PROJECT: 119777-5.2.2

2900 WOODROFFE AVENUE
PAD A
SERVICING AND STORMWATER MANAGEMENT DESIGN BRIEF

Prepared for Chris Flemming Developments
by IBI Group

May 8, 2019

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1 INTRODUCTION

IBI Group has been retained by Chris Flemming Developments, c/o the Owner, Woodroffe Square Inc., to provide civil engineering services to support a new pad in the Mulligan Centre Shopping Centre.

This Site Servicing Brief outlines the detailed design for extending storm, sanitary, and water services to Building Pad A, a proposed two storey 467.2 sq. m (233.6 x 2) stand-alone building, located in the existing Mulligan Centre shopping plaza near the intersection of Woodroffe Avenue and Longsfields Drive. The existing shopping center is bound by residential developments to the north and west, commercial lands to the south, and Woodroffe Avenue to the east. Refer to site location map in Figure 1.

The 0.95 Ha property is known as 2900-2910 Woodroffe Avenue and is Block 102 on Registered Plan 4M-796 in the City of Ottawa. It is zoned LC (2127). A copy of the Site Plan prepared by P-Squared Concepts Inc. is included in **Appendix A**.

2 WATER DISTRIBUTION

2.1 Existing Conditions

The subject lands currently contains 2 commercial buildings and they are serviced by an onsite private watermain and fire protection is provided with an onsite private hydrant.

A 200mm diameter watermain on Longfields Ave provides the connection to the existing municipal water distribution system.

2.2 Design Criteria

The following design criteria, which were extracted from the City's Water Distribution Design Guidelines, were used to estimate the water demand requirements for the site:

- Average Daily Demand (ADD) = 2500 l/1000sm/day
- Maximum Daily Demand (MDD) = 1.5 X ADD = 3750 l/1000sm/day
- Peak Hourly Demand = 1.8 X ADD = 4500 l/1000sm/day
- Fire Demand = 66.7 l/s (as per Fire Underwriters Survey – calculations provided in **Appendix B**)

Required Hydraulic Gradients are defined by the City of Ottawa Water Distribution Guidelines:

- Minimum – max hour 276 kPa
- Minimum – max day and fire 140 kPa
- Maximum pressure 552 kPa

A site boundary condition was provided by the City of Ottawa, and the hydraulic gradients for the site are provided below. Correspondence of the boundary conditions is provided in **Appendix B**.

- Maximum Day plus Fire Flow 125.4 m
- Minimum HGL (Peak Hour) 126.5 m
- Maximum HGL 132.6 m

J:\119777_2900Woodrfe\5.9 Drawings\59civil\current\Figures\Fig-1.dwg Layout Name: FIGURE 1

Project Title	Drawing Title	Sheet No.
2900 WOODROFFE AVENUE OTTAWA, ONTARIO	SITE LOCATION	FIGURE 1

The water demand for the building was calculated using the City of Ottawa guidelines (2500l/d for each 1000 sm of office space). Based on a building with 467.2sm, the expected water demand for the proposed building is:

- Average Daily Demand 0.0135 l/s
- Maximum Daily Demand 0.02 l/s
- Peak Hourly Demand 0.024 l/s

2.3 Hydraulic Calculation

The main level and second floor finished floor elevations for the new building will be approximately 92.3 and 95.7meters respectively. Under the Minimum HGL condition, the hydraulic head is 126.5m as provided by the City of Ottawa, the head difference to the main level is 34.2m and 30.8m to the second level, which converts to a water pressure inside the building of 335 and 302 kPa respectively, which exceeds the minimum requirement of 276 kPa per the City guidelines.

Under the Maximum HGL condition the water pressure is calculated for the main level finished floor, elevation 92.3m. The head difference between maximum HGL 132.6 and the main level finished floor (92.3m) is 40.3m, which equates to a water pressure of 395 kPa, which is less than the maximum allowed of 552 kPa per City guidelines. Therefore, pressure reducing valves are not required.

A required fire flow rate of 66.7 l/s has been determined using the methodology from the Fire Underwriters Survey (FUS) 1999, a copy of the calculation is included in **Appendix B**. The 66.7 l/s fire flow was provided to the City in order to determine the HGL condition for the maximum day plus fire condition as shown in Section 2.2. The Maximum Day plus Fire Flow head is 125.4m, and the hydrant elevation is assumed to be 92.7m, the head difference is 32.7, which equates to an available pressure of 320 kPa, which exceeds the minimum of 140 kPa per City guidelines. Accordingly, there will be sufficient fire flow pressure available for the site.

2.4 Proposed Water Plan

The water service for Pad A will be provided through a proposed 50mm diameter type K copper line connected to the existing 150 mmØ private watermain network located in the existing parking lot. Fire protection will be provided by existing hydrant located in the parking lot. See Drawing C-001 in **Appendix B** for details.

3 SANITARY SEWERS

The existing plaza is serviced by a series of 200 mmØ sanitary sewers which discharge into a 250 mmØ outlet sewer which is located in a servicing block and connects to the 300 mmØ sanitary sewer in Woodpark Way. The above is illustrated on the original site servicing plan, a copy of which is included in **Appendix C**.

Unfortunately, we are unable to locate the original sewer design sheets. However, based on the sewer design parameters used at the time of the original design, the 0.95 Ha commercial site would have been designed to accommodate a design volume of 50,000 l/Ha/d, a peak factor of 1.5, and an infiltration rate of 0.28 l/s/Ha. Which equates to (0.95 x 50,000) x 1.5/86400) + (0.95 x 0.28) = 0.824 + 0.266 = 1.09 l/s. The existing 250 mmØ outlet sewer was installed with a slope of 0.5% and has a capacity of 43.8 l/s, which is ample to accommodate the site.

The addition of 467.2 sq. m of office space (Real Estate Office) to accommodate approximately 21 staff will have a very limited increase in flow. Using the City's Sewer Design Guidelines, Appendix 4A, employees for an office are anticipated to have a demand of 75 l/d for the 21 people. Using a peak factor of 1.5 this equates to 0.027 l/s which will have no significant impact on the onsite or offsite sewers.

To service the new building a 150 mmØ service will be extended to the existing 200 mmØ sewer. Due to the limited depth of cover, the sewer has been designed with a slope of 0.65% and will require thermal installation. See details on Servicing Plan C-001, a copy of the sanitary service design sheet is included in **Appendix C**.

4 STORM SEWERS AND STORMWATER MANAGEMENT

The existing plaza is serviced by a series of 300 and 325 mmØ storm sewers which discharge into a 450 mmØ outlet sewer which is located in an existing servicing block connecting to the 1500 mmØ storm sewer in Woodpark Way. The above is illustrated on the original Site Servicing Plan which is included in **Appendix C**. The existing system was designed to meet the local design criteria of 64 l/s/Ha, and an orifice is located in existing MH6 which limits the site to 53 l/s. The original Ponding Plan for the site is included in **Appendix D** which illustrates a total surface storage of 296 m^3.

The proposed pad is located on the existing asphalt surface and therefore, no increase in runoff coefficient due to the transition from asphalt to roof. A small section of existing grassed area will be replaced with a walkway along the rear of the building and providing a pedestrian link to the Woodroffe Avenue sidewalk. This area between the curb and the sidewalk is a depressed landscape area with mature trees and shrubs. The area is approximately 0.3 to 0.5 m below the curbs on site and 0.5 to 0.8 m below the City sidewalk and does not have a direct connection to the onsite storm system.

From reviewing old plans this former ditch was not "urbanized" when the storm sewers were installed along Woodroffe Avenue. Since this area has mature maintained landscaping, we propose to leave the area as is, except for the installation of the linking walkway.

The new pad will have the roof drains controlling flow from the roof to 1.26 l/s (2 drains @ 0.63 l/s each). An updated tributary area plan C-500 has been prepared and is included in **Appendix D**.

Since the existing storm sewer system has an ICD controlling flow from the site to 64 l/s/Ha and no significant change is proposed to the tributary area or the associated runoff coefficient. We do not propose any modifications to the ICD and we do not expect any negative impact on the local and downstream storm system due to the proposed pad addition. Nor do we anticipate any negative impact on the current onsite roadway.

We have included an updated modified rational method calculation in **Appendix D** demonstrating when adding the new pad, the original ponding volumes remain sufficient to accommodate the rate.

The Site Servicing Plan in **Appendix C** illustrates the proposed 200 mmØ service lateral to servicing the building. A copy of the local storm sewer design sheet is included in **Appendix D.**

5 GRADING

The area which the building is proposed is located at the high end of the site topography. The original Ponding Plan noted the limits of ponding at 91.90 m and the proposed building FF elevation of 92.3 provides sufficient freeboard from the ponding elevation. Minor regrading of the asphalt parking lot adjacent to the building is proposed to facilitate transition from the existing asphalt surface to the proposed walkway around the building. Drawing 200 in **Appendix E** illustrates the proposed regrading works around the pad.

There are no off-site grading proposed for this project other than the pedestrian link noted above.

Gemtec Geotechnical Report dated May 3, 2019 provides details on the existing soils within the development. The report provides recommendations which include but are not limited to the following:

- The permissible grade raise in the area of the proposed building is limited to a maximum elevation of 92.70m.
- Fill placed below the foundations to meet OPSS Granular 'B' Type II placed in 200 mm lifts compacted to 95% SPMDD.
- Pavement Structure:

ACCESS LANES AND HEAVY TRUCK PARKING AREAS	CAR PARKING AREAS
40 mm superpave 12.5 mm 60 mm superpave 19 mm 150 mm Granular 'A' 450 mm Granular 'B' Type II	50 mm superpave 12.5 mm 150 mm Granular 'A' 300 mm Granular 'B' Type II

The grading plan does not propose grades above 92.45 meters near the building, therefore, no grade raise issues are expected. The Site Servicing Plan notes the above pavement structure is to be followed unless directed otherwise by the Geotechnical Engineer.

6 SEDIMENT AND EROSION CONTROL PLAN

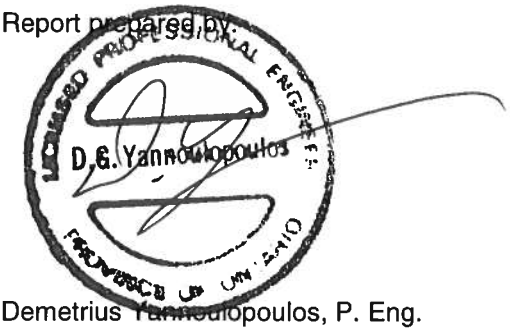
To reduce the possibility of sediment loads entering the existing storm sewer system during construction, a continuous row of silt bags will be placed around the perimeter of the construction limits, in addition, existing catchbasins in the vicinity of the proposed construction will have a silt bag placed in the structure. The sediment control measures should be maintained on a regular basis and remain in place until the area is repaved and vegetation is established in the landscape areas. See Drawing C-900 in **Appendix E**.

7 RECOMMENDATIONS

This servicing and stormwater management design brief has demonstrated the proposed site plan can be serviced by connecting to existing storm, sanitary, and watermain pipes in the existing parking lot of the shopping plaza. The existing services have sufficient capacity to accommodate the proposed expansion. On-site stormwater management is provided by an existing ICD limiting flow to 64 l/s/Ha. The construction of storm, and sanitary sewers, and watermain for the proposed building can be completed in conformance with the City of Ottawa standards. Adherence to the sediment and erosion control plan during construction will minimize harmful impacts on downstream systems.

Since this site is serviced by one connection to the municipal system and the site is owned by single owner, we believe it does not require an ECA for the construction of the service laterals. However, the Owner will be required to obtain a Commence Work Notification for the servicing and a Water Permit for the water service connection to the existing main.

Report prepared by:



Demetrius Yannoulopoulos, P. Eng.
Director, Ottawa Office Lead

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APPENDIX A

- Site Plan

Plan o□S□r□e□

Bloc□102 Regi□tered Plan □M□□9□ Cit□o□Ottawa	S□r□e□Pre□ared B□□ Anni□, O□S□lli□an, Volle□e□□Ltd.	Dated□ 2□Fe□r□ar□2019

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Min. Bic□cle Par□ing S□ace□	□	□
Gar□age Enclo□□re		
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Min. Height o□O□ag□e Screen	2.00 □	□.□□ □ □E□i□ting□

Par□ing Calc□altion□

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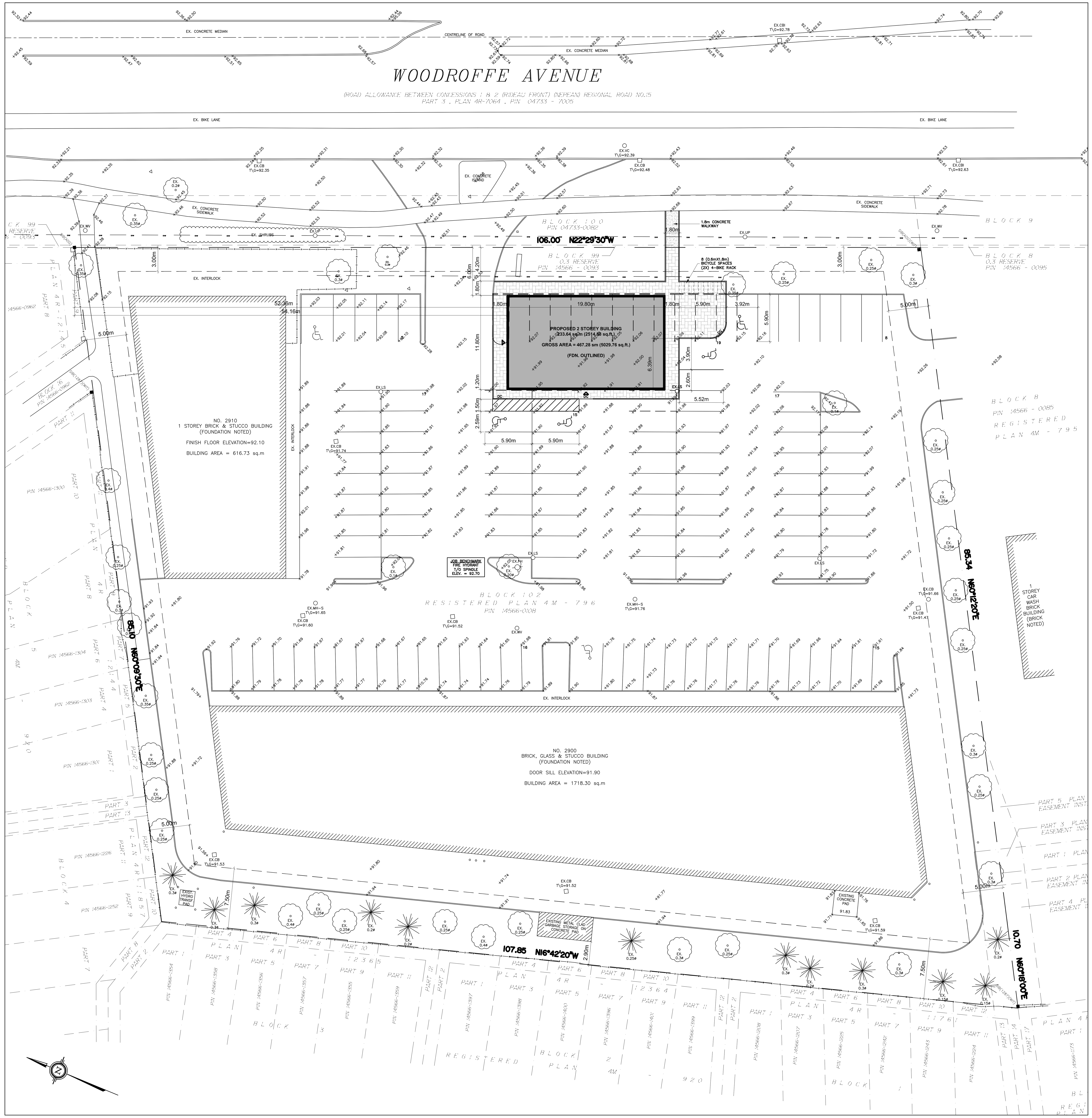
Land□ca□e Area	219□.□□ □□.□
Site Gro□□Floor Area	2□02.□1 □□.□



1 SP 01 **SITE PLAN**
SCALE □1:2□0

CLIENT:
C. FLEMING DEVELOPMENTS LTD.

PLANNING CONSULTANT:
LLOYD PHILLIPS & ASSOCIATES LTD.
PLANNING CONSULTANTS

No.	REVISIONS	BY	DATE
11			
10			
09			
08			
07			
06			
05			
04			
03			
02	FINAL REVIEW	PE	2019.05.06
01	FOR REVIEW	PE	2019.04.17

NOT AUTHENTIC UNLESS SIGNED AND DATED

OWNER:
WOODROFFE SQUARE INC.
1280 BASELINE ROAD,SUITE 201
OTTAWA, ONTARIO, K2C 0A9
(P) 613-274-7700

CONSULTING ENGINEERS
STRUCTURAL
MECHANICAL
ELECTRICAL

P2 concepts
739 RIDGEWOOD AVE., UNIT 201
OTTAWA, ONTARIO, K1V 6M8

DESIGNED BY:	DRAWN BY:	APPROVED BY:
P.E.	P.K.	P.E.

PROJECT
PROPOSED
COMMERCIAL DEVELOPMENT
2900-2910 WOODROFFE AVE.
OTTAWA, ONTARIO

DRAWING TITLE
SITE PLAN

PROJECT NO.
328
DATE
APRIL 2019

SP-01

APPENDIX B

- FUS Calculation
- Boundary Conditions
- C-001 Site Servicing Plan

Fire Flow Requirement from Fire Underwriters Survey - 2900 Woodroffe

Building

Floor Area of Largest building	467	m^2
Total Floor Area	467	m^2

$F = 220C\sqrt{A}$

C	0.8		C =	1.5	wood frame
A	467	m^2		1.0	ordinary
				0.8	non-combustible
F	3,803	l/min		0.6	fire-resistive
use	4,000	l/min			

Occupancy Adjustment

			-25%	non-combustible
			-15%	limited combustible
Use	-15%		0%	combustible
			+15%	free burning
Adjustment	-600	l/min	+25%	rapid burning
Fire flow	3,400	l/min		

Sprinkler Adjustment

			-30%	system conforming to NFPA 13
			-50%	complete automatic system
Use	0%			
Adjustment	0	l/min		

Exposure Adjustment

Building Face	Separation	Charge
north	40	5%
east	30	5%
south	37	5%
west	27	10%
Total		25%
Adjustment		850 l/min
Fire flow		4,250 l/min
Use		**4,000 l/min**
		67 l/s

Separation	Charge
0 to 3m	+25%
3.1 to 10m	+20%
10.1 to 20m	+15%
20.1 to 30m	+10%
30.1 to 45m	+5%

BOUNDARY CONDITIONS

Boundary Conditions For: 2900 Woodroffe Ave

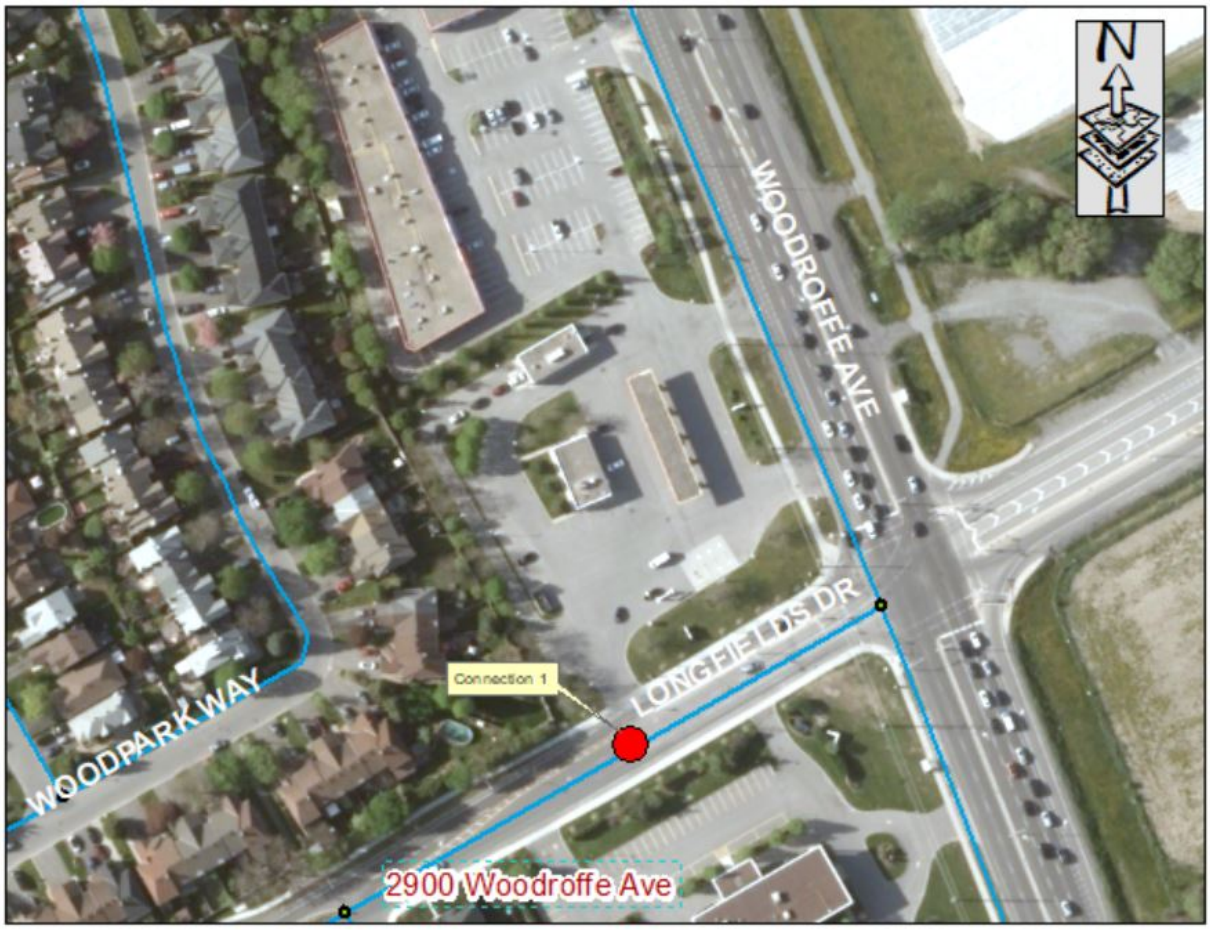
Date of Boundary Conditions: 2019-Mar-27

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	0.6	0.01
Maximum Daily Demand	1.2	0.02
Peak Hour	1.2	0.02
Fire Flow #1 Demand	4,000	66.7

Number Of Connections: 1

Location:



BOUNDARY CONDITIONS

Results:

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	132.6	56.3
Peak Hour	126.5	47.5
Max Day Plus Fire (4,000) L/min	125.4	46.0

[1]Elevation: **93.036 m**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

DRAWING NOTES

1.0 GENERAL

1.1 CONTRACTOR TO VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION.

1.2 DO NOT SCALE DRAWINGS.

1.3 CONTRACTOR TO REPORT ALL DISCOVERIES OF ERRORS, OMISSIONS OR DISCREPANCIES TO THE ARCHITECT OR DESIGN ENGINEER AS APPLICABLE.

1.4 USE ONLY THE LATEST REVISED DRAWINGS OR THOSE THAT ARE MARKED "ISSUED FOR CONSTRUCTION".

1.5 ALL CONSTRUCTION SHALL COMPLY WITH CURRENT CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.

1.6 THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATIONS.

1.7 FOR LEGAL SURVEY INFORMATION REFER TO REGISTERED PLAN.

1.8 REFER TO SITE PLAN BY P-SQUARED CONCEPTS INC.

1.9 CONTRACTOR TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES AS IDENTIFIED IN THE EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.). DURING ALL PHASES OF THE SITE PREPARATION AND CONSTRUCTION THE MEASURES ARE TO BE MAINTAINED TO THE SATISFACTION OF THE ENGINEER AND CITY OF OTTAWA IN ACCORDANCE WITH THE BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL. SHOULD ANY ADDITIONAL MEASURES BE REQUIRED TO ADDRESS FIELD CONDITIONS THEY SHALL BE INSTALLED AS DIRECTED BY THE ENGINEER OR THE CITY OF OTTAWA. SUCH ADDITIONAL MEASURES MAY INCLUDE BUT NOT BE LIMITED TO INSTALLATION OF FILTER CLOTHS ACROSS MANHOLE AND CATCHBASIN LIDS TO PREVENT SEDIMENT FROM ENTERING THE STRUCTURE AND INSTALLATION AND MAINTENANCE OF A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.

1.10 ALL IRON WORK ELEVATIONS SHOWN ARE APPROXIMATE AND ARE SUBJECT TO MINOR ADJUSTMENTS AS DETERMINED BY THE ENGINEER.

1.11 ALL CONCRETE CURBS AND SIDEWALKS TO CONFORM TO O.P.S. AND CONSTRUCTED TO CITY STANDARDS. ALL ONSITE CURBS TO BE BARRIER TYPE, WITH DEPRESSIONS AS NOTED.

1.12 ALL CONCRETE SHALL BE "NORMAL PORTLAND CEMENT" IN ACCORDANCE WITH O.P.S.S. 1350 AND SHALL ACHIEVE A MINIMUM STRENGTH OF 30MPa AT 28 DAYS.

1.13 ALL CONSTRUCTION TRAFFIC TO ACCESS SITE FROM WOODROFFE AVENUE.

1.14 FOR GEOTECHNICAL REPORT SEE GEOTECHNICAL INVESTIGATION PROPOSED COMMERCIAL BUILDING - 2900 WOODROFFE AVENUE, BY GEMTEC CONSULTING ENGINEERS AND SCIENTISTS.

1.15 CONTRACTOR TO PROTECT EXISTING INFRASTRUCTURE AND PROPERTY SUCH AS TREES, PARKING METERS, SIDEWALKS, CURBS, ASPHALT, AND STREET SIGNS FROM DAMAGE DURING CONSTRUCTION. CONTRACTOR TO PAY THE COST TO REINSTATE OR REPLACE ANY DAMAGED INFRASTRUCTURE OR PROPERTY TO THE SATISFACTION OF THE CITY.

1.16 THE POSITION OF POLE LINES, CONDUITS, WATERMAIN, SEWERS, AND OTHER UNDERGROUND AND ABOVEGROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK THE CONTRACTOR SHALL INFORM ITSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, SHALL PROTECT ALL UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

1.17 CONTRACTOR TO SUPPLY SUITABLE FILL MATERIAL WHERE REQUIRED TO ROUGH GRADE THE SITE. ALL IMPORTED FILL MATERIAL TO BE CERTIFIED AS ACCEPTABLE BY THE GEOTECHNICAL ENGINEER.

1.18 CONTRACTOR TO HAUL EXCESS MATERIAL OFFSITE AS NECESSARY TO GRADE SITE TO MEET THE PROPOSED GRADES. ALL EXCESS MATERIAL TO BE HAULED OFFSITE AND DISPOSED OF AT AN APPROVED DUMP SITE. SHOULD THE CONTRACTOR DISCOVER ANY HAZARDOUS MATERIAL, CONTRACTOR IS TO NOTIFY ENGINEER. ENGINEER TO DETERMINE APPROPRIATE DISPOSAL METHOD/LOCATION.

1.19 FILL MATERIAL WITHIN THE PARKING LOT AND BUILDING PAD AREAS, AND SUPPORTING BUILDING FOUNDATIONS SHALL BE COMPACTED TO 98% STANDARD MODIFIED PROCTOR DENSITY AND TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER.

1.20 ALL COMPACTION METHODS TO BE PERFORMED TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER TO INCLUDE BUT NOT BE LIMITED TO THE THICKNESS OF LIFTS, AND COMPACTION EQUIPMENT USED.

1.21 ALL DISTURBED BOULEVARDS TO BE REINSTATED WITH SOD ON 100mm TOPSOIL.

1.22 UTILITY DUCTS TO BE INSTALLED PRIOR TO ROAD BASE CONSTRUCTION.

1.23 CLAY DIKES TO BE INSTALLED WHERE INDICATED ON THE DRAWINGS OR AS APPROVED AND DIRECTED BY THE GEOTECHNICAL ENGINEER ALL IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.

1.24 ALL UTILITY BOXES (i.e. PEDESTALS, TRANSFORMERS, ETC) ARE TO BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF OTTAWA'S "GUIDELINES FOR UTILITY PEDESTALS WITHIN THE ROAD RIGHT OF WAY"

2.0 SANITARY

2.1 ALL SANITARY SEWER MAINS TO BE CSA CERTIFIED, BELL AND SPIGOT TYPE. ONLY FACTORY FITTINGS TO BE USED. SEWER TO BE INSTALLED AS PER OSPD 1005.01. SANITARY SEWER MATERIALS TO BE:
250mmØ AND SMALLER - PVC DR 35

2.2 ALL SANITARY MAINTENANCE HOLES TO BE 1.2m DIAMETER AS PER CITY OF OTTAWA STANDARDS COMPLETE WITH BENCHING, RUNGS, FRAME AND COVER, DROP PIPES AND LANDINGS WHERE NEEDED.

2.3 SANITARY MANHOLE COVERS TO BE CITY OF OTTAWA STD. S25 (MOD. OPSD. 401.020). SANITARY MANHOLE COVER TO BE CLOSED COVER TYPE, AS PER CITY STANDARD S24.

2.4 SANITARY SEWER LEAKAGE TEST AND CCTV INSPECTION SHALL BE COMPLETED AS PER CITY SPECIFICATIONS PRIOR TO INSTALLATION OF BASE COURSE ASPHALT.

2.5 ANY SANITARY SEWER WITH LESS THAN 2.0m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

2.6 CONNECTION TO THE EXISTING SANITARY SEWER TO BE INCLUDED IN THE COST FOR SANITARY SEWER INSTALLATION. THIS INCLUDES REINSTATEMENT OF ROAD CUTS TO CITY STANDARDS.

3.0 STORM

3.1 ALL STORM SEWERS TO BE CSA CERTIFIED, BELL AND SPIGOT TYPE. ALL STORM SEWERS TO BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS. ONLY FACTORY FITTINGS TO BE USED. STORM SEWER MATERIALS TO BE : 375mmØ AND SMALLER - PVC DR 35
450mmØ AND LARGER - 100-D REINFORCED CONCRETE.

3.2 ALL STORM MAINTENANCE HOLES TO BE SIZED IN ACCORDANCE WITH THE PLANS AND AS PER CITY OF OTTAWA STANDARDS COMPLETE WITH BENCHING, RUNGS, AND FRAME AND COVER.

3.3 STORM MH COVERS TO BE OPEN TYPE, AS PER CITY STANDARD S24, FRAMES TO BE PER CITY OF OTTAWA STD. S25. CONTRACTOR TO INSTALL FILTER FABRIC UNDER STORM MH COVER UNTIL SODDING IS COMPLETE.

3.4 STORM MAINTENANCE HOLES TO BE OPSD, SIZE AS SPECIFIED, TAPER TOP.

3.5 ALL CATCH BASINS TO BE AS PER OPSD 705.010, FRAME & FISH TYPE GRATE AS PER CITY OF OTTAWA STD. S19.1.

3.6 150mm DIAMETER SOCK-WRAPPED PERFORATED PVC SUBDRAINS TO BE INSTALLED AT THE LIMIT OF THE HEAVY DUTY ROAD STRUCTURE WHERE IT MEETS THE LIGHT DUTY ROAD STRUCTURE AND AT ALL CB'S IN HEAVY DUTY ROADS AS IDENTIFIED ON PLAN. SUBDRAINS TO DISCHARGE TO CB'S AS SHOWN.

3.7 ANY STORM SEWER WITH LESS THAN 2.0m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

3.8 CONNECTION TO THE EXISTING STORM SEWER TO BE INCLUDED IN THE COST FOR STORM SEWER INSTALLATION. THIS INCLUDES REINSTATEMENT OF ROAD CUT TO CITY STANDARDS.

3.9 CONTRACTOR TO PROVIDE IPEX-TEMPEST MHF ICD'S SHOP DRAWINGS, OR EQUIVALENT, FOR ENGINEERS REVIEW PRIOR TO ORDERING ICD'S.

4.0 WATER

4.1 ALL WATERMAINS TO BE PVC DR 18, WITH MINIMUM COVER OF 2.4m AND INSTALLED PER CITY OF OTTAWA STANDARDS. ALL DOMESTIC WATER SERVICES ARE TO BE 50mmØ.

4.2 THRUST BLOCKS TO BE INSTALLED AT ALL BENDS, TEES, AND CAPS ALL AS PER OPSD 1103.01 AND 1103.02.

4.3 CONTRACTOR TO CONDUCT PRESSURE AND LEAKAGE TESTING OF ALL WATERMAINS AND DISINFECT AND CHLORINATE ALL WATERMAINS TO THE SATISFACTION OF M.O.E. AND THE CITY OF OTTAWA.

4.4 TRACER WIRE TO BE INSTALLED ALONG THE FULL LENGTH OF WATERMAIN AND ATTACHED TO EACH MAIN STOP AS PER CITY OF OTTAWA STANDARDS.

4.5 ALL COMPONENTS OF THE WATER DISTRIBUTION SYSTEM SHALL BE CATHODICALLY PROTECTED AS PER CITY OF OTTAWA STANDARDS.

4.6 ALL VALVES & VALVE BOXES AND CHAMBERS, HYDRANTS, AND HYDRANT VALVES AND ASSEMBLIES SHALL BE INSTALLED AS PER CITY OF OTTAWA STANDARDS.

4.7 ANY WATERMAIN WITH LESS THAN 2.4m COVER REQUIRES THERMAL INSULATION AS PER CITY OF OTTAWA STANDARD W22, OR AS APPROVED BY THE ENGINEER.

4.8 CONTRACTOR IS RESPONSIBLE FOR ACQUIRING THE WATER PERMIT FROM THE CITY OF OTTAWA AND PAYMENT OF ANY FEES ASSOCIATED WITH SECURING THE WATER PERMIT. OWNER IS RESPONSIBLE FOR REIMBURSING THE CONTRACTOR FOR THE ACTUAL COST OF ACQUIRING THE WATER PERMIT.

4.9 CONNECTION TO EXISTING WATERMAIN TO BE INCLUDED IN THE COST FOR THE WATERMAIN INSTALLATION. THIS COST INCLUDES REINSTATEMENT OF ROAD CUTS TO CITY STANDARDS.

5.0 PARKING LOT AND WORK IN PUBLIC RIGHTS OF WAY

5.1 CONTRACTOR TO REINSTATE ROAD CUTS PER CITY OF OTTAWA STANDARD R-10.

5.2 THE CONTRACTOR SHALL PREPARE A TRAFFIC MANAGEMENT PLAN FOR REVIEW AND APPROVAL BY THE CITY OF OTTAWA. CONTRACTOR TO MAINTAIN TRAFFIC FLOW DURING THE ENTIRE CONSTRUCTION PERIOD. MAINTENANCE OF ROAD CUTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. PROVISION OF FLAGMEN, DETOURS AS NECESSARY, BARRICADES AND SIGNS TO THE FULL SATISFACTION OF THE ENGINEER AND ROAD AUTHORITY SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

5.3 CONTRACTOR TO PREPARE SUBGRADE, INCLUDING PROOFROLLING, TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER PRIOR TO THE COMMENCEMENT OF PLACEMENT OF GRANULAR B MATERIAL.

5.4 FILL TO BE PLACED AND COMPACTED PER THE GEOTECHNICAL REPORT REQUIREMENTS.

5.5 CONTRACTOR TO SUPPLY, PLACE AND COMPACT GRANULAR B MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOETCHNICAL ENGINEER. CONTRACTOR TO PROVIDE ENGINEER WITH SAMPLES OF GRANULAR B MATERIAL FOR TESTING AND CERTIFICATION FROM THE GEOTECHNICAL ENGINEER THAT THE MATERIAL MEETS THE GRADATION REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT.

5.6 GRANULAR A MATERIAL TO BE PLACED ONLY UPON APPROVAL BY THE GEOTECHNICAL ENGINEER OF GRANULAR B PLACEMENT.

5.7 CONTRACTOR TO SUPPLY, PLACE AND COMPACT GRANULAR A MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOETCHNICAL ENGINEER. CONTRACTOR TO PROVIDE ENGINEER WITH SAMPLES OF GRANULAR A MATERIAL FOR TESTING AND CERTIFICATION FROM THE GEOTECHNICAL ENGINEER THAT THE MATERIAL MEETS THE GRADATION REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT.

5.8 ASPHALT MATERIAL TO BE PLACED ONLY UPON APPROVAL BY THE GEOTECHNICAL ENGINEER OF GRANULAR A PLACEMENT.

5.9 CONTRACTOR TO SUPPLY, PLACE AND COMPACT ASPHALT MATERIAL IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE GEOTECHNICAL ENGINEER. CONTRACTOR TO PROVIDE ENGINEER WITH SAMPLES OF ASPHALT MATERIAL FOR TESTING AND CERTIFICATION FROM THE GEOTECHNICAL ENGINEER THAT THE MATERIAL MEETS THE REQUIREMENTS SPECIFIED IN THE GEOTECHNICAL REPORT.

5.10 CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING LINE AND GRADE IN ACCORDANCE WITH THE PLANS, AND FOR PROVIDING THE ENGINEER WITH VERIFICATION PRIOR TO PLACEMENT.

5.11 DITCHES DISTURBED DURING CULVERT INSTALLATION AND GRADING OPERATIONS ARE TO BE REINSTATED TO THEIR ORIGINAL CONDITION AND FLOWLINE GRADES.

5.12 ALL EXCESS MATERIAL TO BE HAULED OFFSITE AND DISPOSED OF AT AN APPROVED DUMP SITE. SHOULD THE CONTRACTOR DISCOVER ANY HAZARDOUS MATERIAL, CONTRACTOR IS TO NOTIFY ENGINEER. ENGINEER TO DETERMINE APPROPRIATE DISPOSAL METHOD/LOCATION.

5.13 PAVEMENT STRUCTURE (MATERIAL TYPES AND THICKNESSES) FOR HEAVY DUTY AND LIGHT DUTY AREAS TO BE AS SPECIFIED IN THE GEOTECHNICAL REPORT AND SHOWN ON THE PLANS.

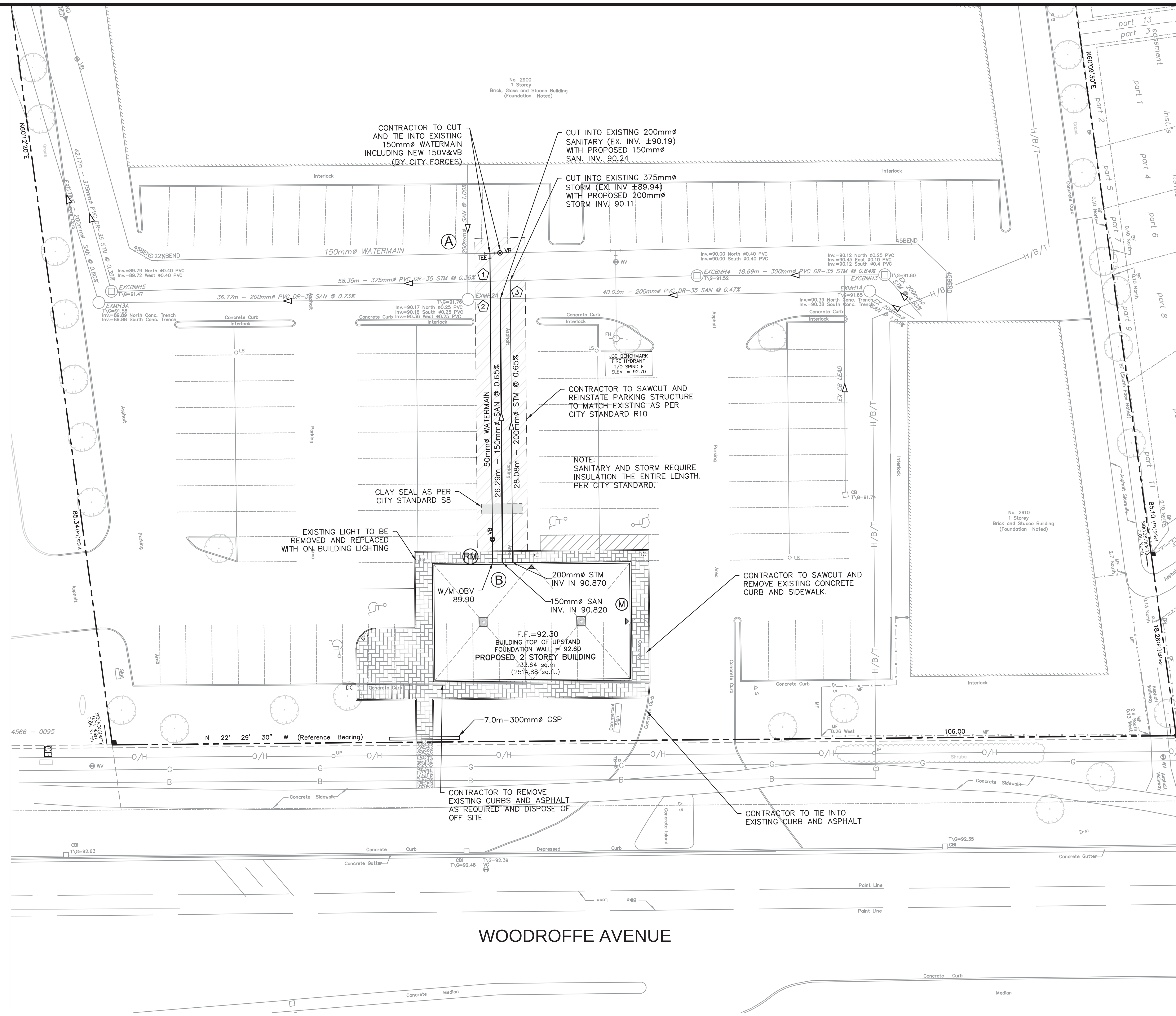
PAVEMENT STRUCTURE

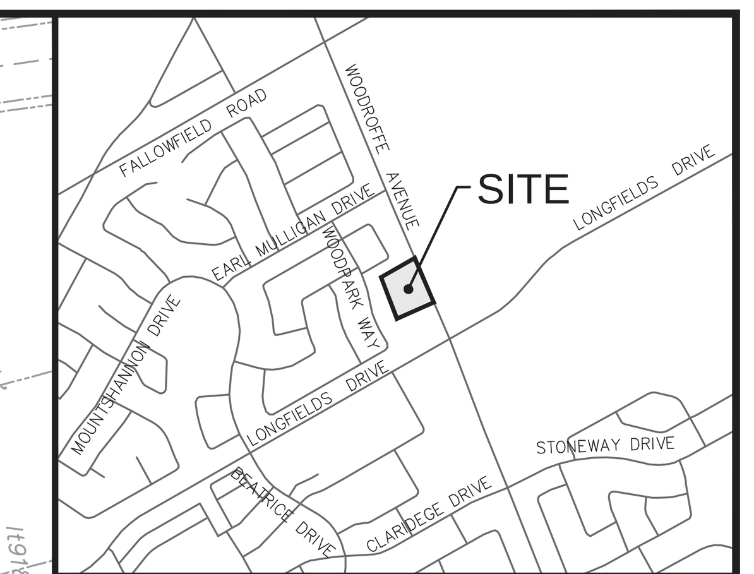
CAR ONLY PARKING AREAS:

50mm WEAR COURSE – SUPERPAVE 12.5
150mm BASE – OPSS GRANULAR "A" CRUSHED STONE
300mm SUBBASE – OPSS GRANULAR "B" TYPE II

HEAVY TRUCK PARKING AREAS AND ACCESS LANES:

40mm WEAR COURSE – SUPERPAVE 12.5
60mm BINDER COURSE – SUPERPAVE 19.0
150mm BASE COURSE – OPSS GRANULAR "A" CRUSHED STONE
450mm SUBBASE – OPSS GRANULAR "B" TYPE II





KEY PLAN
(NTS)

NOTES:

1. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	ISSUED FOR SPA	DGY	19:05:08
2	REVISED AS PER NEW ARCHITECTS PLANS	DGY	19:05:06
1	ISSUED FOR SPA	DGY	19:05:03

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T 613 274 7700

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PLANNER
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SURVEYOR
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LEGEND:

- EXISTING SANITARY MANHOLE (MH3A)
- EXISTING STORM MANHOLE (MH3)
- EXISTING STREET CATCHBASIN (CB T/G 99.76)
- EXISTING CURB INLET CATCHBASIN (CICB G/G 99.76)
- EXISTING VALVE AND VALVE BOX (V&VB)
- EXISTING VALVE AND CHAMBER (V&C)
- EXISTING HYDRANT (HYD B/F 100.56)
- EXISTING BARRIER CURB
- EXISTING DEPRESSED BARRIER CURB (D.C.)
- EXISTING CONCRETE SIDEWALK
- 250mmØ SUBDRAIN
- SIAMESE CONNECTION (IF REQUIRED)
- (M) METER
- (RM) REMOTE METER
- PRV PRESSURE REDUCING VALVE
- (B) WATERMAIN IDENTIFICATION
- (1) PIPE CROSSING IDENTIFICATION
- INLET CONTROL DEVICE LOCATION
- PROTECTIVE BOLLARD
- HEAVY DUTY ASPHALT / FIRE ROUTE
- SANITARY MANHOLE (MH3A)
- STORM MANHOLE (MH3)
- CATCHBASIN c/w TOP OF GRATE (CB T/G 99.76)
- REAR YARD CATCHBASIN c/w GUTTER GRADE (RYCB T/G 99.76)
- REAR YARD "END" CATCHBASIN C/W TOP OF GRATE 300ø) (ECB T/G 100.25)
- CATCHBASIN MANHOLE c/w TOP OF GRATE (CBMH T/G 101.55)
- VALVE AND VALVE BOX (V&VB)
- VALVE AND CHAMBER (V&C)
- HYDRANT c/w BOTTOM OF FLANGE ELEVATION (HYD B/F 100.56)
- DEPRESSED BARRIER CURB AS PER SC1.1 (D.C.)
- BARRIER CURB AND GUTTER AS PER SC1.2
- MOUNTABLE CURB AS PER SC1.3
- PROPOSED CONCRETE SIDEWALK
- SANITARY SEWER & FLOW DIRECTION (200mmø SAN)
- STORM SEWER & FLOW DIRECTION (825mmø STM)
- WATERMAIN (200ø WATERMAIN)
- WATERMAIN REDUCER (200ø WM RED 150ø WM)
- VERTICAL BEND LOCATION (2 VBENDS)
- PROPERTY LINE
- PROPOSED MAIL BOX
- PROPOSED SWALE C/W FLOW DIRECTION
- PROPOSED DITCH C/W FLOW DIRECTION AND SLOPE (0.5%)
- SLOPE C/W FLOW DIRECTION (1.3%)
- MAJOR OVERLAND FLOW ROUTE
- PROPOSED SPOT GRADE (104.62)
- PROPOSED SWALE GRADE (104.40 (S))
- PROPOSED SWALE HIGH POINT (104.50 (S)HP)
- LOT CORNER GRADE C/W EXISTING GROUND (104.60 / 103.59)
- TIE INTO EXISTING GRADE (86.45 EX)
- FULL STATIC PONDING GRADE (96.79)
- RETAINING WALL
- TOP OF RETAINING WALL (105.30 T/W)
- PROPOSED BOTTOM OF RETAINING WALL (103.50 B/W)
- TERRACING 3:1 MAXIMUM UNLESS NOTED OTHERWISE
- PRELIMINARY ROOF DRAIN LOCATION
- TEST PITS (SEE GEOTECHNICAL REPORT) (TP 13-301)
- CLAY DYKES PER S8
- F.F.E.=106.30 PROPOSED BUILDING FINISHED FLOOR ELEVATION
- U.S.F.=104.30 PROPOSED UNDERSIDE OF FOOTING ELEVATION
- PROPOSED TRANSFORMER
- PROPOSED BIKE RACK

WATERMAIN SCHEDULE					
	STATION	DESCRIPTION	FINISHED GRADE (m)	TOP OF WATERMAIN	AS-BUILT WATERMAIN
A	0+000	CONNECT TO EX. 150Ø W/M	91.75	89.35	
	0+020	--	91.86	89.46	
	0+028.50	50Ø V&VB	92.08	89.68	
B	0+030.80	50Ø BUILDING SERVICE	92.25	89.85	
		150Ø W/M ADD 150Ø V&VB	91.76	89.36	

REVISED 2019-05-06

ROOF DRAINS: ROOF DRAINS RESTRICTED TO 0.63 l/s EACH (2 @ 0.63 =1.26 l/s TOTAL) SEE MECHANICAL DRAWINGS FOR DETAILS.

Crossing Schedule			
1	50 Φ WM	0.60 m CLEARANCE UNDER	375 Φ STM
2	50 Φ WM	0.85 m CLEARANCE UNDER	200 Φ SAN
3	200 Φ STM	0.30 m CLEARANCE OVER	200 Φ SAN

REVISED 2019-05-02

Project Title

2900 WOODROFFE AVENUE

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2019/05/08
PROVINCE OF ONTARIO

N

Drawing Title

SITE SERVICING PLAN

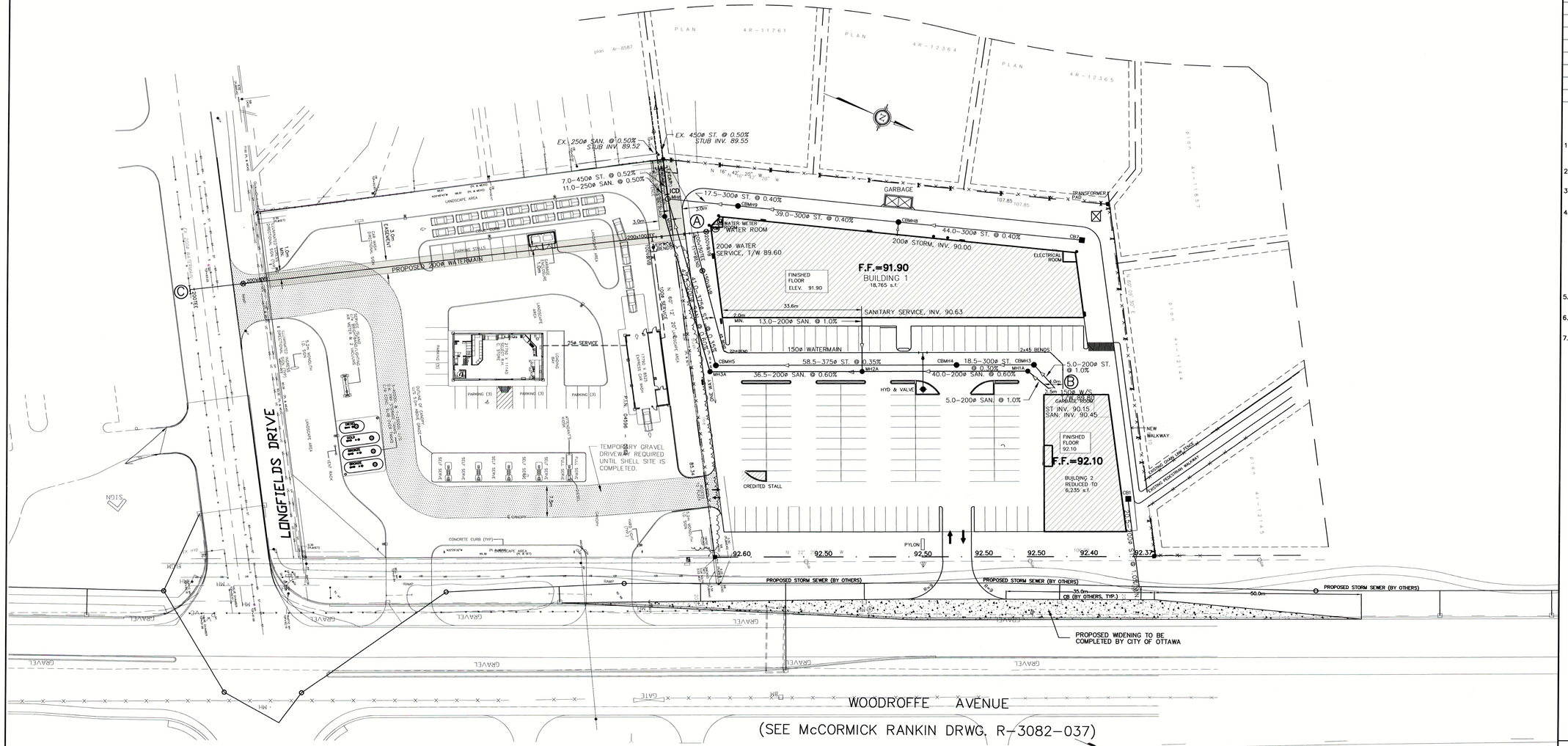
Scale	
1:250	
Design: SEL	Date: MAY 2019
Drawn: DPS	Checked: DGY
Project No.: 119777	Drawing No.: 001

D07-12-1x-0xxx

#17xxx

APPENDIX C

- 3356-LD-100 – Original Site Servicing Plan
- Sanitary Sewer Design Sheet



NO.	DATE	BY	REVISION
0.	01:06:14		ISSUED FOR TENDER
1.	01:06:27		REVISED AS PER CLIENT
2.	01:07:06		REVISED PER NEW ARCHITECT PLAN
3.	01:07:10		REVISED WM THROUGH SHELL LANDS
4.	01:07:13		REVISED AS PER SWM
5.	01:08:07		REVISED AS PER CIRCULATION
6.	01:08:30		REVISED HEAVY DUTY ASPHALT
7.	01:09:20		REVISED AS PER CITY
7.	01:10:01		LOWER SITE 100mm

NOTES :

1. ALL WATERMAINS TO BE CONSTRUCTED IN ACCORDANCE WITH LATEST REVISIONS TO CITY SPECIFICATIONS AND DRAWINGS.
2. INSULATION TO BE PROVIDED AT CATCHBASINS PER R.M.O.C. STANDARD DRAWING WSD-23.
3. CATHODIC PROTECTION TO BE PROVIDED TO R.M.O.C. STANDARDS AND SPECIFICATIONS.
4. ALL BENDS, TEES, AND CAPS ARE TO BE RESTRAINED PER R.M.O.C. STANDARDS.
   NO WATERMAIN TO BE LAID ON FILL UNTIL THE DENSITY TEST REPORTS HAVE BEEN SUBMITTED TO AND APPROVED BY THE CITY, FILL TO BE PLACED TO 0.60m MINIMUM ABOVE THE TOP OF THE WATERMAIN GRADES AND COMPACTED TO MINIMUM OF 100% STANDARD PROCTOR IN 0.30m LIFTS. TESTS SHALL BE TAKEN ALONG THE CENTRE OF THE LIFT. ALL TEES, HORIZONTAL BENDS, AND BRANCH VALVES IN FILL AREAS TO BE TIED WITH THRUST RESTRAINING JOINTS AND THRUST BLOCKS AS APPROPRIATE.
5. ALL SEWER CONSTRUCTION IN ACCORDANCE WITH THE LATEST REVISIONS TO CITY STANDARDS.
6. ALL SANITARY & STORM SERVICES TO HAVE A MINIMUM 1.0% SLOPE.
7. ALL PIPES WITH LESS THAN 1.5m COVER TO BE INSULATED WITH 50mm RIGID STYROFOAM INSULATION.

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

SANITARY SEWER SCHEDULE

LOCATION	INVERT ELEVATIONS (m)				
	NORTH	SOUTH	EAST	WEST	TOP COVER
MH1A		90.40	90.40		91.65
MH2A	90.16	90.15		90.50	91.65
MH3A	89.93			89.86	91.55
MH4A			89.60	89.58	91.80
EXSAN			86.52		92.00

STORM SEWER SCHEDULE

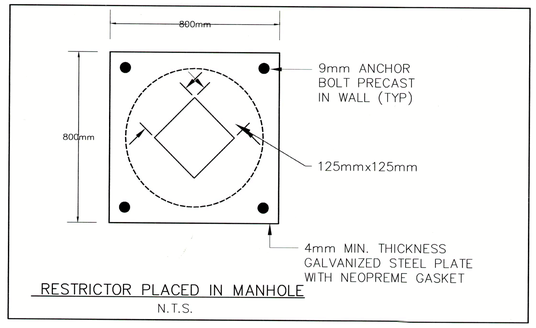
LOCATION	INVERT ELEVATIONS (m)				
	NORTH	SOUTH	EAST	WEST	TOP COVER
CB1				90.65	91.80
CBMH3		90.06		90.10	91.65
CBMH4	90.00	90.00			91.65
CBMH5	89.80			89.75	91.55
MH6	89.63		89.60	89.60	91.70
CB7		90.15			91.55
CBMH8	89.97	89.90			91.60
CBMH9	89.75	89.70			91.60

WATERMAIN SCHEDULE

STATION	DESCRIPTION	FINISHED GRADE(m)	TOP OF WATERMAIN(m)	AS BUILT WATERMAIN(m)
0+000	BUILDING	91.90	89.50	
0+001.5	200V&VB	91.85	89.45	
(A) 0+004.5	200x150TEE	91.80	89.40	
0+006.5	11 1/4° BEND	91.80	89.40	
0+010	150V&VB	91.80	89.40	
0+030	45° BEND	91.65	89.25	
0+031.5	22 1/2° BEND	91.65	89.25	
0+078.5	HYDRANT & VALVE	91.70	89.30	
0+109.2	45° BEND	91.70	89.30	
(B) 0+113.5	45° BEND	91.75	89.35	
0+117	BUILDING	91.90	89.50	
(A) 0+000	200x150TEE	91.80	89.40	
0+003	45° VERTICAL BEND	91.85	89.45	
0+004.5	45° VERTICAL BEND	91.85	89.25	
0+007.5	45° VERTICAL BEND	91.95	89.35	
0+009	45° VERTICAL BEND	92.20	89.80	
0+014.5	200x100TEE	92.35	89.95	
0+110	200V&VB	93.00	90.60	
(C) 0+123	200x200TEE	92.95	90.55	

NOTE :

WATERMAIN SERVICE TO BUILDINGS 1 & 2 MUST BE DONE PRIOR TO FOOTING INSTALLATION



RESTRICTOR PLACED IN MANHOLE
N.T.S.

Ottawa

Cumming Cockburn Limited
Consulting Engineers, Planners, and Environmental Scientists

REGISTERED PROFESSIONAL ENGINEER
R.W.WINGATE
01:06:01
PROVINCE OF ONTARIO

TAYLOR-PHILLIPS ARCHITECTS

BARRHAVEN TOWN SQUARE
GENERAL PLAN OF SERVICES

SCALE:	1:500		
DRAWN:	M.M.	DATE:	JUNE '01
DESIGN:	K.HOTOVEC	DATE:	JUNE '01
CHECKED:	R.W.W.	DATE:	JUNE '01

PROJECT NO.	DRAWING NO.
3356-LD	100

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

2900 Woodroffe
CITY OF OTTAWA

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)				AREA w/o Units (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW			CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		1bd	2bd	TH		IND	CUM			INSTITUTIONAL		RETAIL (staff)		INDUSTRIAL			IND	CUM	(L/s)	IND	CUM						L/s	(%)
													IND	CUM	IND	CUM	IND	CUM												
2900 WOODROFFE		BLDG	MH1A-2A						0	0	4.00	0.00			21.00	21.00			0.027	0.023	0.023	0.008			0.035	12.81	26.29	150	0.65	0.702	12.77	99.73%

Design Parameters:

Residential			ICI Areas			
1bd	1.4	p/p/u	INST	28,000	L/Ha/day	
2bd	2.1	p/p/u	RET	28,000	L/Ha/day	
TH	2.7	p/p/u	IND	35,000	L/Ha/day	MOE Chart
			office	75	L/cap/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Infiltration Allowance = 0.33 l/s

Designed: SL

Checked: DY

Dwg. Reference:

No.	Revision	Date
1.	Site Servicing Study	April 25, 2019

File Reference: 119777.5.7.1
Date: 2019-04-25
Sheet No: 1 of 1

APPENDIX D

- 3356-LD-300 – Original Ponding Plan
- C-500 – Storm Drainage Area Plan
- Modified Rational Method Design Sheet
- Storm Service Design Sheet

NO.	DATE	BY	REVISION
0.	01:06:14		ISSUED FOR TENDER
1.	01:06:28		REVISED PER NEW ARCHITECT PLAN
2.	01:07:06		REVISED PER NEW ARCHITECT PLAN

F.F.=92.00
BUILDING 1
18,765 s.f.

FINISHED FLOOR ELEV. 92.00

F.F.=92.20
BUILDING 2
6,796 s.f.

FINISHED FLOOR

V=215m3

V=26m3 FIRE ROUTE

V=20m3

V=35m3

PROPOSED WIDENING TO BE COMPLETED BY CITY OF OTTAWA

LONGFIELDS DRIVE

WOODROFFE AVENUE

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

Ottawa

Cumming Cockburn Limited
Consulting Engineers, Planners, and Environmental Scientists

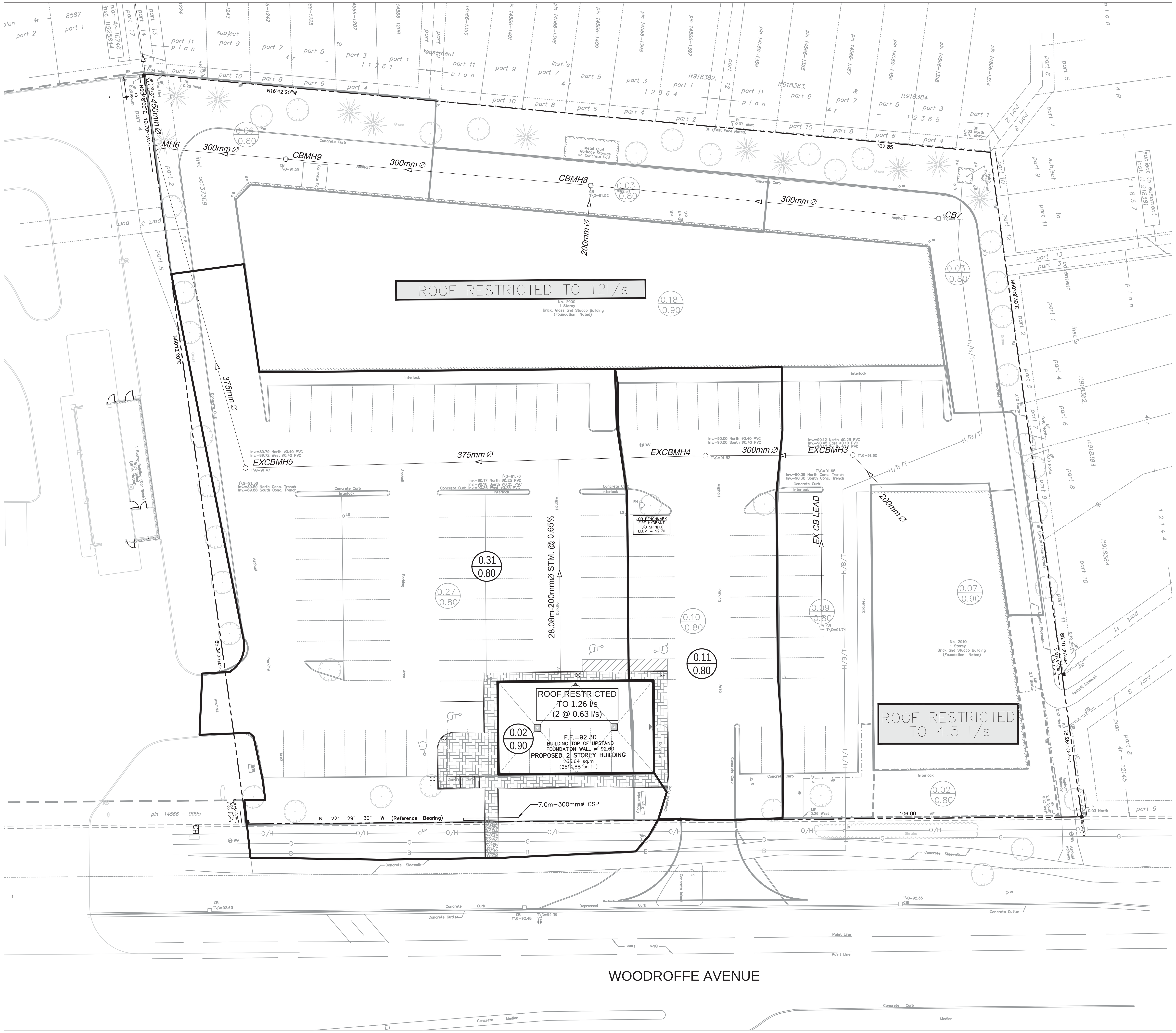
REGISTERED PROFESSIONAL ENGINEER
R.W.WINGATE
01:06:01
PROVINCE OF ONTARIO

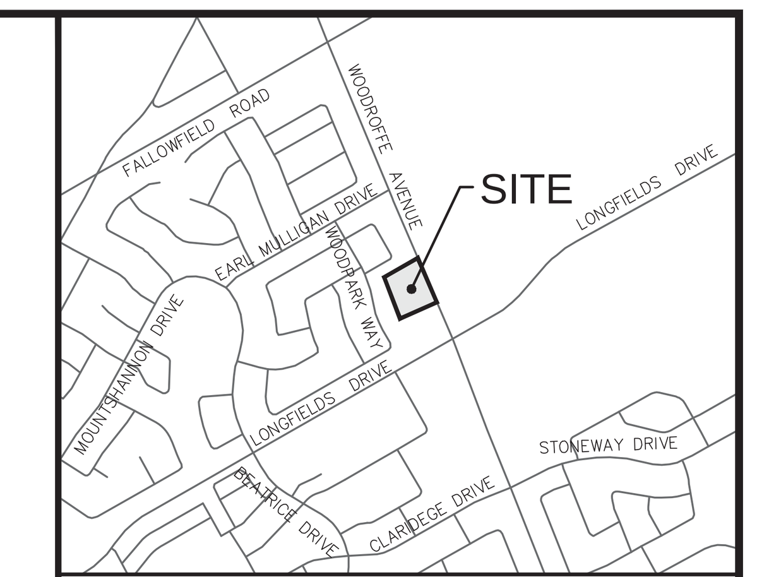
TAYLOR · PHILLIPS ARCHITECTS

BARRHAVEN TOWN SQUARE
PONDING PLAN

SCALE:	1:300		
DRAWN:	M.M.	DATE:	JUNE '01
DESIGN:	K.HOTOVEC	DATE:	JUNE '01
CHECKED:	R.W.W.	DATE:	JUNE '01

PROJECT NO.	DRAWING NO.
3356-LD	300





KEY PLAN
(NTS)

NOTES:

1. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

LEGEND:

- DRAINAGE AREA LIMITS
- EXISTING DRAINAGE AREA LIMITS
- 0.11 — AREA IN HECTARES
- 0.80 — RUNOFF COEFFICIENT
- 0.18 — EXISTING AREA IN HECTARES
- 0.90 — EXISTING RUNOFF COEFFICIENT

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	ISSUED FOR SPA	DGY	19:05:08
2	REVISED AS PER NEW ARCHITECTS PLANS	DGY	19:05:06
1	ISSUED FOR SPA	DGY	19:05:03

OWNER
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IBI
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ibigroup.com

Project Title
2900 WOODROFFE AVENUE

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2019/05/08
PROVINCE OF ONTARIO

N

Drawing Title
STORM DRAINAGE AREA PLAN

Scale
1:250

Design	SEL	Date	MAY 2019
Drawn	DPS	Checked	DGY
Project No.	119777	Drawing No.	500

D07-12-1x-0xxx

#17xxx

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PROJECT: 2900 Woodroffe
DATE: 8/05/2019
FILE: 119777-5.7
REV #: 1
DESIGNED BY: S.L.
CHECKED BY: D.Y.

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = 732.951 / $(T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = 998.071 / $(T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate (based on 64 L/s/Ha)

A_{site} = 0.83 Ha

$Q_{restricted}$ = 53.12 L/s

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area	***roof a***		
Area (Ha)	0.172		
C =	1.00	Restricted Flow Q_r (L/s)=	12.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p =2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
30	91.87	43.88	12.00	31.88	57.378
32	87.89	41.97	12.00	29.97	57.551
34	84.27	40.25	12.00	28.25	**57.622**
36	80.96	38.67	12.00	26.67	57.604
38	77.93	37.22	12.00	25.22	57.505

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	57.62	64.43	0.00	0.00

* Assume roof top storage of 150mm over 75% of flat roof

Drainage Area	***roof a***		
Area (Ha)	0.172		
C =	0.90	Restricted Flow Q_r (L/s)=	12.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p =2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
16	80.46	34.59	12.00	22.59	21.68
18	74.97	32.23	12.00	20.23	21.84
19	72.53	31.17	12.00	19.17	**21.86**
20	70.25	30.20	12.00	18.20	21.84
22	66.15	28.43	12.00	16.43	21.69

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	21.86	64.43	0.00	0.00

Drainage Area	***roof a***		
Area (Ha)	0.172		
C =	0.90	Restricted Flow Q_r (L/s)=	12.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p =2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
11	73.17	31.45	12.00	19.45	12.84
13	66.93	28.77	12.00	16.77	13.08
14	64.23	27.61	12.00	15.61	**13.11**
15	61.77	26.55	12.00	14.55	13.10
17	57.42	24.68	12.00	12.68	12.93

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	13.11	64.43	0.00	0.00

Drainage Area	roof b
Area (Ha)	0.062
C =	1.00
Restricted Flow Q_r (L/s)=	4.50

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
30	91.87	15.73	4.50	11.23	20.218
32	87.89	15.05	4.50	10.55	20.256
33	86.03	14.73	4.50	10.23	**20.262**
34	84.27	14.43	4.50	9.93	20.258
36	80.96	13.86	4.50	9.36	20.228

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	20.26	23.10	0.00	0.00

* Assume roof top storage of 150mm over 75% of flat roof

Drainage Area	roof b
Area (Ha)	0.062
C =	0.90
Restricted Flow Q_r (L/s)=	4.50

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
15	83.56	12.88	4.50	8.38	7.54
17	77.61	11.96	4.50	7.46	7.61
18	74.97	11.55	4.50	7.05	**7.62**
19	72.53	11.18	4.50	6.68	7.61
21	68.13	10.50	4.50	6.00	7.56

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	7.62	23.10	0.00	0.00

Drainage Area	roof b
Area (Ha)	0.062
C =	0.90
Restricted Flow Q_r (L/s)=	4.50

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
10	76.81	11.84	4.50	7.34	4.40
12	69.89	10.77	4.50	6.27	4.52
13	66.93	10.32	4.50	5.82	**4.54**
14	64.23	9.90	4.50	5.40	4.54
16	59.50	9.17	4.50	4.67	4.48

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.54	23.10	0.00	0.00

Drainage Area	roof c
Area (Ha)	0.023
C =	1.00
Restricted Flow Q_r (L/s)=	1.26

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
41	73.83	4.78	1.26	3.52	8.665
43	71.35	4.62	1.26	3.36	8.673
44	70.18	4.55	1.26	3.29	**8.675**
45	69.05	4.47	1.26	3.21	8.674
47	66.91	4.33	1.26	3.07	8.668

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	8.67	8.74	0.00	0.00

* Assume roof top storage of 150mm over 75% of flat roof

Drainage Area	roof c
Area (Ha)	0.023
C =	0.90
Restricted Flow Q_r (L/s)=	1.26

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
21	68.13	3.97	1.26	2.71	3.42
23	64.29	3.75	1.26	2.49	3.43
24	62.54	3.65	1.26	2.39	**3.44**
25	60.90	3.55	1.26	2.29	3.44
27	57.88	3.37	1.26	2.11	3.42

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	3.44	8.74	0.00	0.00

Drainage Area	roof c
Area (Ha)	0.023
C =	0.90
Restricted Flow Q_r (L/s)=	1.26

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
15	61.77	3.60	1.26	2.34	2.11
17	57.42	3.35	1.26	2.09	2.13
18	55.49	3.23	1.26	1.97	**2.13**
19	53.70	3.13	1.26	1.87	2.13
21	50.48	2.94	1.26	1.68	2.12

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.13	8.74	0.00	0.00

Drainage Area	Parking lot	Qf=1.26+4.5+12=	17.76
Area (Ha)	0.630		
C =	1.00	Restricted Flow Q_r (L/s)=	53.00

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Qf+Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
40	75.15	131.61	53.00	96.37	231.29
42	72.57	127.10	53.00	91.86	231.48
43	71.35	124.97	53.00	89.73	**231.50**
44	70.18	122.91	53.00	87.67	231.46
46	67.96	119.03	53.00	83.79	231.25

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
	231.50	296.00	0.00	0.00

Drainage Area	Parking lot	Qf=1.26+4.5+12=	17.76
Area (Ha)	0.630		
C =	0.80	Restricted Flow Q_r (L/s)=	53.00

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Qf+Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
18	74.97	105.04	53.00	69.80	75.39
20	70.25	98.43	53.00	63.19	75.83
21	68.13	95.46	53.00	60.22	**75.87**
22	66.15	92.68	53.00	57.44	75.82
24	62.54	87.63	53.00	52.39	75.44

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	75.87	296.00	0.00	0.00

Drainage Area	Parking lot	Qf=1.26+4.5+12=	17.76
Area (Ha)	0.630		
C =	0.80	Restricted Flow Q_r (L/s)=	53.00

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Qf+Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
13	66.93	93.78	53.00	58.54	45.66
15	61.77	86.54	53.00	51.30	46.17
16	59.50	83.37	53.00	48.13	**46.21**
17	57.42	80.45	53.00	45.21	46.11
19	53.70	75.24	53.00	40.00	45.60

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	46.21	296.00	0.00	0.00

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STORM SEWER DESIGN SHEET

2900 WOODROFFE
City of Ottawa

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW													SEWER DATA							
		From	To	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.80	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
Existing Storm		Bldg 1	CBMH3										0.07	0.18	0.18	10.00	0.04	10.04	76.81	104.19	122.14	178.56	13.45	18.25	21.39	31.27	4.50	4.50	72.58	6.00	200			4.50	2.238	68.08	93.80%
Existing Storm		CBMH3	CBMH4									0.09		0.20	0.20	10.04	0.28	10.33	76.63	103.96	121.86	178.15	15.34	20.81	24.39	35.66	4.50	19.84	80.71	18.69	300			0.64	1.106	60.87	75.42%
Proposed Storm		**Pad A**	**CBMH4/5**										**0.02**	**0.06**	**0.06**	**10.00**	**0.55**	**10.55**	**76.81**	**104.19**	**122.14**	**178.56**	**4.42**	**6.00**	**7.03**	**10.28**	**1.26**	**1.26**	**27.59**	**28.08**	**200**			**0.65**	**0.851**	**26.33**	**95.43%**
Existing Storm		CBMH4	CBMH5									0.11		0.24	0.44	10.55	1.01	11.56	74.76	101.37	118.82	173.68	33.25	45.09	52.85	77.25	5.76	39.01	109.75	58.35	375			0.36	0.963	70.74	64.45%
Existing Storm		CBMH5	CBMH6									0.31		0.69	1.13	11.56	0.72	12.28	71.29	96.61	113.22	165.45	80.86	109.58	128.42	187.66	5.76	86.62	108.21	41.00	375			0.35	0.949	21.59	19.95%
Existing Storm		CBMH8	CBMH9									0.06		0.13	0.13	10.00	0.74	10.74	76.81	104.19	122.14	178.56	10.25	13.90	16.30	23.83	12.00	22.25	63.80	39.00	300			0.40	0.874	41.55	65.13%
Existing Storm		CBMH9	CBMH6									0.06		0.13	0.27	10.74	0.33	11.08	74.06	100.42	117.70	172.04	19.77	26.80	31.41	45.91	12.00	31.77	63.80	17.50	300			0.40	0.874	32.04	50.21%
Existing Storm		CBMH6	Woodpark											0.00	1.40	12.28	0.59	12.87	69.03	93.52	109.57	160.09	96.72	131.03	153.52	224.31	53.00	53.00	210.32	45.00	450			0.50	1.281	157.32	74.80%

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

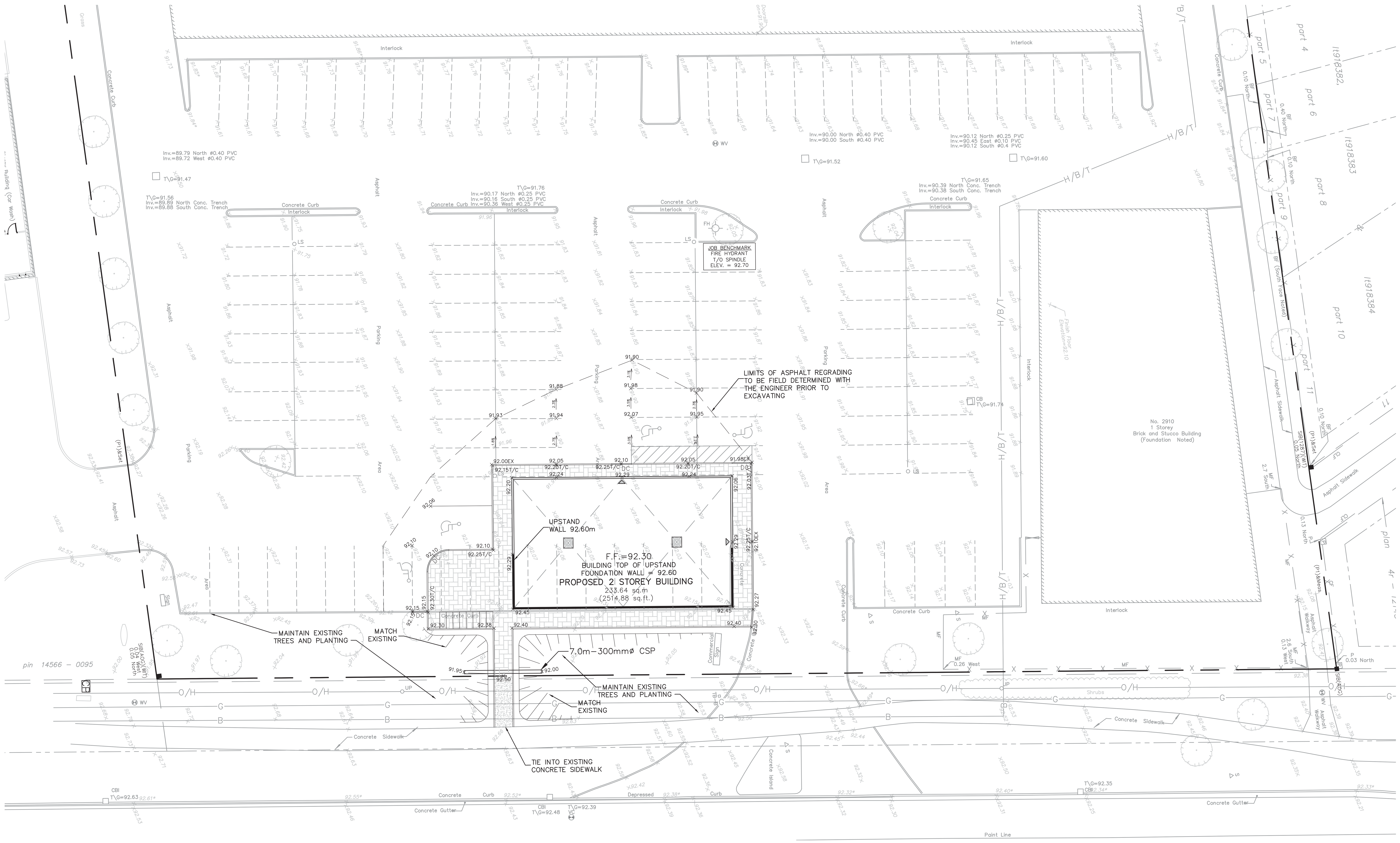
Designed: SEL
Checked: DY
Dwg. Reference: N/A

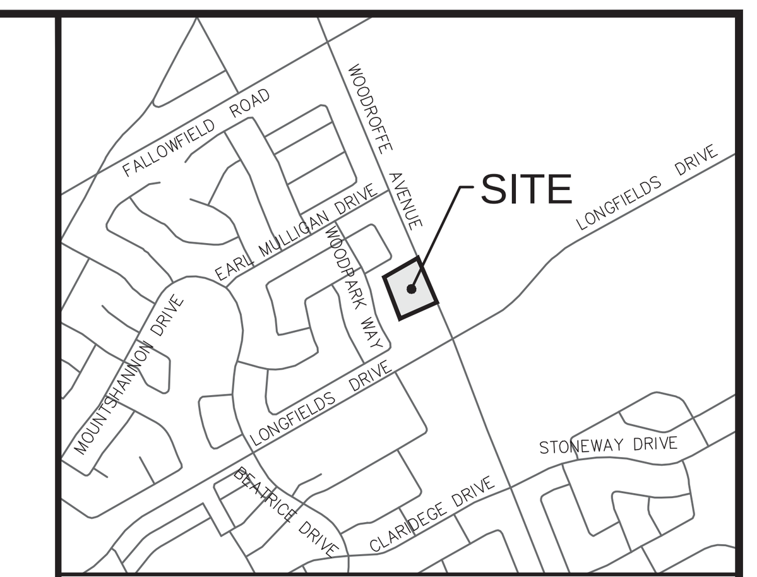
No.	Revision	Date
1.	Site Servicing Study	April 25, 2019

File Reference: 119777.5.7.1
Date: 2019-04-25
Sheet No: 1 of 1

APPENDIX E

- C-200 – Grading Plan
- C-900 – Sediment and Erosion Control Plan





NOTES:

1. SEE DRAWING 001 FOR ADDITIONAL DETAILS, AND NOTES.
2. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
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4			
3	ISSUED FOR SPA	DGY	19:05:08
2	REVISED AS PER NEW ARCHITECTS PLANS	DGY	19:05:06
1	ISSUED FOR SPA	DGY	19:05:03

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Project Title
2900 WOODROFFE AVENUE

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2019/05/08
PROVINCE OF ONTARIO

Drawing Title
SITE GRADING PLAN

Scale
1:200

Design	Date
SEL	MAY 2019
Drawn	**Checked**
DPS	DGY
Project No.	**Drawing No.**
119777	200

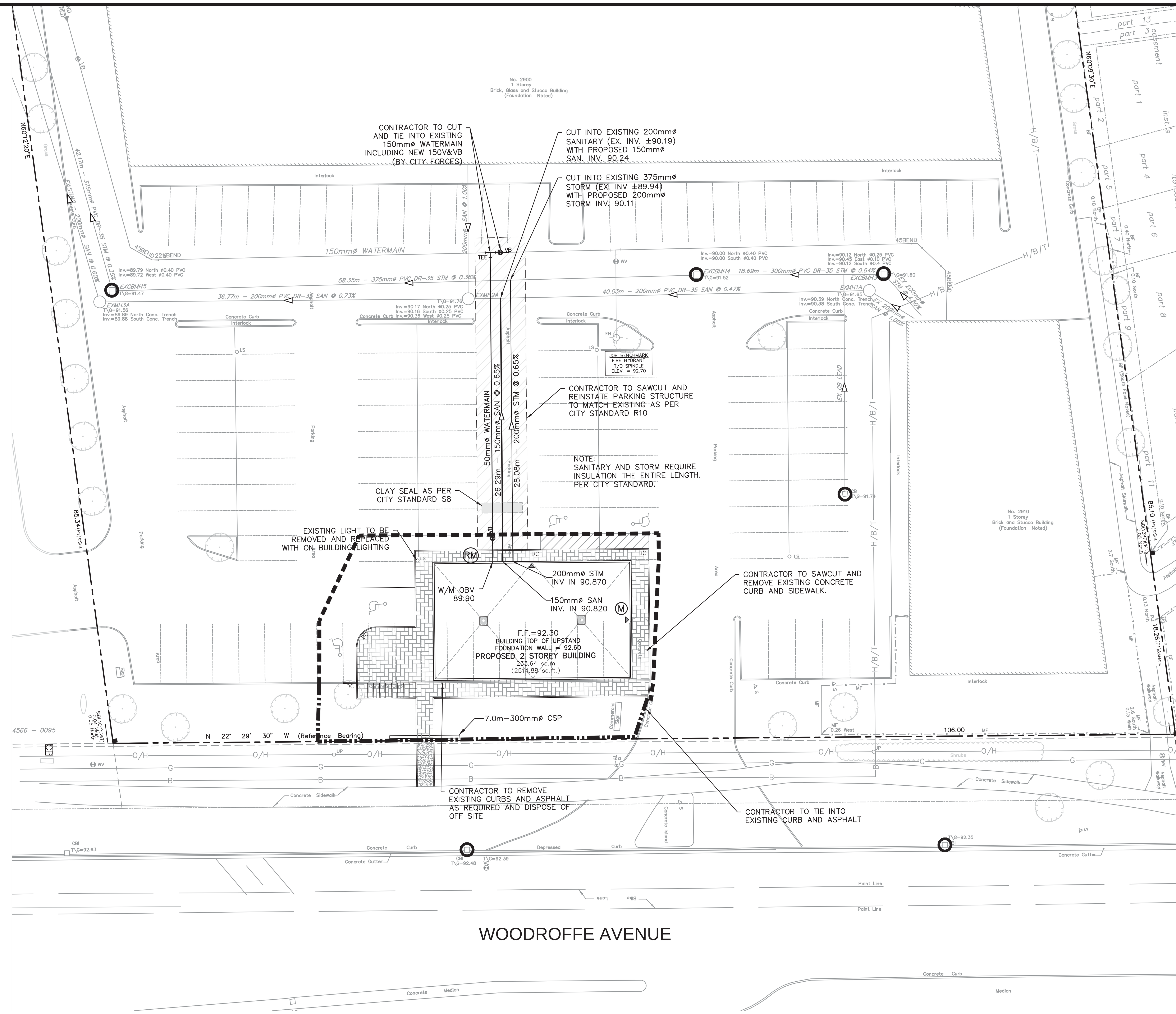
D07-12-1x-0xxx

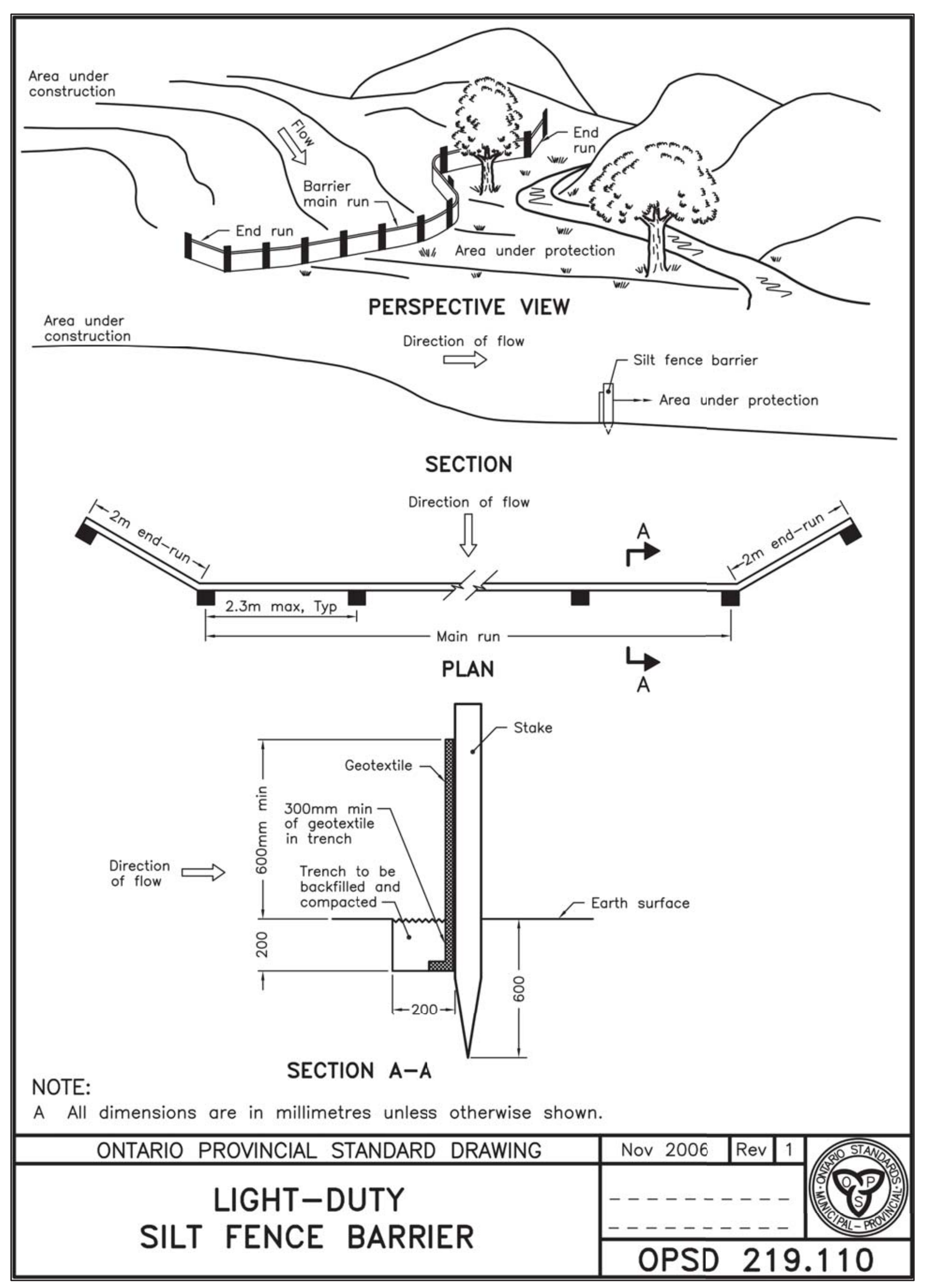
#17xxx

NOTES:

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED AND OR PAVEMENT/WALKWAYS COMPLETED.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK CATCHBASIN INSERTS TO BE PLACED UNDER COVER OF ALL CATCHBASINS. SILT SACK IN STREET CB'S AND MANHOLES TO REMAIN UNTIL BASE COURSE ASPHALT IS LAID. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. THE SEDIMENT AND EROSION CONTROL MEASUREMENTS MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.

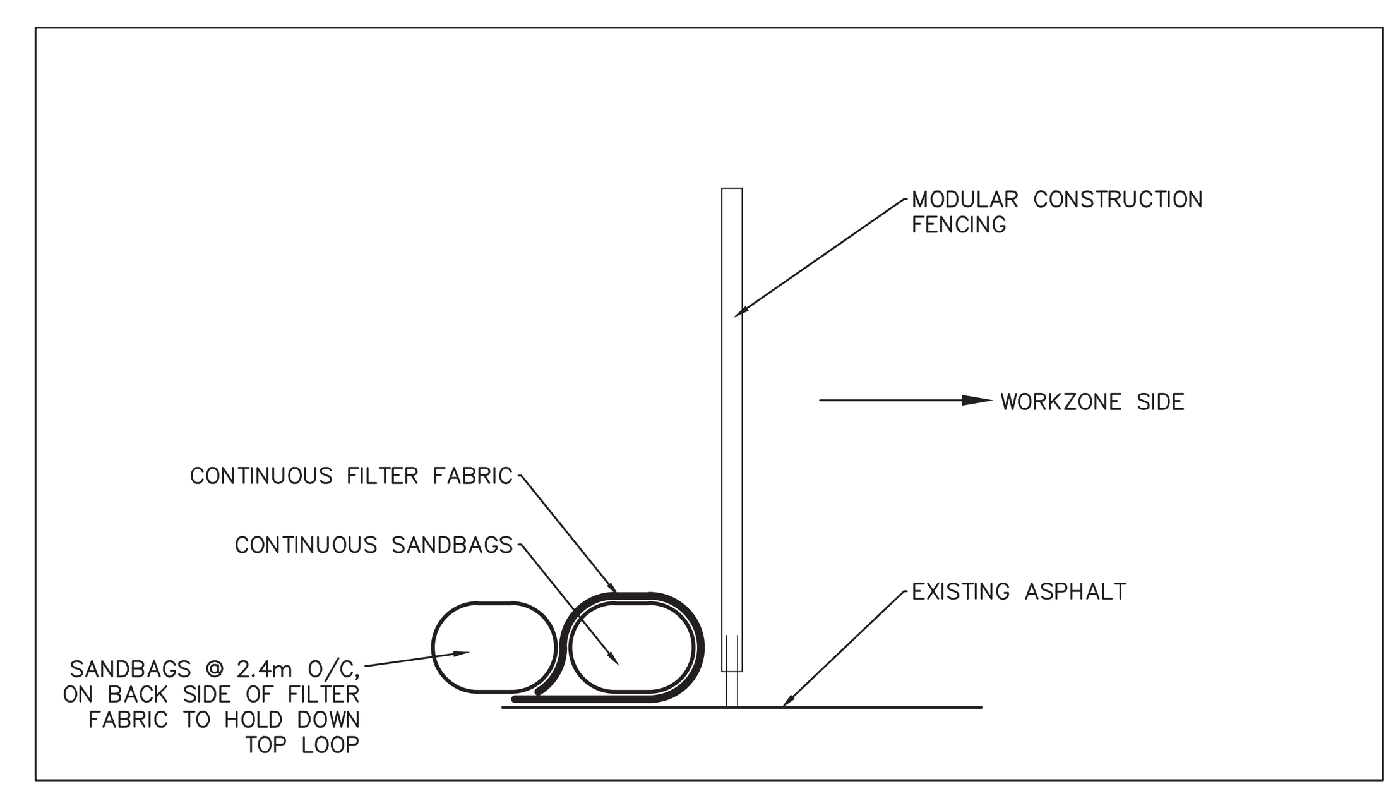
THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATER COURSE, DURING CONSTRUCTION ACTIVITIES. THIS INCLUDES LIMITING THE AMOUNT OF EXPOSED SOIL, USING FILTER CLOTH UNDER THE GRATES OF MANHOLES AND INSTALLING SILT FENCES, SILT SACKS AND OTHER EFFECTIVE SEDIMENT TRAPS. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES AND/OR MAINTAIN THEM THAT THEY MAY BE SUBJECT TO PENALTIES IMPOSED BY APPLICABLE REGULATORY AGENCIES.



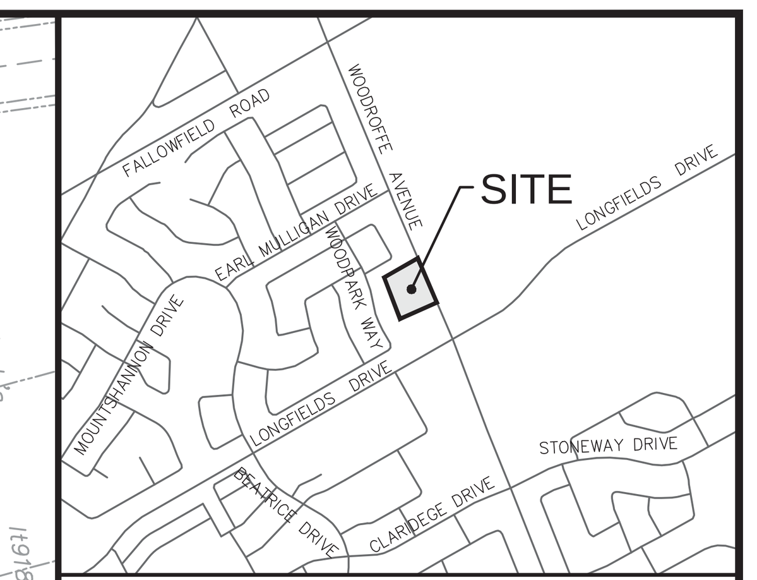


LEGEND :

- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- CUSTOM SILT FENCE (AS PER DETAIL)
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- SILT SACK CATCHBASIN INSERT PLACED UNDER CB OR MH COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH (15.00 × 7.00)



CUSTOM SILT FENCE DETAIL FOR SITE PERIMETER LOCATION AS REQUIRED



KEY PLAN (NTS)

NOTES:

1. SITE BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3	ISSUED FOR SPA	DGY	19:05:08
2	REVISED AS PER NEW ARCHITECTS PLANS	DGY	19:05:06
1	ISSUED FOR SPA	DGY	19:05:03

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Project Title

2900 WOODROFFE AVENUE

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2019/05/08 PROVINCE OF ONTARIO

Drawing Title

EROSION AND SEDIMENTATOIN CONTROL PLAN

Scale 1:250

Design	Date
SEL	MAY 2019
Drawn	Checked
DPS	DGY
Project No.	Drawing No.
119777	900

D07-12-1x-0xxx

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