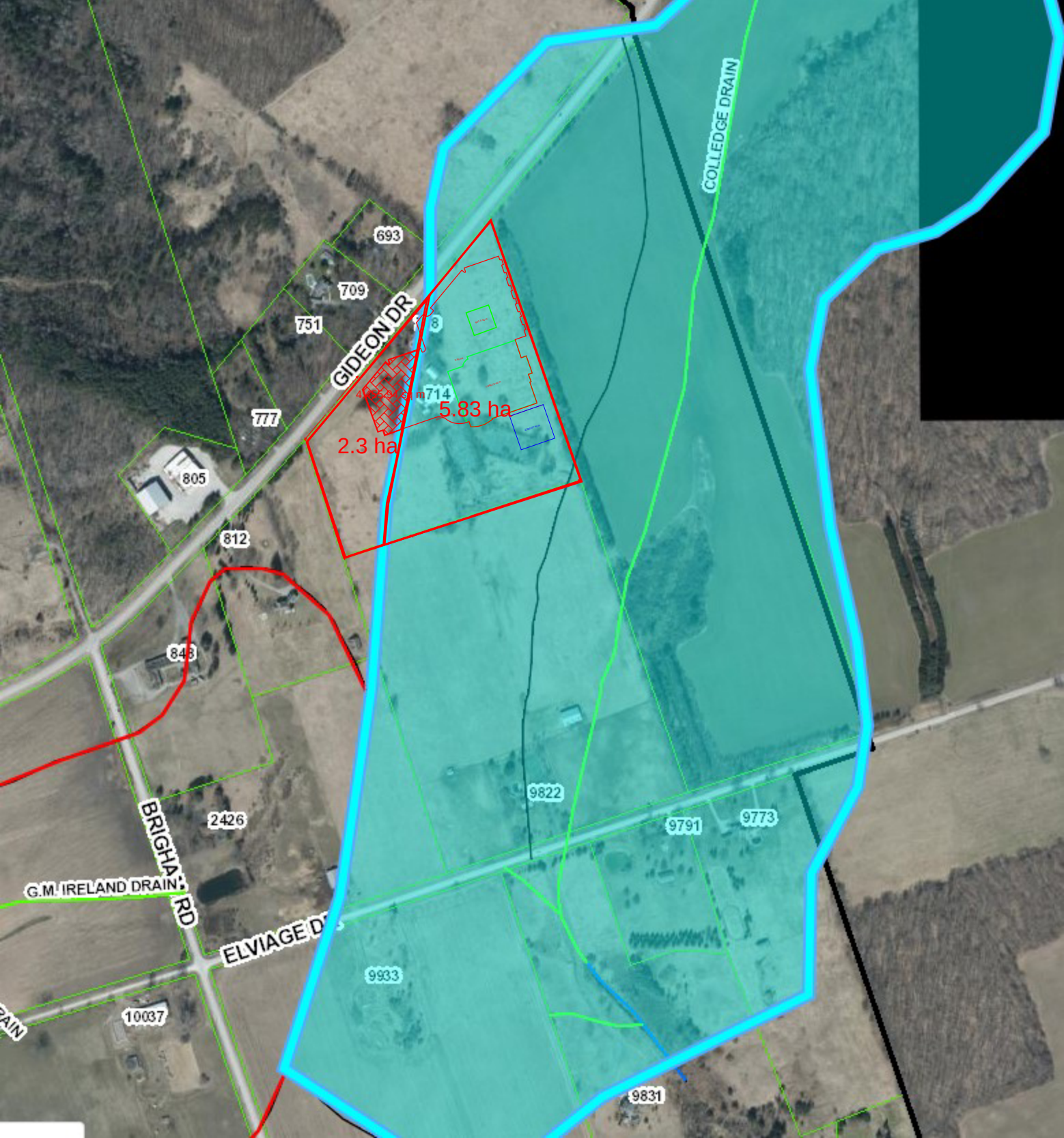
COLLEDGE DRAIN

TOWNSHIP OF DELAWARE

Scale: As Shown	Approved By: F.B. B-36	JOB NO. 78140	Drawn By: J. N. H.
Date: SEPT 25/1978			Revised:

PLAN & PROFILES

SPRIET ASSOCIATES CONSULTING ENGINEERS — LONDON SUDBURY — Drawing Number 1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GIDEON DR
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2.3 ha
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ELVIAGE D
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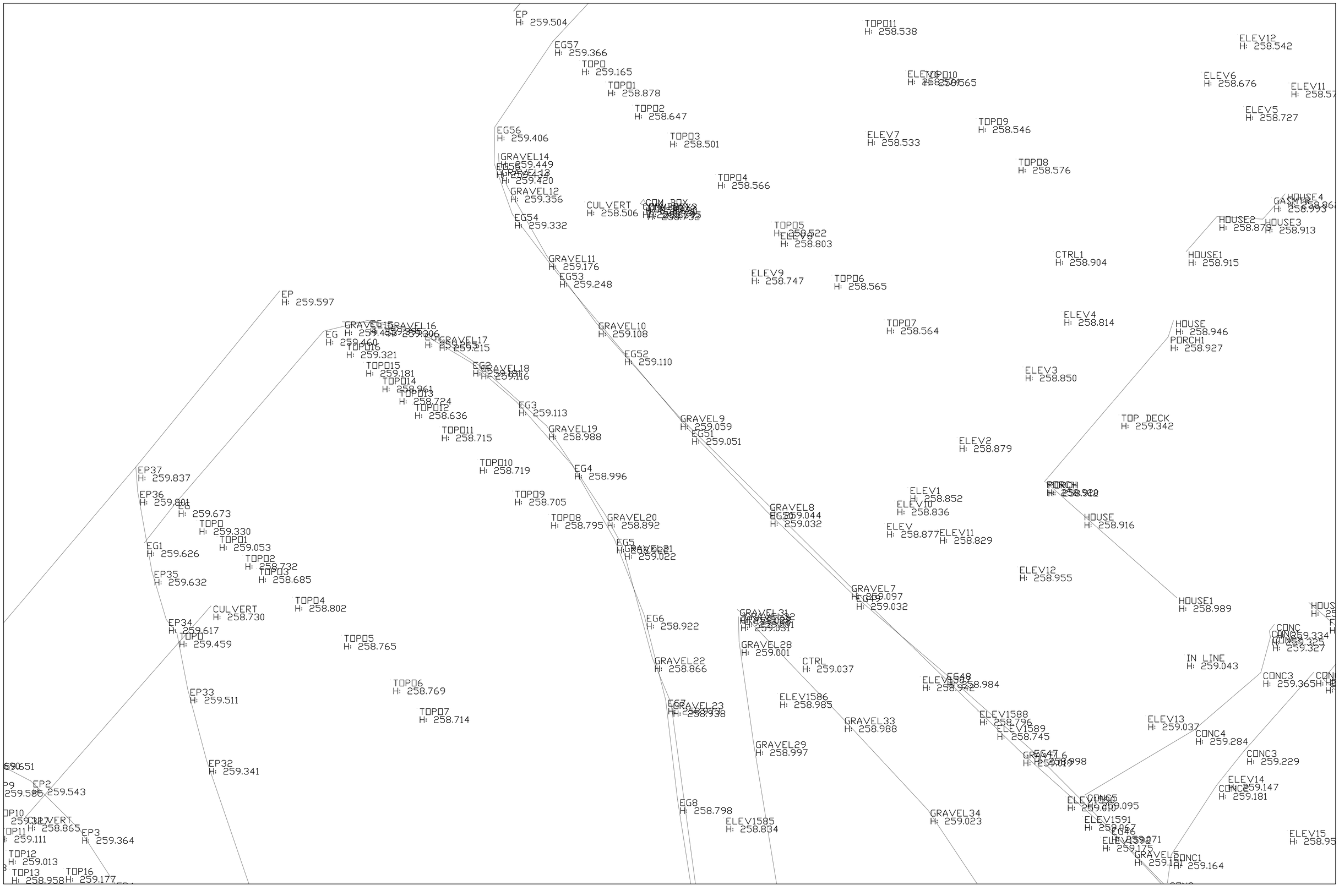
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H: 259.147
CONC2
H: 259.181
ELEV15
H: 258.95
CONC1
H: 259.164
EP2
H: 259.543
CULVERT
H: 258.865
EP3
H: 259.364
TOP12
H: 259.013
TOP13
H: 258.958
TOP16
H: 259.177

100 GM

BACKFLOW VALVE

150 OFF 600 TAPPING SLEEVE AND VALVE

EX ABANDONED BELL CABLES

EX. 600 STEEL WM

EX 50 GM

B.T.U.C.

583'
from 1st manhole
to valve.

90° x 10 L.S
S. of hyd

150 WM

3 way M67

EX ASPHALT PARKING

C900 CL150 DR18 PVC PIPE WITH TRACER WIRE

3-WAY HYDRANT WITH STORZ CONNECTION

(NOTE: HYDRANT TO BE S
WITH SECURITY DEVICE TO
SATISFACTION OF THE FIR
WATERWORKS DEPT AND
TOWNSHIP)

150 TEE

150 VALVE

10 EX 90 LS

90° BEND & THRUST RESTRAINT

90° BEND & THRUST RESTRAINT

15

SUNHAVEN NURSING HOME

150 WM

15

EX SEPTIC OUTLET TO TILEBED

SEPTIC TANK

SEPTIC TANK

67.5° BENDS & THRUST RESTRAINTS

PROPOSED

ASPHALT

Water main proposed


Gideon Dr
3
Project site
London West Resource Centre
Guideon Dr/Brigham Rde intersection
Intersection
621m, 300mm WM
Brigham Rd
1,400m, 350mm WM
Reservoir, Elviage Dr at City limits
Reservoir
Elviage Dr
Elviage Dr

Domestic Water Demand Calculations

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DOMESTIC WATER DEMAND, VELOCITY, AND TURNOVER CALCULATION

DATE:	March 15, 2023
JOB N0.:	SBM-22-2780
Client:	**MCI Design Build Corp**
Project:	**Proposed Recreation Center and Medical Clinic**
Location:	**708 & 714 Gideon Drive, Middlesex Center, Ontario**

DEMAND CALCULATION

Residential Avg. Day Demand =	350	L/day/cap	5.3.2
Residential Avg. Day Demand =	0.004050926	L/s/cap	
Max. Day Peaking Factor =	3.5		
Max. Hour Peaking Factor =	7.8		
Low Density Residential=	3	p/Unit	
*Commercial Area Allowance Average Flow= 28m3/(ha*d) =	28000.0	L/day/ha	3.4.3, DGDWS
Max. Day Peaking Factor =	2.75		Table 3-1: Peaking Factors
Max. Hour Peaking Factor =	4.13		Table 3-1: Peaking Factors

Project Site	Units/Area (ha)	Population	Avg. Day (L/s)	Max. Hour (L/s)	Max. Day (L/s)
Institutional Project Site Area	0.9		0.29	1.19	0.79
Total			**0.29**	**1.19**	**0.79**
					47.59 L/min

Location	Units/Area (ha)	Population	Avg. Day (L/s)	Max. Hour (L/s)	Max. Day (L/s)
848 Gideon Area	0.3		0.09	0.36	0.24
805 Gideon area	0.3		0.10	0.40	0.27
Low Density Residential	20.0	60	0.243	1.90	0.85
Total			**0.43**	**2.66**	**1.36**
			0.716		**81.52** L/min

Total max Day Demand=	**129.11**	L/min
	2.15	L/sec

*Refer to MOECC " The Design Guidelines for Drinking-Water Systems" (2008)

VELOCITY CALCULATION

Diameter (mm)	Demand (L/s)	Velocity (m/s)
300	1.19	**0.017**
350	2.66	**0.028**

Maximum allowable velocity of 1.5 m/s under maximum hour domestic flow conditions as per Section 4.3.5 of the City Middlesex Centre, Infrastructure Design Standards..

VOLUME CALCULATION

Diameter (mm)	Length from Guideon Dr/Brigham Rd intersection to project site	Volume (Litres)
300	621.95	43963.05
350	1400.00	134695.79
	Total	**178658.84**

TURNOVER CALCULATIONS

Average Day Demand (L/s)	Volume (L)	Hours	Days
0.72	178658.84	**69.292**	**2.89**

Maximum allowable turnover of 3 days (72 hours) under average flow conditions as per Section 7.3.6 of the Municipality of Middlesex Center Infrastructure Design and Standards Manual (IDS)

Water Supply Fire-Fighting Calculations

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Water Supply for Fire-Fighting Calculations

	For data entry
	Calculated, not for data entry

DATE:	March 15, 2023
JOB N0.:	SBM-19-2024

Client:	**MCI Design Build Corp**
Project:	**Proposed Recreation Center and Medical Clinic**
Location:	**708 & 714 Gideon Drive, Middlesex Center, Ontario**

$Q=K*V*S_{Tot}$

Building Classification (3.1.2.1):	A-3	
Type of Construction:	Noncombustible	
K (Table 1):	**22**	
Building Area, m^2:	8051.30	
Building Height, m:	15.00	
Building Volume, m^3:	**120769.50**	

$S_{Tot} = 1.0 + (S_{side1} + S_{side2} + S_{side3} + S_{side4})$

S_{side1} (Figure 1) =	0.00	(North)
S_{side2} (Figure 1) =	0.00	(East)
S_{side3} (Figure 1) =	0.00	(South)
S_{side4} (Figure 1) =	0.00	(West)
S_{Tot} =	1.00	
S_{Tot} < or = 2, therefore S_{Tot} =	**1.00**	
Q, L =	**2656929**	

Required Supply Flow Rate, L/min (Table 2) =	9000	
Maximum day domestic demand (as per separate calculation sheet)	2.15	L/sec
	129.00	L/min
Required Supply Fire Flow + Maximum Day Demand, L/min =	**9129**	
	152	L/s

****HGL from City of London (Low Level System) =**	301.80	m
Approximate Elevation of Proposed Connection to Hydrant =	260.00	m
Water Pressure at service entrance Under Firefighting Conditions =	41.80	m head (59.44 psi, 409.81 kPa)

Therefore, water supply pressure at the proposed property under fire flow conditions accounting for losses = 409.81 kPa - 102.93 kPa - 108.79kPa = 198.09 kPa (28.73psi)

*Refer to attached Domestic Water Demand calculation.
**Refer to attached Watermain Pressure Loss Calculations

Watermain Pressure Loss Calculations

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Watermain Pressure Loss Calculations

DATE: March 15, 2023
JOB N0.: SBM-22-2780

Client: **MCI Design Build Corp**
Project: **Proposed Recreation Center and Medical Clinic**
Location: **708 & 714 Gideon Drive, Middlesex Center, Ontario**

For data entry
Calculated, not for data entry

Pressure Loss in 350mm pipe, from Reservoir located at Elviage Dr to Guideon Dr/Brigham Rd intersection, Total distance 1,400m

Pressure in Main

Starting Pressure Head at Elviage Dr/Westdel Bourne intersection without pressure loss	409.81	kPa	Refer to Water Supply for Fire-Fighting Calculations

Pressure Loss in 350mm Service

Friction Losses Through Pipe Fitting in Terms of Equivalent Length of Pipe:

**TEE (2x30.10 ft)	18.35	m	
Length of pipe (m)	1400	m	Distance from Recervoir located at Elviage Dr to Guideon Dr/Brigham Rd intersection
l = total length of pipe, including additional length due to loss in fittings	1418.35	m	
***c = Hazen-Williams roughness constant	120		Refer to Middlesex Center, Infrastructure Design Standards, section 5.3.3
q = volume flow (L/s) [refer to fire-fighting demand calculations]	152.2		Refer to Water Supply for Fire-Fighting Calculations
d = inside or hydraulic diameter (mm)	350	mm	

Calculated Pressure Loss

f = friction head loss in mm of water per 100 m of pipe (mm H_20 per 100 m pipe)	-781.84			
f = friction head loss in kPa per 100 m of pipe (kPa per 100 m pipe)	-7.67			
Head loss (mm H20)	-11089.21			
Head loss (kPa)	-108.79	or	-15.78	psi

Calculated Flow Velocity

v = flow velocity (m/s)	1.58	****Less than 2.4 m/s as per section 5.3.7, Middlesex Center Design Standards.

Final Pressure at the proposed building accounting for pressure loss (kPa)	**301.02**	or	43.66	**psi**

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Watermain Pressure Loss Calculations

DATE: March 15, 2023
JOB N0.: SBM-22-2780

Client: **MCI Design Build Corp**
Project: **Proposed Recreation Center and Medical Clinic**
Location: **708 & 714 Gideon Drive, Middlesex Center, Ontario**

For data entry
Calculated, not for data entry

Pressure Loss in 300mm pipe, From Gideon Dr/Brigham Rd intersection to project site, Total distance 621.95m

Pressure in Main

Starting Pressure Head at Gideon Dr/Brigham Rd intersection accounting for losses	301.02	kPa	*Refer to attached Watermain Pressure Loss Calculations for 350mm

Pressure Loss in 300mm Service

Friction Losses Through Pipe Fitting in Terms of Equivalent Length of Pipe:

**Valve (2x4.56 ft)	2.78	m	**Refer to NFPA 1142, Table I.1 (c)
**TEE (1x30.10 ft)	9.17	m	
Length of pipe (m)	621.95	m	Distance from Gideon Dr/Brigham Rd intersection to project site
l = total length of pipe, including additional length due to loss in fittings	633.90	m	
***c = Hazen-Williams roughness constant	120		***Refer to the Municipality of Middlesex Center (IDS) , section 5.3.3
q = volume flow (L/s) [refer to fire-fighting demand calculations]	152.2		**** Refer to Water Supply for Fire-Fighting calculations
d = inside or hydraulic diameter (mm)	300	mm	

Calculated Pressure Loss

f = friction head loss in mm of water per 100 m of pipe (mm H_20 per 100 m pipe)	-1655.19			
f = friction head loss in kPa per 100 m of pipe (kPa per 100 m pipe)	-16.24			
Head loss (mm H20)	-10492.23			
Head loss (kPa)	-102.93	or	-14.93	psi

Calculated Flow Velocity

v = flow velocity (m/s)	2.15	*****Less than 2.4 m/s as per the Municipality of Middlesex Center (IDS), section 5.3.7

Final Pressure at the proposed building for sprinklers accounting for pressure loss (kPa)	**198.09**	or	28.73	**psi**

Sewage System Design Calculations

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Sewage System Sizing Calculations (OBC)

	For data entry
	Calculated, not for data entry

DATE:	March 15, 2023
JOB N0.:	SBM-22-2780

Client:	**MCI Design Build Corp**
Project:	**Proposed Recreation Center and Medical Clinic**
Location:	**708 & 714 Gideon Drive, Middlesex Center, Ontario**

DAILY SEWAGE FLOW (Based on Sewage System Design Flows), OBC, Section 8.2.1.3

Facility	Number	Volume, Litres	Calculated Flow L/day
Clinic, Doctor Office			
Particioner	1	275	275.0
Employee	1	75	75.0
Food service operations, (per seat)			
Restaurant (1), 76 seats	76	125	9500.0
Bar (2), 24 seats	24	125	3000.0
Office Building			
Second floor Offices	7	0.75	5.3
Stadiums, (per seat)			
Hockey fields (2)	996	20	19920.0
TOTAL			32775.3

As per table 8.2.1.3.A, Sewage System Design Flow. OBC,Minimum Septic Tank Size (L) in non-residential Occupancies = 3* Daily Flow = 3 * 32775.25	**98325.75**

*Since the total design capacity is greater 10,000 litres per day falls under the jurisdiction of MECP

**Refer to Site Plan prepared by MCI Design-Build Corporation, Drawing A1,A2 dated October, 2021

Preliminary SWM Calculations

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SWM Calculations

DATE:	March 16, 2023
JOB N0.:	SBM-22-2780
Client:	**MCI Design Build Corp**
Project:	**Proposed Recreation Center and Medical Clinic**
Location:	**708 & 714 Gideon Drive, Middlesex Center, Ontario**

PRE-DEVELOPMENT CONDITIONS

PRE-DEVELOPMENT FULL SITE:

	Area (m^2)	C	A*C
Total Area:	81370		
Building Area:	1113.36	0.9	1002.02
Asphalt:	7513.79	0.9	6762.41
Concrete:	0.00	0.9	0.00
Gravel:	841.20	0.7	588.84
Landscaped/Open:	71901.65	0.2	14380.33
Totals:	81370.00		22733.61
C_{eq} = Sum(A*C)/Sum(A) =	0.28		

3 CHICAGO RAINFALL DISTRIBUTION PARAMETERS*

Return Period (years)	A,B,C Parameters A	B	C
2	1290.000	8.500	0.860
5	1183.740	7.641	0.838
10	1574.382	9.025	0.860
25	2019.372	9.824	0.875
50	2270.665	9.984	0.876
100	2619.363	10.500	0.884
250	3048.220	10.030	0.888

Intensity i=A/(t+B)^C (mm/hr)

100 Year Pre-Development Area Flows

C =	0.28	
Time to concentration t_c =	19	min
Intensity, i (@ t_c) =	131.48	mm/hr
Pre Development Flow, Q_r = 2.78*C*i*A =	830.97	l/s

P0ST-DEVELOPMENT CONDITIONS

POST-DEVELOPMENT FULL SITE:

	Area (m^2)	C	A*C
Total Area:	81370.00		
Building Area:	11073.86	0.9	9966.47
Asphalt/Concrete:	20633.01	0.9	18569.71
Landscaped/Open:	49663.13	0.2	9932.63
Totals:	81370.00		38468.81
C_{eq} = Sum(A*C)/Sum(A) =	0.47		

100 Year Area Post-Development Flows

C =	0.47	
Time to concentration t_c =	19	min
Intensity, i (@ t_c) =	131.48	mm/hr
Area Post Development Flow, Q_r = 2.78*C*i*A =	**1406.13**	l/s

RETURN PERIOD OF STORM	PRE-DEVELOPMENT FLOWS (L/S)	POST-DEVELOPMENT FLOWS (L/S)	RESTRICTED POST-DEVELOPMENT FLOWS (L/S)
100-YEAR	830.97	1406.13	**575.16**

STORAGE CALCULATIONS

RAINFALL DATA

100 Yr Stm Event							
Duration (min.)	Intensity "i" (mm/hr)	Inflow, Q_i 2.78*C*i*A	Volume In Q*t*60/1000 (m^3)	Restricted Outflow, Q_o (L/s)	Surface Outflow, Q_o (L/s)	Volume Out Q_o*t*60/1000 (m^3)	Difference/ Storage (m^3)
11.5	170.41	1822.42	1257.47	575.16	0.00	396.86	860.61
15	149.56	1599.44	1439.50	575.16	0.00	517.65	921.85
30	99.36	1062.57	1912.63	575.16	0.00	1035.29	877.34
60	60.87	650.95	2343.43	575.16	0.00	2070.58	272.85
120	35.32	377.70	2719.46	377.70	0.00	2719.46	0.00
180	25.28	270.35	2919.75	270.35	0.00	2919.75	0.00
						Max. Storage Volume (m^3) =	2932.65

* Refer to Topographical Plan of Survey provided by MCI
** Refer to Site Plan prepared by MCI Design-Build Corporation dated May, 2022