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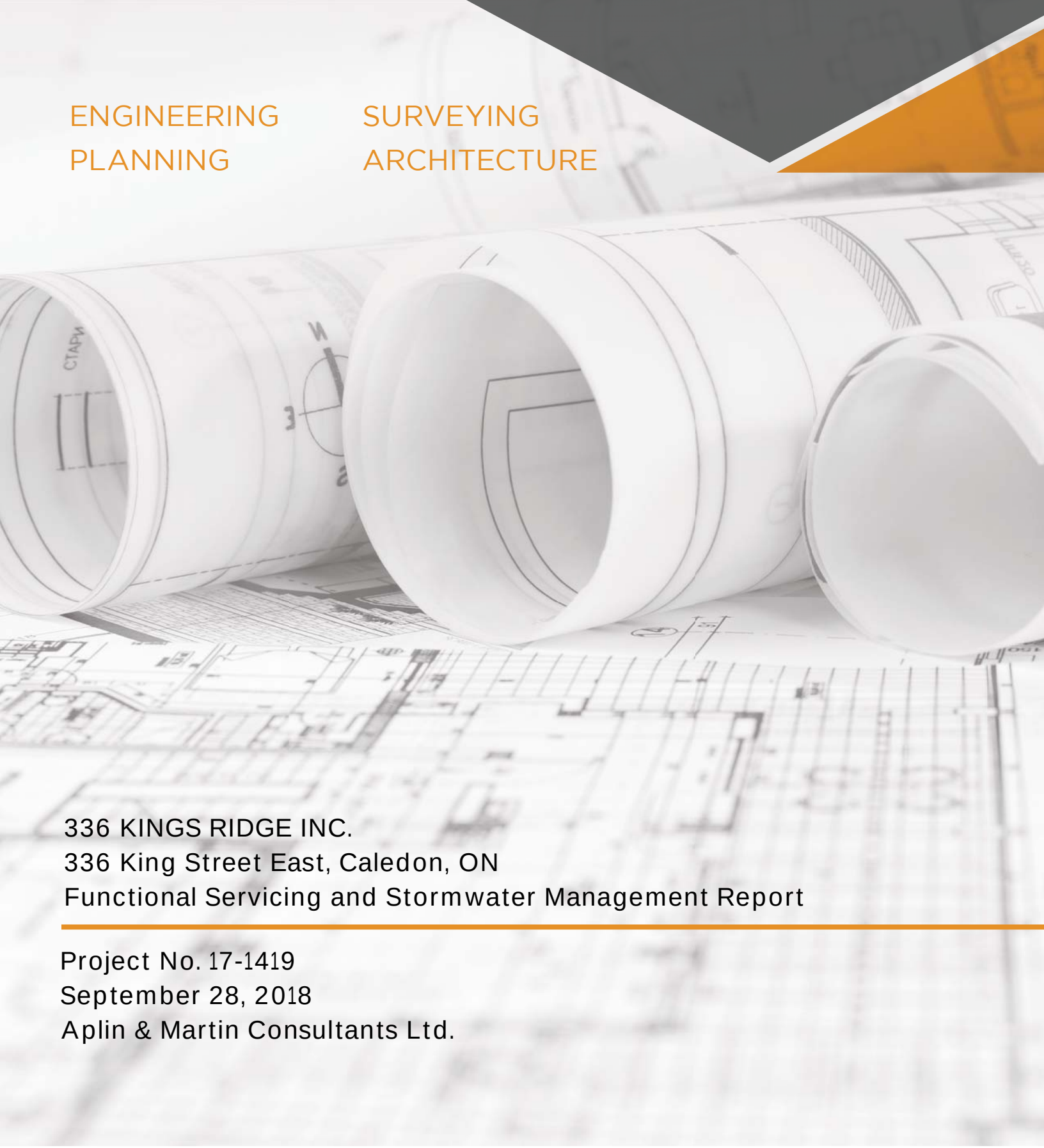

336 KINGS RIDGE INC.
336 King Street East, Caledon, ON
Functional Servicing and Stormwater Management Report

Project No. 17-1419
September 28, 2018
Aplin & Martin Consultants Ltd.

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Quality Information

Prepared By:
Aplin & Martin Consultants

Name: Andrew Farina, EIT
Title: Engineering Designer

Prepared By:
Aplin & Martin Consultants

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Title: Water Resource Designer

Checked & Approved By:
Aplin & Martin Consultants

Name: Chesley Blahut, P.Eng
Title: Project Engineer

Revision History

Revision	Date	Details	Name	Title
A	28-Sept-18	Issued for Site Plan Application	Chesley Blahut	Project Engineer

Distribution List

# Hard Copies	PDF Submission	Company/Association
8	1	336 Kings Ridge Inc.

Statement of Limitations

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1.0 INTRODUCTION

Aplin Martin has been retained by 336 Kings Ridge Inc. to prepare a Functional Servicing Report and Stormwater Management Report (FSR & SWM) in support of a private 16-unit townhouse development. The proposed 0.26 ha site is located in the Humber River watershed within the Toronto and Region Conservation Authority (TRCA) jurisdiction.

This report has been prepared in support of a Site Plan Application to assess and demonstrate that the proposed development can be sustained by the existing municipal infrastructure. It contains a SWM section that identifies the SWM design details by quantifying the erosion, water balance and quality control measures employed, in accordance with the applicable guidelines.

Figure 1: – Aerial View (Source: Google Maps Imagery 2017)

2.0 SITE CONDITIONS

2.1. Existing Site Conditions

The site is currently occupied by one detached residential building with a paved roundabout driveway that provides access to King Street East. The subject lands are bound by King Street East to the north, existing residential developments to the east and west, and the Humber River to the south. Given the site's close proximity to the Humber River, the southern portion of the site is encroached by the regional floodplain. Refer to Figure 1 for an aerial photo of the site under current conditions and Appendix A for the site's topographic survey.

Although two storm sewer networks exist on King Street East, the existing development is not serviced by these networks. A small portion of the site drains towards King Street East with the remainder of the runoff being conveyed in a south-westerly direction towards the Humber River.

2.2. Proposed Site Conditions

The subject site consists of two townhouse blocks totaling sixteen (16) units. Each row consists of 8, 4-storey units complete with private driveways and rear lots. The proposed development is equipped with a dead-end private condominium laneway providing access to King Street East. All townhouse units will have at-grade parking and landscape features. A total of 3 visitor parking stalls are proposed and one garbage truck loading area along the east limit of the proposed roadway. Refer to Appendix A for the site plan prepared by Kirkor Architects + Planners.

3.0 DOMESTIC AND FIREFIGHTING WATER SUPPLY

3.1. Existing Water Supply

Domestic water supply is provided to the site by an existing 150 mm diameter watermain located within the south boulevard of King Street East. An existing fire hydrant is located approximately 50 m to the west of the proposed entrance to the subject site.

3.2. Proposed Water Supply

The design of the proposed watermain within the road allowance will be in accordance with the Region of Peel Standards and specification. A proposed 150 mm diameter watermain connection to the municipal main will provide domestic and firefighting supply to the proposed residential buildings. The water demands have been determined

in accordance with Region of Peel's design criteria and as per the Fire Underwriter's Survey (FUS) design criteria.
The projected domestic water demand under maximum day and peak hour flows are estimated to be 0.28 L/s and 0.42 L/s, respectively. Firefighting demands for the development are estimated to be 66.70 L/s. Refer to Appendix B for the detailed calculations.

Water metering shall be accomplished by private domestic water meters located in each unit of the two townhouse blocks. Each unit will be serviced via a private 50mm diameter water service connection. A fire hydrant and isolation valves are proposed at the end of the Road 'A' which will provide the required coverage to service the development. Refer to Appendix E for the Site Servicing drawing (17-1419-C03).

Fire hydrant flow testing for this site using the nearest fire hydrants on King Street East. The King Street East results have determined that at a minimum pressure of 20 psi the theoretical flowrate within the municipal main is approximately 76.40 L/s.

Therefore, there is sufficient flow to meet the fire flow demand for the proposed development. Refer to Appendix B for the Fire Hydrant Flow Test Report prepared by Jackson Waterworks.

4.0 SANITARY SERVICING

4.1. Existing Sanitary Servicing

Based on the as-built information provided by the Region of Peel, an existing 250 mm diameter sanitary sewer system is located within the north boulevard on King Street East and conveys flows in a westerly direction.

4.2. Proposed Sanitary Servicing

Sanitary servicing will be achieved by a 250 mm diameter regional sanitary within the road allowance and ultimately connecting to the existing sanitary sewer within King Street East. Each unit will be serviced via a 125mm diameter service connection at a minimum 1% slope. For details of the proposed sanitary sewer refer to Appendix D for the Sanitary Profile drawing (17-1419-C05).

The peak sanitary flow from the subject site has been determined in accordance with the Region of Peel design guidelines, using the following design criteria:

- Domestic sewage flow of 302.8 L/cap/day for residential areas.
- Infiltration flow of 0.2 L/sec/ha.

The resulting peak residential sanitary discharge flow rate is estimated to be 0.66 L/s. Refer to Appendix C for the sewer design sheet.

5.0 STORMWATER MANAGEMENT

5.1. Design Criteria

Stormwater Management for the proposed development will be designed in accordance with the criteria outlined in the Town's Stormwater Design Guidelines as well as those in the TRCA's Stormwater Management Criteria. A summary of the Stormwater Management criteria applicable to this project follows:

- Quantity Control – Quantity controls are not required for this development if site flows discharge to the Humber River. However, the design proposes a connection to the King Street East storm sewer network a thus controls are proposed to achieve 100-year post-development flows to the 10-year pre-development levels.
- Water Balance - The TRCA requires the site to retain a minimum of 5 mm across the site area through infiltration, evapotranspiration or water re-use techniques.
  Erosion Control – As required for all watercourses within TRCA's jurisdiction, the first 5mm of every storm event must be retained on-site.
- Quality Control– The site shall treat stormwater runoff to enhanced level protection achieving 80% Total Suspended Solids (TSS) removal.

5.2. Quantity Control

5.2.1. Existing Conditions

Under existing conditions, the site encounters split drainage with a portion of the site draining towards King Street East (A1 Pre) and the remainder towards the Humber River (A2 Pre). Rational method calculations were performed using the Township of Caledon's intensity-duration-frequency (IDF) parameters to determine the target release rate for this development. Refer to Table 1 below for a summary of input parameters and target release rate established for the development.

Drainage Area ID	Area (ha)	Runoff Coefficient	Intensity (mm/hour)	10-Year Peak Flow Rate (L/s)
A1 Pre	0.05	0.48	68.91	7.9
A2 Pre	0.20	0.32		19.4

Table 1: Pre-development input parameters

5.2.2. Proposed Conditions

The subject site is located within the Humber River watershed where quantity controls are not required if site flows are discharged to the watercourse. However, the *Slope Stability Investigation* by DS Consultants Ltd. dated August 9, 2018 recommends that site flows are not discharged over the slope. Therefore, the design proposes to discharge the site runoff to the existing storm sewer network along King Street East. As per the direction from the Region, 100-year post-development flows must be controlled to the 10-year pre-development levels for the area conveyed to the network under existing conditions. To achieve this target release rate, the below control measures are proposed:

- 93.1 m^3 of quantity storage provided in underground storage chambers within the proposed condominium laneway.
- A 75SVHV-1 vertical vortex flow regulator located in manhole D1 downstream of the proposed storage chambers.

Modified Ration Method (MRM) calculations were performed using the same IDF parameters as pre-development conditions to quantify the required storage for this development. See ***Table 2*** below for a summary of the proposed SWM strategy.

Storm Event	Area (ha)	Required Storage (m^3)	Storage Provided (m^3)	Controlled Release Rate (L/s)	Target Release Rate (L/s)
2-Year	0.25	32.4	93.1	2.9	7.9
5-Year		45.1		4.3	
100-Year		91.7		6.6	

Table 2: Post-Development Storage/Discharge Summary

As indicated above, the proposed SWM scheme achieves the required target release rate to King Street East. This is accomplished by restricting flows using a vertical flow regulator and providing 93.1 m^3 of storage in 40 DC-780 Stormtech Chambers. Given the depth of the storm system the Stormtech DC-780 chambers were selected due to their ability to handle a large cover. Refer to Appendix D for detailed quantity control calculations and Figure 3 for the control device selection.

5.3. Water Balance / Erosion Control

As required by the MOECC, an annual hydrologic budget is required to demonstrate that the pre-development infiltration volumes are maintained in post-development conditions. This post-to-pre-analysis was completed using climate data collected from the Toronto Region Source Protection Act (TRSPA) water balance tool and the Albion Field Centre weather station. This analysis concluded that the site experiences an

infiltration deficit of 108 m^3/year in post-development conditions. This infiltration deficit can be offset by retaining 70 mm/year which corresponds to less than 5 mm as per the Albion Field Centre normal climate data. Therefore, it is concluded that retention of the 5 mm event is more conservative and achieves erosion control criteria as well.

Retention of the 5 mm event results in a retention volume of 12.6 m^3. After accounting for initial abstraction on pervious and impervious surfaces, the remaining retention volume for design is 6.3 m^3. Infiltration of this volume is achieved through the 230 mm stone layer below the chambers which maintains 1.0 m separation from the groundwater elevations presented in the *Geotechnical Investigation* prepared by DS Consultants Ltd. dated May 28, 2018. Refer to Appendix D for detailed calculations and excerpts from DS Consultants Ltd. reports.

5.4. Quality Control

As stated above, the water quality objective for the site is to achieve 80% TSS removal. This is accomplished by using a Jellyfish Unit (JF4-1-1) that has been sized to achieve the minimum 80% TSS removal. All impervious areas of the site are directed through the Jellyfish Unit proposed upstream of the storage chambers to minimize the maintenance frequency on the chambers. A small portion of landscaped area along the northern limit of the site enters directly into the chambers without receiving treatment. This is not of concern given that landscaped areas are considered inherently clean due to its natural ability to filter out sediment. See detailed calculations and sizing report in Appendix D.

5.5. Erosion and Sediment Control

Sediment control measures will be installed for all phases and activities during construction. To reduce the sediment-landed runoff and minimize damages to natural downstream system; the following process shall be implemented:

- Contain sediment on site by using cut-off swales, silt fences and sediment traps on existing and proposed catch basins.
- Provide a gravel mud mat at the entrance of the site.
- Conduct regular inspections of erosion and sediment control measures.

Once all phases of construction have been completed, removal of the erosion and sediment control measures can take place.

5.6. Proposed Storm Discharge Location

The proposed townhouse development will discharge its storm runoff through onsite storm sewers and an onsite detention system that will ultimately connect into the existing 450mm diameter storm sewer within King Street East. The storm sewers and

appurtenances will be designed in accordance with the Township of Caledon's design guidelines. Refer to Appendix E for the proposed storm servicing design on the Site Servicing drawing (17-1419-C03).

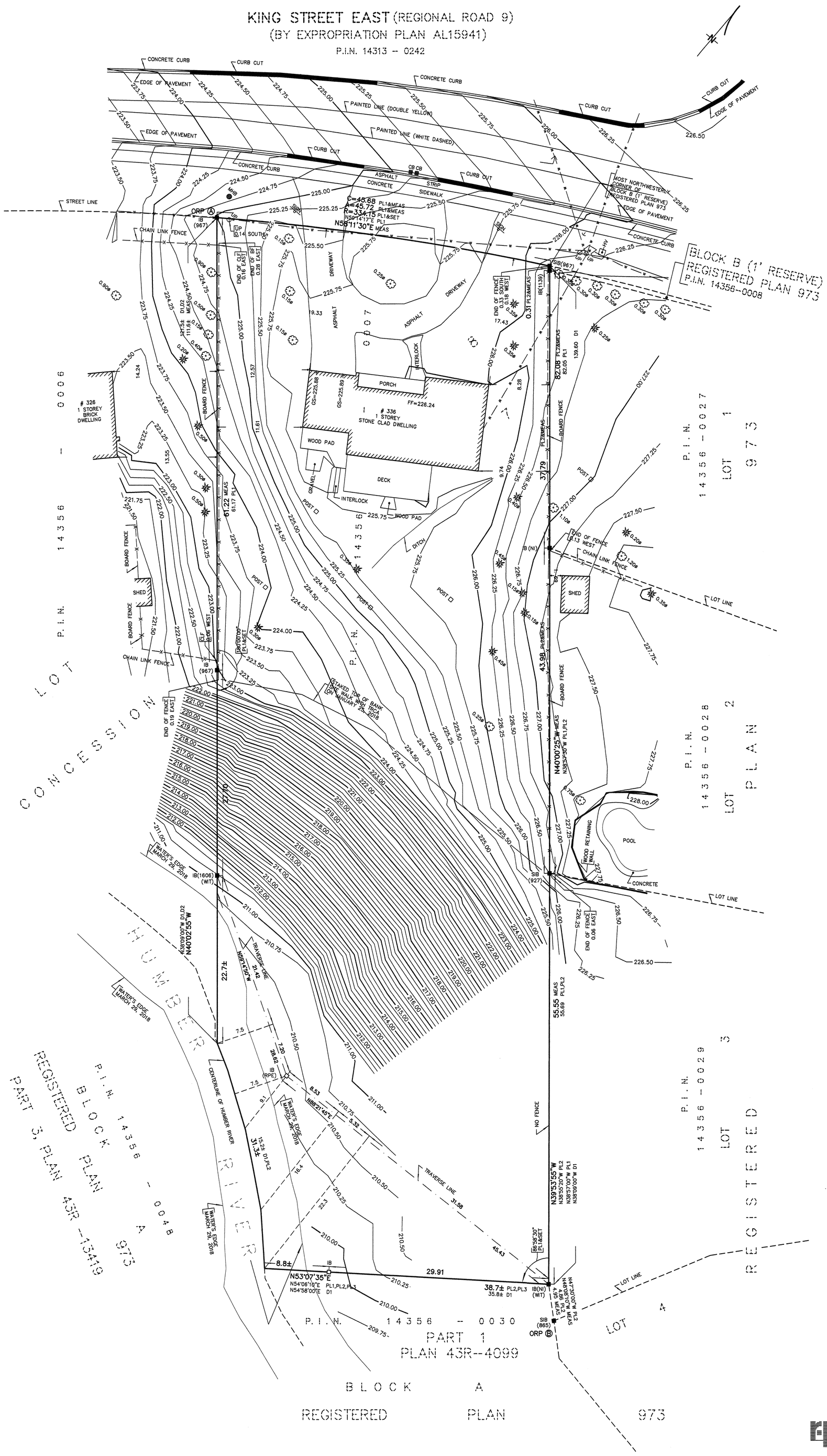
6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our reflection of the proposed development and supporting documentation, the following conclusions and recommendations are made:

- A 250 mm diameter sanitary sewer will provide sanitary servicing for the proposed development.
- Each townhouse unit will have a private 125 mm diameter sanitary lateral connection coming off the sanitary main.
- Water supply will be provided by a proposed 150 mm diameter watermain.
- All townhouse units will have a private 50 mm diameter water service connection and an internal water meter.
- SWM quantity controls storage will be provided via 40 Stormtech chambers and a 75SVHV-1 vertical flow regulator located at manhole D1.
- SWM quality control is achieved by using a Jellyfish unit (JF4-1-1) approved for 80% TSS removal.
- SWM water balance and erosion control criteria is achieved via infiltration through the stone layer below the Stormtech chambers.

APPENDIX A

Supporting Documentation



PLAN OF SURVEY AND PARTIAL TOPOGRAPHY OF PART OF LOT 8 CONCESSION 7

(GEOGRAPHIC TOWNSHIP OF ALBION)

TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

SCALE 1:300

10m 5m 0 10m 20metres

RADY-PENTEK & EDWARD SURVEYING LTD., O.L.S.

METRIC

DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

NOTES

■	DENOTES MONUMENT FOUND
□	DENOTES MONUMENT SET
SIB	DENOTES STANDARD IRON BAR
IB	DENOTES IRON BAR
CP	DENOTES CONCRETE PIN
ORP	DENOTES OBSERVED REFERENCE POINT
P.I.N.	DENOTES PROPERTY IDENTIFIER NUMBER
PL1	DENOTES PLAN OF SURVEY BY W. N. WILDMAN, O.L.S., DATED JUNE 10, 1965
PL2	DENOTES REGISTERED PLAN 973
PL3	DENOTES PLAN 43R-4099
D1	DENOTES INSTRUMENT No. RO1067661
D2	DENOTES INSTRUMENT No. RO1094983
(865)	DENOTES D. P. MCLEAN, O.L.S.
(927)	DENOTES J. R. SNEATH, O.L.S.
(967)	DENOTES W. N. WILDMAN, O.L.S.
(1139)	DENOTES R. A. H. SILVERA, O.L.S.
(1606)	DENOTES L. BIASON, O.L.S.
(NI)	DENOTES NOT IDENTIFIED
HV	DENOTES HYDRO VAULT
UP	DENOTES UTILITY POLE
MHB	DENOTES BELL MANHOLE
CB	DENOTES CATCH BASIN
-W-	DENOTES OVERHEAD WIRE
ø	DENOTES DIAMETER
-X-	DENOTES FENCE
FF	DENOTES FINISHED FLOOR ELEVATION
GS	DENOTES GARAGE SILL ELEVATION
TRCA	DENOTES TORONTO AND REGION CONSERVATION
	DENOTES DECIDUOUS TREE
	DENOTES CONIFEROUS TREE
	DENOTES GUY WIRE ANCHOR

BEARING NOTE

BEARINGS ARE UTM GRID, DERIVED FROM GPS OBSERVATIONS USING CAN-NET REAL TIME NETWORK STATION 20120110037, UTM ZONE 17, NAD83 (CSRS: CBNv6: 2010.0).

COORDINATES ARE UTM ZONE 17, NAD83 (CSRS: CBNv6: 2010.0), TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10, AND CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

POINT ID	NORTHING	EASTING
ORP A	4860029.82	602065.07
ORP B	4859945.14	602195.94

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999703.

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO FIRST ORDER VERTICAL BENCHMARK NUMBER 00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

BENCHMARK LOCATED ON THE EAST SIDE OF HWY 50, 0.8 KM SOUTH OF JUNCTION OF HWY 50 AND KING ST IN THE TOWN OF CALEDON (BOLTON), 55.2 M NORTH OF ELLWOOD DR AND 104 M EAST OF CENTRELINE OF HWY 50. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF GYMNASIUM AT ELLWOOD MEMORIAL PUBLIC SCHOOL, 1.7 M NORTH OF S.W. CORNER AND 12 CM BELOW BRICKWORK.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
2045814

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR In accordance with Regulation 1026, Section 29(3).

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 29th DAY OF MARCH 2018.

DATE APRIL 2ND, 2018

C. P. EDWARD
ONTARIO LAND SURVEYOR

RADY-PENTEK & EDWARD SURVEYING LTD.
ONTARIO LAND SURVEYORS
643 Chrislea Road, Suite 7, Woodbridge, Ontario, L4L 8A3
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Website: www.r-pe.ca

DRAWN: A.K. CHECKED: S.G. / C.P.E.
CAD FILE No. 18013tp01 JOB No. 18-013
Apr. 02, 2018 - 07:00:00

CONCEPT SITE PLAN

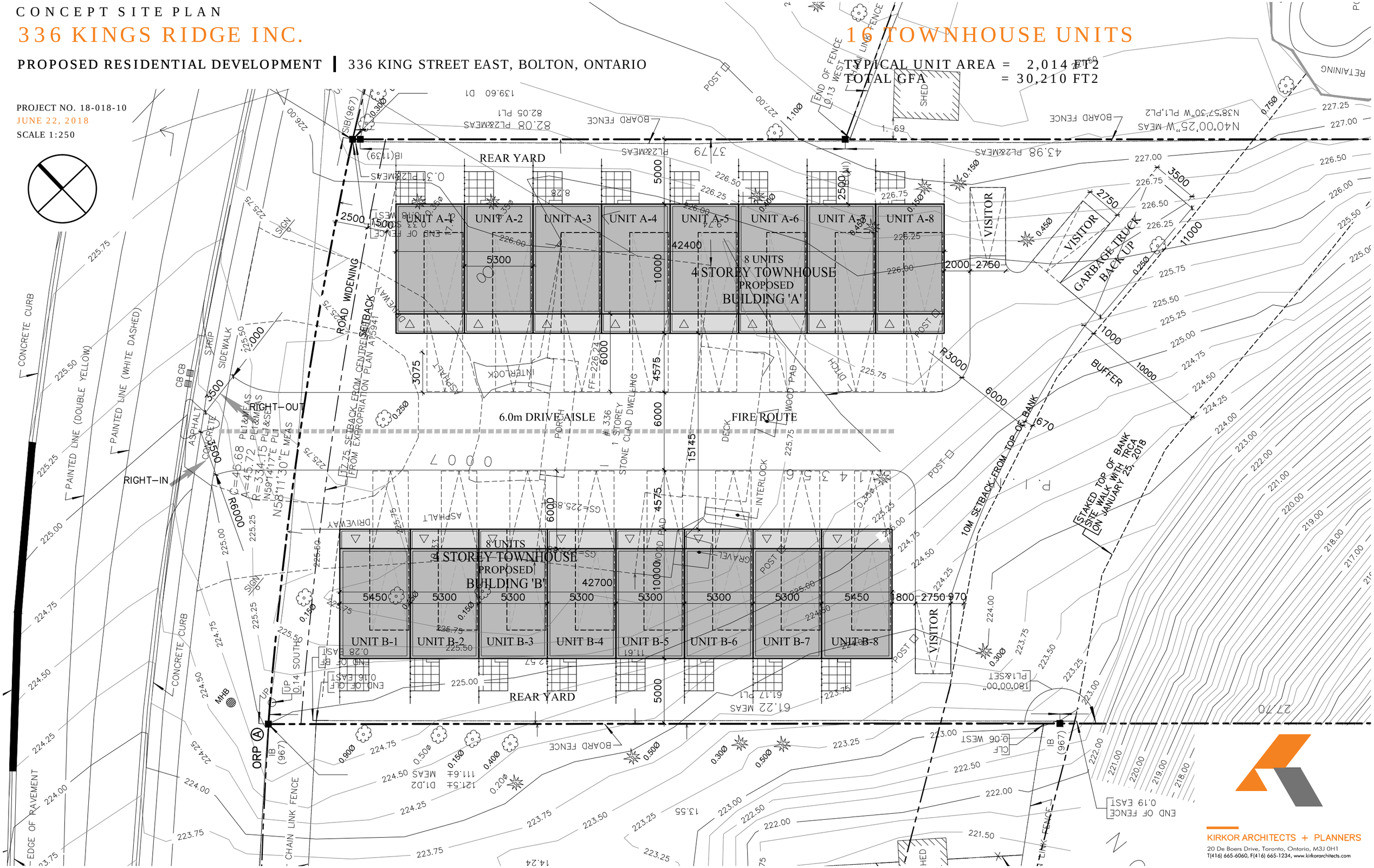
336 KINGS RIDGE INC.

16 TOWNHOUSE UNITS

PROPOSED RESIDENTIAL DEVELOPMENT | 336 KING STREET EAST, BOLTON, ONTARIO

TYPICAL UNIT AREA = 2,014 FT2
TOTAL GFA = 30,210 FT2

PROJECT NO. 18-018-10
JUNE 22, 2018
SCALE 1:250



KIRKOR ARCHITECTS + PLANNERS
20 De Boers Drive, Toronto, Ontario, M3J 0H1
T(416) 665-6060, F(416) 665-1234, www.kirkorarchitects.com

APPENDIX B

WATER SUPPLY DESIGN

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Residential Development
Project Location:	336 King Street East, Caledon ON
Developer:	336 Kings Ridge Inc.

Domestic Water Demand

Average Day Connsumption [1]	280	L/capita/day

Site Statistics			Occupancy Data		
	Denisty	No. of Units	Population Density	Population	Water Demand
			people/unit		L/day
Residential	Townhouse	16.00	2.70	43.20	12096.00

Peaking Factors [1]		
Land Use	Peak Hour	Maximum Day
Residential	3	2

Peak Flows	
Factors	L/s
Max Day	0.28
Peak Hour	0.42

[1] Population denisties and peaking factors is basd on the Region of Peel Public Works Design, Specifications & Procedures Manual.

Fire Flow Estimate

APLIN MARTIN

Date: 28-Sep-18
By: RJT
Checked: CAB
A&M File No.: 17-1419

Residential Development
336 King Street East, Bolton

Development Type: Residential

Fire Area Considered:

Type of Construction: Wood Frame C = 1.5

Area Calculation: Total of all floor areas

Building B	
Floor 1	121.33
Floor 2	121.33
Floor 3	121.33
Floor 4	121.33
Total Applicable Floor Area:	485.33 m^2

Fire Flow From Formula (a): 220C(A^1/2) = 220 x 1.5 (485.333 ^1/2) = 7269.9931 L/min

Round off to the nearest 1,000 L/min = **7000** **L/min**

Occupancy: Non-Combustible Add/Sub: -25.00 % -1750

Subtotal(b) 5250 L/min

Automatic Sprinklers: yes Subtract: 50 % x (b) = -2625

Subtotal **2625** **L/min**

Exposures:

	Direction	Separation (Minimum)	Charge Limit (i.e. Charge not to Exceed)
Side 1	N	68.0	0
Rear	E	24.0	10
Side 2	S	-	-
Front	W	18.0	15

	Applied Charge	
Add	0	%
Add	8	%
Add	-	%
Add	11	%
Total	19	%
Use	19	% x b = + 997.50

Total 3622.50 L/min

Fire Flow Required **4000** **L/min**

$$\frac{\textbf{4000}}{\textbf{60}}\ \frac{\textbf{L/min}}{\textbf{s}} = \textbf{66.67}\ \frac{\textbf{L}}{\textbf{s}}$$

Notes:

1. Fire flow calculation template is based on Fire Underwriter's Survey 1999
2. Building information provided by Kirkor Architects & Planners
3. Floor area calculations assume that each building will have two fire walls spaced every two units

JACKSON WATERWORKS

Telephone: (905) 547-6770
Toll Free: (800)-734-5732
E-mail: jww@bellnet.ca
Website: www.jacksonwaterworks.ca

Mr. Andrew Farina
Aplin Martin
55 St. Clair Avenuje West, Suite 405
Toronto Ontario **M4V 2Y7**

12 July 2018

Jackson Waterworks has recently completed fire hydrant flow testing at 336 King Street East in Bolton.

We define the Test Hydrant as the one being flowed, and the Base Hydrant as the one where static and residual pressures are recorded. Wherever possible, we inspect the secondary valve for the Test Hydrant to make sure it is in the fully open position. Likewise, we count the number of turns needed to open the Test Hydrant (to make sure it is opening completely).

The secondary valve for the Test Hydrant could not be inspected at the time of the test.

Testing was completed in accordance with NFPA 291 guidelines.

An irregularity was observed during the test, in that the residual pressure dropped substantially from the static pressure when the first nozzle port was opened. This is normally indicative of a supply problem, where the distribution system is kept at a high static pressure for normal demand. Supply collapses under high demand. The theoretical flow calculation is based on the first pitot and residual measurements, and is obviously not accurate as the actual flow rate was well above the theoretical flow rate once the second nozzle port was opened. While not our normal practice, we have plotted the graph and used two lines to illustrate the difference.

At the time of the test, the theoretical flow rate provided in the report can be taken as a minimum value.

Trusting this meets with your approval, we are...

Yours truly,

Mark Schmidt
Jackson Waterworks

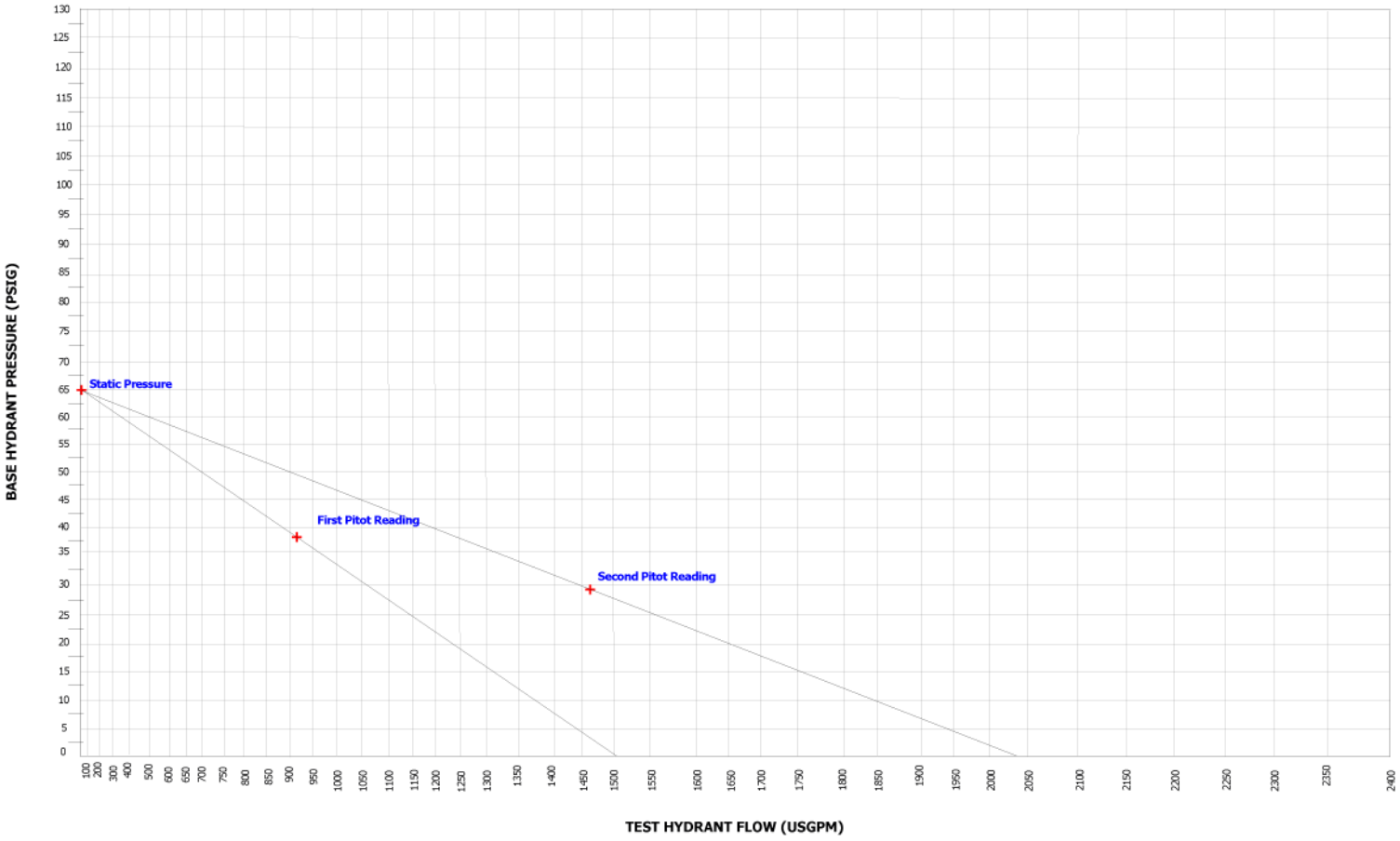
221 Sherman Avenue North, Hamilton, Ontario L8L 6N2

JACKSON WATERWORKS

Telephone: (905) 547-6770
Toll Free: (800)-734-5732
E-mail: jww@bellnet.ca
Website: www.jacksonwaterworks.ca

FIRE HYDRANT FLOW TEST RESULTS

TEST #1 of 1



No. of Ports Open	Port Dia. (in)	Pitot Reading (psig)	Pitot Conversion (usgpm) Conversion Factor = 0	Residual Pressure (psig)
1	2.50	30	919	38
2	2.50	19/19	1462	29
THEORETICAL FLOW @ 20psi			1211	

Test Date	11 July 2018
Test Time	11:00am
Pipe Diameter (in)	6
Static Pressure (psig)	65

Site Information		
Site Name or Developer Name	336 Kins Ridge Inc.	Engineer/Architect: Aplin Martin
Site Address/Municipality	336 King Street East, Bolton	
Location of Test Hydrant	In Front of 336 King Street East	
Location of Base Hydrant	In Front of 398 King Street East	
Comments	Testing has been completed in accordance with NFPA-291 guidelines wherever and whenever possible and practical. Conversion factors for pitot tube readings have been used depending on hose nozzle internal design and installation profile. Refer to attached cover letter for additional information.	
Verified By	Mark Schmidt	

221 Sherman Avenue North, Hamilton, Ontario L8L 6N2

APPENDIX C

SANITARY DESIGN

SANITARY SYSTEM DESIGN - CALCULATION SHEET

Project Title: Residential Development
Project Location: 336 King Street East
Caledon, ON

Developer: 336 Kings Ridge Inc.

AVERAGE DAILY FLOW
Residential= 302.8 L/cap/day
MANNINGS "n" 0.013
Inflow & Infiltration 0.2 L/s/ha

Peaking Factor = Harmon Equation

Consultant: APLIN MARTIN

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

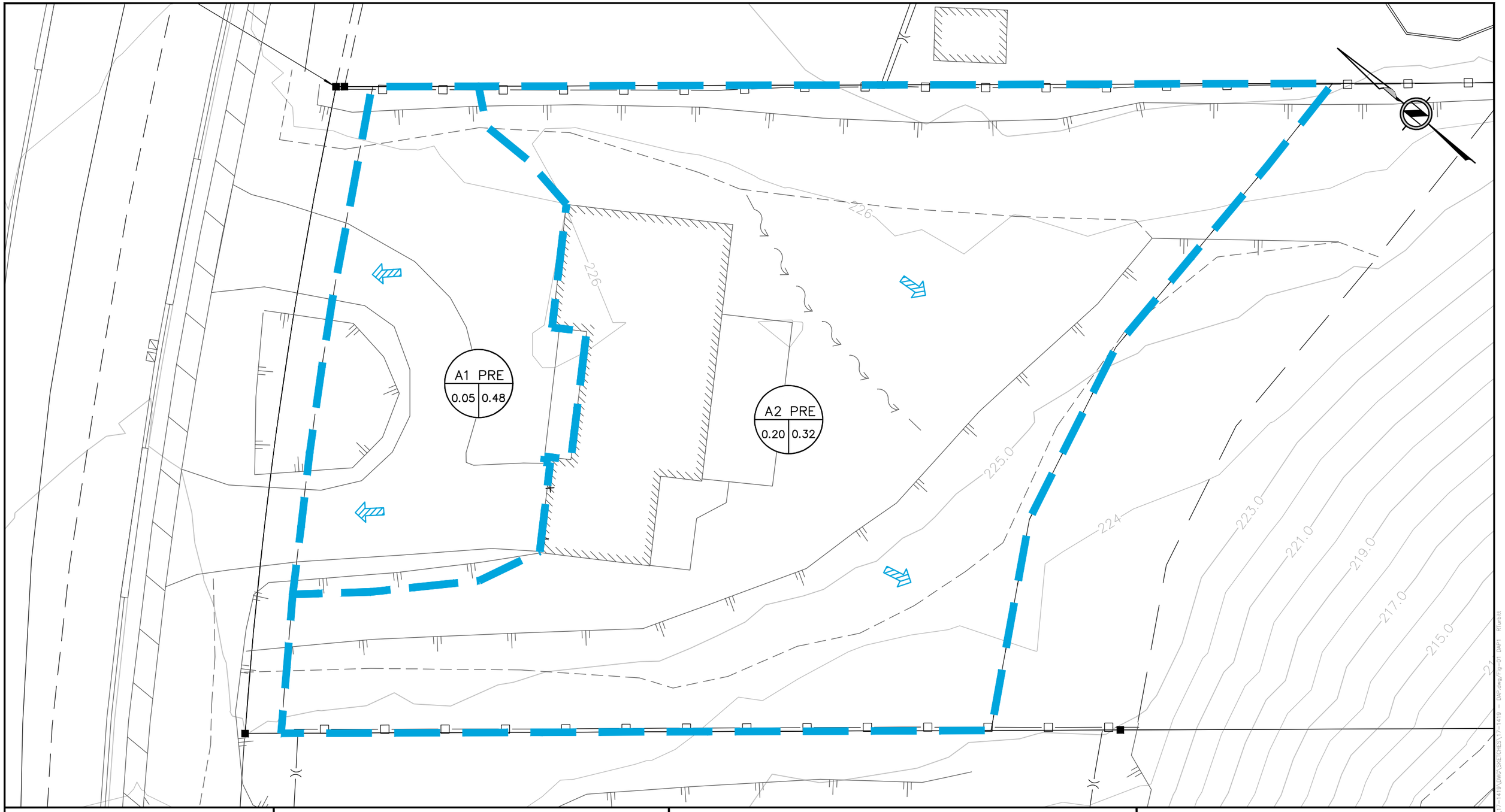
A&M Proj # 17-1419
Page: 1 of 1

Designed by: ADF
Checked by: CAB
Date: July-06-18

Locations			Sub-Catchments									Flow Calculations					Pipe Parameters					Results			
Street	Manhole		Sub-Catchment No.	Area	Cum Area	Land Usage	Density	Pop Rate	Population	Cum. Pop	Usage Level	Avg Flow	Peaking Factor	Cum Peak Flow	Inflow & Infiltration	Design Flow	Sewer Design					Flow Ratio	Partial Velocity	Full Flow Velocity Check	Depth of Flow
	From	To		A (ha)	(ha)		(units)	(cap/unit)			L/cap/day	ADWF (L/s)	P_f	PDWF (L/s)	I&I (L/s)	Q (L/s)	S %	DIA mm	L m	V_{cap} m/s	Q_{cap} (L/s)	Q/Q_{cap} %	V_{act} (m/s)	$V_{act} \geq$ 0.60 (m/s)	d/D %
Road A	S1	S2	A	0.26	0.26	Residential	16	2.70	43.20	43.20	303	0.151	4.00	0.61	0.05	0.66	1.00	250	44.80	1.21	59.47	1%	0.40	OK	7%
King Street East	S2	S3	B	0.02	0.28	Residential		2.70		43.20	303	0.151	4.00	0.61	0.06	0.66	1.00	250	25.20	1.21	59.47	1%	0.40	OK	7%

APPENDIX D

Stormwater Management Design



APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

CLIENT:
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT:
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON, ONTARIO

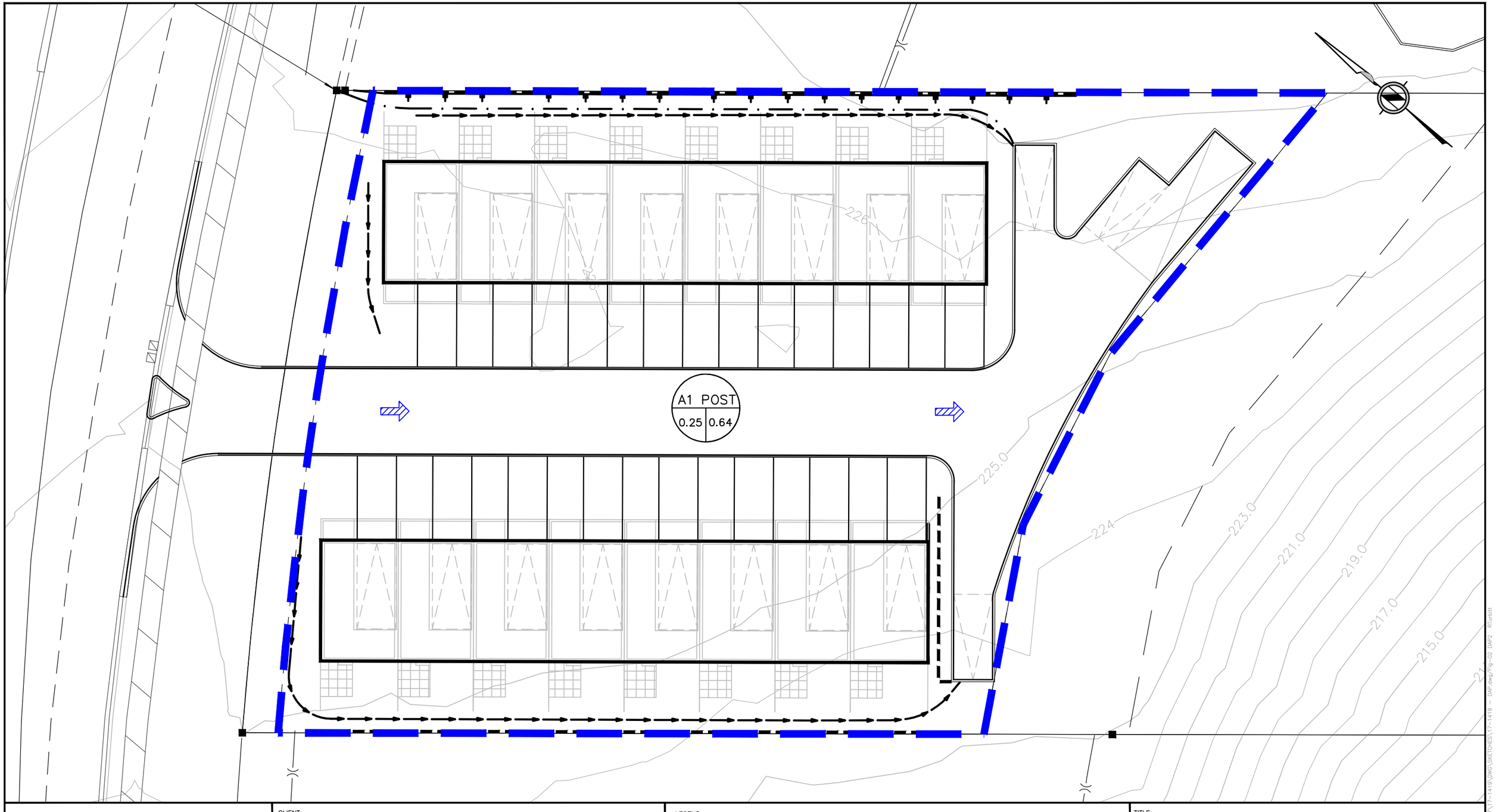
LEGEND:
PRE-DEVELOPMENT DRAINAGE AREA
OVERLAND FLOW AAROW

A1 PRE
0.05 0.48
DRAINAGE AREA ID
RUNOFF COEFFICIENT
DRAINAGE AREA (ha)

TITLE:
PRE-DEVELOPMENT DRAINAGE AREA PLAN

PROJECT NO.	DRAWING DATE:
17-1419	SEPTEMBER, 2018
FIGURE NO.	SCALE :
FIG-01	1:250

Sep 28 2018 - 1:24pm M:\2017\17-1419\DWG\SKETCHES\17-1419 - DAP.dwg/Fig-01 DAP1 RTurbitt



APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

CLIENT:
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT:
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON, ONTARIO

LEGEND:
POST-DEVELOPMENT DRAINAGE AREA
OVERLAND FLOW AAROW

A1 POST
0.90 0.75
DRAINAGE AREA ID
RUNOFF COEFFICIENT
DRAINAGE AREA (ha)

TITLE:
POST-DEVELOPMENT DRAINAGE AREA PLAN

PROJECT NO.	DRAWING DATE:
17-1419	SEPTEMBER, 2018
FIGURE NO.	SCALE :
FIG-02	1:250

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Townhouse Development
Project Location:	336 King Street East
Developer:	336 Kings Ridge Inc.

Pre-Development Runoff Coefficient

A1Pre	Total Area	0.05	C
	Pervious	0.03	0.20
	Impervious	0.02	0.90
		Composite 'C'	0.48
A2Pre	Total Area	0.20	C
	Pervious	0.16	0.20
	Impervious	0.03	0.90
		Composite 'C'	0.32

Pre-Development Peak Flows

Area ID	A (ha)	C	Tc (min)
A1	0.05	0.48	15.00
A2	0.20	0.32	15.00
Total	0.25	0.35	15.00

IDF Data : Town of Caledon

Storm Frequency (Yr)	a	b	c
2	1070.0	0.8759	7.9
5	1593.0	0.8789	11.0
10	2221.0	0.9080	12.0
25	3158.0	0.9335	15.0
50	3886.0	0.9495	16.0
100	4688.0	0.9624	17.0

$$I = \frac{a}{(t + c)^b}$$

Where: a, b, c = above
I = intensity (mm/hr)
t = storm duration (min)

Storm Frequency: 2 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	68.91	0.00	4.88
A2	0.06	68.91	0.01	12.01

Storm Frequency: 5 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	90.91	0.01	6.44
A2	0.06	90.91	0.02	15.85

Storm Frequency: 10 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	111.40	0.01	7.89
A2	0.06	111.40	0.02	19.42

Storm Frequency: 25 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	131.98	0.01	9.35
A2	0.06	131.98	0.02	23.01

Storm Frequency: 50 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	149.09	0.01	10.56
A2	0.06	149.09	0.03	25.99

Storm Frequency: 100 Year

Area ID	AC	I (mm/hr)	Q (m^3/s)	Q (L/s)
A1	0.03	166.89	0.01	11.82
A2	0.06	166.89	0.03	29.09

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Townhouse Development
Project Location:	336 King Street East
Developer:	336 Kings Ridge Inc.

Post-Development Runoff Coefficient

A1Post	Total Area	0.25	C
	Impervious	0.16	0.90
	Pervious	0.09	0.20
		Composite 'C'	0.64

2 Year Peak Flow Calculations

	Tc min	Runoff Coefficient	Area Ha	Intensity mm	n	Q cms
Q_{Pre}	15.00	0.35	0.25	68.9	0.00278	0.017
Q_{Target}						0.008
Q_{Post}	10.00	0.64	0.25	85.5	0.00278	0.038

Storage Volume Required (Modified Rational Method)

	A1 Post	
Area	0.25	ha
RC	0.64	
AC	0.16	
Required Storage	32.4	m^3
Head	0.28	m
Actual Release Rate	0.0029	m^3/s

Orifice	221.22	m
Tank Bottom	221.27	m
Head	0.33	m
Elevation	221.55	m

Rainfall Duration Tr min	Rainfall Intensity I mm/hour	Storm Runoff cms	Runoff Volume cms	Released Volume cm	Storage Volume cm	Storage Depth m
5	113.9	0.051	15.3	0.9	14.4	0.12
10	85.5	0.038	22.9	1.7	21.2	0.18
15	68.9	0.031	27.7	2.6	25.1	0.22
20	58.0	0.026	31.1	3.5	27.6	0.24
25	50.2	0.022	33.6	4.3	29.3	0.26
30	44.3	0.020	35.7	5.2	30.4	0.27
35	39.8	0.018	37.3	6.1	31.2	0.27
40	36.1	0.016	38.7	6.9	31.8	0.28
45	33.1	0.015	39.9	7.8	32.1	0.28
50	30.6	0.014	41.0	8.7	32.3	0.28
55	28.4	0.013	41.9	9.5	32.4	0.28
60	26.6	0.012	42.8	10.4	32.4	0.28
65	25.0	0.011	43.6	11.3	32.3	0.28
70	23.6	0.011	44.3	12.1	32.1	0.28
75	22.3	0.010	44.9	13.0	31.9	0.28
80	21.2	0.009	45.5	13.9	31.6	0.28
85	20.2	0.009	46.1	14.7	31.3	0.27
90	19.3	0.009	46.6	15.6	31.0	0.27
95	18.5	0.008	47.1	16.5	30.6	0.27
100	17.7	0.008	47.5	17.3	30.2	0.26
105	17.0	0.008	48.0	18.2	29.8	0.26
110	16.4	0.007	48.4	19.1	29.3	0.26
115	15.8	0.007	48.8	19.9	28.8	0.25
120	15.3	0.007	49.1	20.8	28.3	0.25
125	14.8	0.007	49.5	21.7	27.8	0.24
130	14.3	0.006	49.8	22.5	27.3	0.24
135	13.9	0.006	50.2	23.4	26.8	0.23
140	13.4	0.006	50.5	24.3	26.2	0.23
145	13.1	0.006	50.8	25.1	25.6	0.22
150	12.7	0.006	51.1	26.0	25.1	0.22
155	12.4	0.006	51.4	26.9	24.5	0.21
160	12.0	0.005	51.6	27.7	23.9	0.21
165	11.7	0.005	51.9	28.6	23.3	0.20
170	11.4	0.005	52.1	29.5	22.7	0.20
175	11.2	0.005	52.4	30.3	22.0	0.19
180	10.9	0.005	52.6	31.2	21.4	0.19
185	10.7	0.005	52.9	32.1	20.8	0.18
190	10.4	0.005	53.1	32.9	20.1	0.17
195	10.2	0.005	53.3	33.8	19.5	0.17
200	10.0	0.004	53.5	34.7	18.8	0.16
205	9.8	0.004	53.7	35.5	18.2	0.16
210	9.6	0.004	53.9	36.4	17.5	0.15
215	9.4	0.004	54.1	37.3	16.8	0.15
220	9.2	0.004	54.3	38.1	16.2	0.14
225	9.0	0.004	54.5	39.0	15.5	0.13
230	8.9	0.004	54.7	39.9	14.8	0.13
235	8.7	0.004	54.9	40.7	14.1	0.12

5 Year Peak Flow Calculations

	Tc min	Runoff Coefficient	Area Ha	Intensity mm	n	Q cms
Q_{Pre}	15.00	0.35	0.25	90.9	0.00278	0.022
Q_{Target}						0.008
Q_{Post}	10.00	0.64	0.25	109.7	0.00278	0.049

Storage Volume Required (Modified Rational Method)

	A1 Post	
Area	0.25	ha
RC	0.64	
AC	0.16	
Storage	45.1	m^3
Head	0.40	m
Actual Release Rate	0.0043	m^3/s

Orifice	221.22	m
Tank Bottom	221.27	m
Head	0.45	m
Elevation	221.67	m

Rainfall Duration Tr min	Rainfall Intensity I mm/hour	Storm Runoff cms	Runoff Volume cms	Released Volume cm	Storage Volume cm	Storage Depth m
5	139.3	0.062	18.7	1.3	**17.4**	0.15
10	109.7	0.049	29.4	2.6	**26.8**	0.23
15	90.9	0.041	36.6	3.8	**32.7**	0.29
20	77.9	0.035	41.8	5.1	**36.6**	0.32
25	68.3	0.031	45.8	6.4	**39.4**	0.35
30	60.9	0.027	49.0	7.7	**41.3**	0.37
35	55.1	0.025	51.7	9.0	**42.7**	0.38
40	50.3	0.022	53.9	10.2	**43.7**	0.39
45	46.3	0.021	55.9	11.5	**44.4**	0.40
50	43.0	0.019	57.6	12.8	**44.8**	0.40
55	40.1	0.018	59.1	14.1	**45.0**	0.40
60	37.6	0.017	60.5	15.4	**45.1**	0.40
65	35.4	0.016	61.7	16.6	**45.1**	0.40
70	33.5	0.015	62.8	17.9	**44.9**	0.40
75	31.8	0.014	63.9	19.2	**44.7**	0.40
80	30.2	0.014	64.8	20.5	**44.3**	0.40
85	28.8	0.013	65.7	21.8	**44.0**	0.39
90	27.6	0.012	66.6	23.0	**43.5**	0.39
95	26.4	0.012	67.3	24.3	**43.0**	0.38
100	25.4	0.011	68.1	25.6	**42.5**	0.38
105	24.4	0.011	68.7	26.9	**41.9**	0.37
110	23.5	0.011	69.4	28.2	**41.2**	0.37
115	22.7	0.010	70.0	29.4	**40.6**	0.36
120	21.9	0.010	70.6	30.7	**39.9**	0.35
125	21.2	0.009	71.2	32.0	**39.2**	0.35
130	20.6	0.009	71.7	33.3	**38.4**	0.34
135	20.0	0.009	72.2	34.6	**37.6**	0.33
140	19.4	0.009	72.7	35.8	**36.9**	0.33
145	18.8	0.008	73.2	37.1	**36.0**	0.32
150	18.3	0.008	73.6	38.4	**35.2**	0.31
155	17.8	0.008	74.1	39.7	**34.4**	0.30
160	17.4	0.008	74.5	41.0	**33.5**	0.29
165	16.9	0.008	74.9	42.3	**32.6**	0.29
170	16.5	0.007	75.3	43.5	**31.8**	0.28
175	16.1	0.007	75.7	44.8	**30.9**	0.27
180	15.8	0.007	76.0	46.1	**29.9**	0.26
185	15.4	0.007	76.4	47.4	**29.0**	0.25
190	15.1	0.007	76.7	48.7	**28.1**	0.25
195	14.7	0.007	77.1	49.9	**27.1**	0.24
200	14.4	0.006	77.4	51.2	**26.2**	0.23
205	14.1	0.006	77.7	52.5	**25.2**	0.22
210	13.9	0.006	78.0	53.8	**24.3**	0.21
215	13.6	0.006	78.3	55.1	**23.3**	0.20
220	13.3	0.006	78.6	56.3	**22.3**	0.19
225	13.1	0.006	78.9	57.6	**21.3**	0.18
230	12.8	0.006	79.2	58.9	**20.3**	0.18
235	12.6	0.006	79.5	60.2	**19.3**	0.17

100 Year Peak Flow Calculations

	Tc min	Runoff Coefficient	Area Ha	Intensity mm	n	Q cms
Q_{Pre}	15.00	0.35	0.25	166.9	0.00278	0.041
Q_{Target}						0.008
Q_{Post}	10.00	0.64	0.25	196.5	0.00278	0.088

Storage Volume Required (Modified Rational Method)

	A1 Post				
Area	0.25	ha	Orifice	221.22	m
RC	0.64		Tank Bottom	221.27	m
AC	0.16		Head	1.09	m
Required Storage	91.7	m^3	Elevation	222.31	m
Storage Depth	1.04	m			
Actual Release Rate	0.0066	m^3/s			

Rainfall Duration Tr min	Rainfall Intensity I mm/hour	Storm Runoff cms	Runoff Volume cms	Released Volume cm	Storage Volume cm	Storage Depth m
5	239.4	0.107	32.1	2.0	**30.1**	0.26
10	196.5	0.088	52.7	4.0	**48.7**	0.44
15	166.9	0.075	67.1	6.0	**61.1**	0.57
20	145.1	0.065	77.8	8.0	**69.9**	0.68
25	128.5	0.057	86.1	10.0	**76.1**	0.77
30	115.3	0.052	92.7	12.0	**80.8**	0.85
35	104.6	0.047	98.1	13.9	**84.2**	0.91
40	95.7	0.043	102.7	15.9	**86.7**	0.96
45	88.3	0.039	106.5	17.9	**88.6**	0.99
50	82.0	0.037	109.9	19.9	**89.9**	1.01
55	76.5	0.034	112.8	21.9	**90.9**	1.03
60	71.7	0.032	115.3	23.9	**91.4**	1.04
65	67.5	0.030	117.6	25.9	**91.7**	1.04
70	63.7	0.028	119.6	27.9	**91.7**	1.04
75	60.4	0.027	121.5	29.9	**91.6**	1.04
80	57.4	0.026	123.1	31.9	**91.2**	1.04
85	54.7	0.024	124.6	33.9	**90.8**	1.03
90	52.2	0.023	126.0	35.9	**90.2**	1.02
95	50.0	0.022	127.3	37.8	**89.5**	1.00
100	47.9	0.021	128.5	39.8	**88.7**	0.99
105	46.0	0.021	129.6	41.8	**87.8**	0.98
110	44.3	0.020	130.6	43.8	**86.8**	0.96
115	42.7	0.019	131.6	45.8	**85.8**	0.94
120	41.2	0.018	132.5	47.8	**84.7**	0.92
125	39.8	0.018	133.3	49.8	**83.5**	0.90
130	38.5	0.017	134.1	51.8	**82.3**	0.88
135	37.3	0.017	134.8	53.8	**81.1**	0.86
140	36.1	0.016	135.5	55.8	**79.8**	0.84
145	35.0	0.016	136.2	57.8	**78.5**	0.81
150	34.0	0.015	136.8	59.8	**77.1**	0.79
155	33.1	0.015	137.5	61.7	**75.7**	0.77
160	32.2	0.014	138.0	63.7	**74.3**	0.74
165	31.3	0.014	138.6	65.7	**72.8**	0.72
170	30.5	0.014	139.1	67.7	**71.4**	0.70
175	29.8	0.013	139.6	69.7	**69.9**	0.68
180	29.0	0.013	140.1	71.7	**68.4**	0.66
185	28.3	0.013	140.5	73.7	**66.8**	0.64
190	27.7	0.012	141.0	75.7	**65.3**	0.62
195	27.0	0.012	141.4	77.7	**63.7**	0.60
200	26.4	0.012	141.8	79.7	**62.1**	0.58
205	25.9	0.012	142.2	81.7	**60.5**	0.56
210	25.3	0.011	142.6	83.7	**58.9**	0.55
215	24.8	0.011	143.0	85.7	**57.3**	0.53
220	24.3	0.011	143.3	87.6	**55.7**	0.51
225	23.8	0.011	143.6	89.6	**54.0**	0.49
230	23.3	0.010	144.0	91.6	**52.3**	0.48
235	22.9	0.010	144.3	93.6	**50.7**	0.46

Project: **336 King Street East**

StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management℠

Chamber Model -	SC-740	
Units -	**Metric**	Click Here for Imperial
Number of chambers -	40	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	100.00	m
Amount of Stone Above Chambers -	300	mm
Amount of Stone Below Chambers -	230	mm
Area of system -	144.935	sq.meters

☑ Include Perimeter Stone in Calculations

Min. Area - 125.62 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Total Chamber *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Ch & St *(cubic meters)*	Cumulative Chamber *(cubic meters)*	Elevation *(meters)*
1295	0.00	0.00	1.47	1.47	106.32	101.30
1270	0.00	0.00	1.47	1.47	104.85	101.27
1245	0.00	0.00	1.47	1.47	103.38	101.24
1219	0.00	0.00	1.47	1.47	101.91	101.22
1194	0.00	0.00	1.47	1.47	100.43	101.19
1168	0.00	0.00	1.47	1.47	98.96	101.17
1143	0.00	0.00	1.47	1.47	97.49	101.14
1118	0.00	0.00	1.47	1.47	96.02	101.12
1092	0.00	0.00	1.47	1.47	94.54	101.09
1067	0.00	0.00	1.47	1.47	93.07	101.07
1041	0.00	0.00	1.47	1.47	91.60	101.04
1016	0.00	0.00	1.47	1.47	90.13	101.02
991	0.00	0.06	1.45	1.51	88.65	100.99
965	0.00	0.18	1.40	1.58	87.15	100.97
940	0.01	0.32	1.34	1.66	85.56	100.94
914	0.02	0.68	1.20	1.88	83.90	100.91
889	0.02	0.91	1.11	2.02	82.01	100.89
864	0.03	1.08	1.04	2.12	80.00	100.86
838	0.03	1.22	0.99	2.20	77.88	100.84
813	0.03	1.34	0.94	2.27	75.68	100.81
787	0.04	1.43	0.90	2.33	73.40	100.79
762	0.04	1.53	0.86	2.39	71.07	100.76
737	0.04	1.65	0.81	2.46	68.68	100.74
711	0.04	1.73	0.78	2.51	66.21	100.71
686	0.04	1.79	0.76	2.55	63.71	100.69
660	0.05	1.86	0.73	2.59	61.16	100.66
635	0.05	1.92	0.70	2.63	58.57	100.64
610	0.05	1.99	0.68	2.66	55.94	100.61
584	0.05	2.04	0.66	2.70	53.28	100.58
559	0.05	2.10	0.63	2.73	50.58	100.56
533	0.05	2.14	0.61	2.76	47.85	100.53
508	0.05	2.19	0.60	2.79	45.09	100.51
483	0.06	2.24	0.58	2.81	42.30	100.48
457	0.06	2.28	0.56	2.84	39.49	100.46
432	0.06	2.32	0.55	2.86	36.65	100.43
406	0.06	2.35	0.53	2.88	33.79	100.41
381	0.06	2.38	0.52	2.90	30.90	100.38
356	0.06	2.41	0.51	2.92	28.00	100.36
330	0.06	2.44	0.50	2.94	25.08	100.33
305	0.06	2.47	0.49	2.95	22.14	100.30
279	0.06	2.49	0.48	2.97	19.19	100.28
254	0.06	2.50	0.47	2.97	16.22	100.25
229	0.00	0.00	1.47	1.47	13.25	100.23
203	0.00	0.00	1.47	1.47	11.78	100.20
178	0.00	0.00	1.47	1.47	10.31	100.18
152	0.00	0.00	1.47	1.47	8.83	100.15
127	0.00	0.00	1.47	1.47	7.36	100.13
102	0.00	0.00	1.47	1.47	5.89	100.10
76	0.00	0.00	1.47	1.47	4.42	100.08
51	0.00	0.00	1.47	1.47	2.94	100.05
25	0.00	0.00	1.47	1.47	1.47	100.03

SVHV Vertical Vortex Flow Regulator

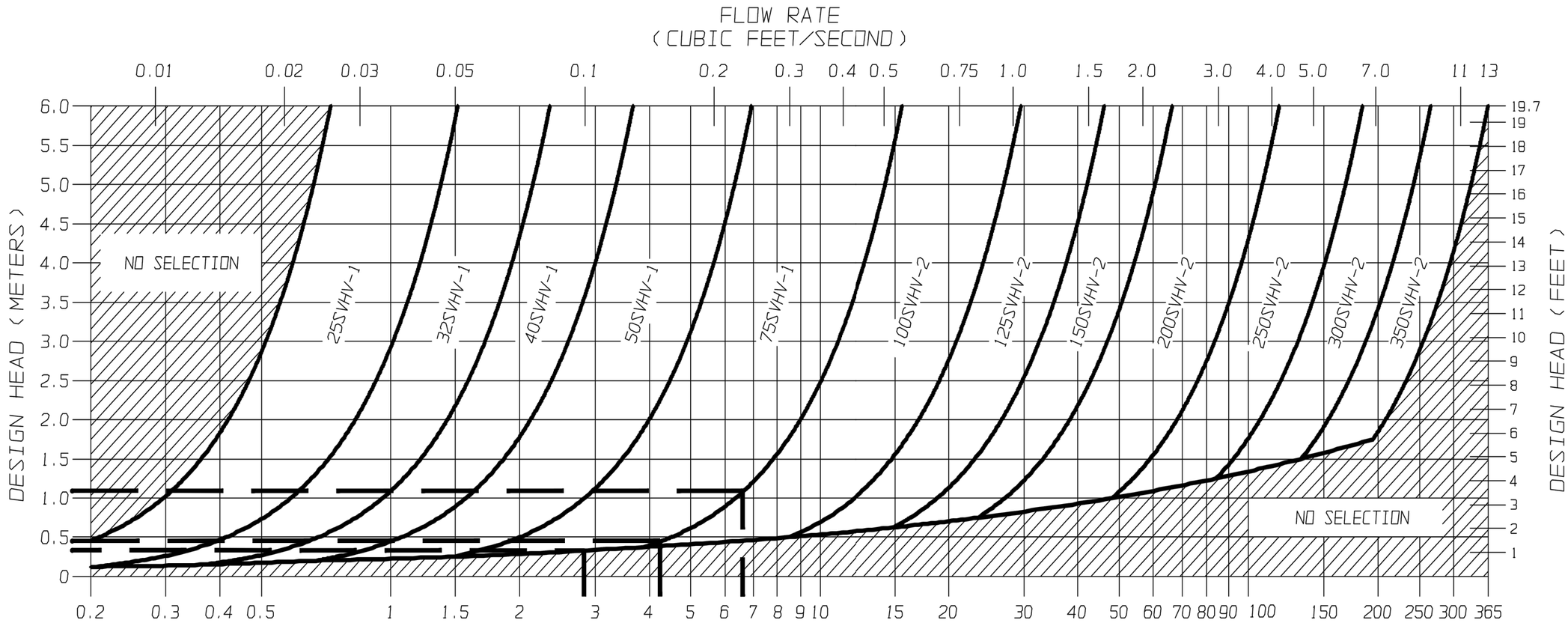


FIGURE 3 - SVHV

DISCHARGE SUMMARY		
STORM	HEAD (m)	Q (L/s)
2–YEAR	0.33	2.9
5–YEAR	0.45	4.3
100–YEAR	1.09	6.6

JOHN MEUNIER

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

CLIENT:
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT:
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON, ONTARIO

LEGEND:

TITLE:
DISCHARGE SUMMARY

PROJECT NO.	DRAWING DATE:
17-1419	SEPTEMBER, 2018
FIGURE NO.	SCALE :
FIG-03	N.T.S.

DRAINAGE SYSTEM DESIGN - RATIONAL METHOD CALCULATION SHEET

Municipal Proj # N/A
Project Title: Residential Development
Project Location: 336 King Street East
Town of Caledon
Developer: 336 Kings Ridge Inc.

Storm Sewer Design Criteria
Design Return Period: 10 YEAR / 100 YEAR
MANNINGS "n" 0.013
Q10/100=RAIN N=0.00278

TOWN OF CALEDON - RAINFALL INTENSITY

Consultant: APLIN MARTIN

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

A&M Proj # 17-1419
Page: 1 of 1

Designed by: RJT
Checked by: CAB
Date: Sep-18

Locations			Sub-Catchments						Flow Calculations		Pipe Parameters									Comments
Street	Manhole		Sub-Catchment No.	Tributary Area			SUM AxR	Time of Concentration		Rain Fall Int. "I"	Q_{10} Q_{100}	Sewer Design					Travel Time	Flow Ratios		Hydraulic Slope	Remarks
	From	To		A (ha)	R	AxR (ha)	(ha)	Inlet (min)	Total (min)	I (mm/hr)	(L/s)	S %	DIA mm	L m	V_{cap} m/s	Q_{cap} (L/s)	(min)	Q_{10}/Q_{cap} %	Q_{100}/Q_{cap} %	Q_{100} %	10 YEAR FLOW ROUTES
Street A	1	3	A	0.25	0.75	0.19	0.19	10.0	10.0	134.2	69.5	0.50	375	1.6	1.12	124.0	0.0	56%	103%	0.53%	IN PIPE
					0.94	0.23	0.23			196.5	127.3										
Street A	3	4					0.19	10.0	10.0	134.2	69.5	0.50	375	12.3	1.12	124.0	0.2	56%	103%	0.53%	IN PIPE
							0.23			196.5	127.3										
Street A	4	Tank					0.19	10.0	10.2	134.0	69.5	0.50	375	1.5	1.12	124.0	0.0	56%	103%	0.53%	IN PIPE
							0.23			196.4	127.2										
Street A	Tank	5	B	0.01	0.25	0.00	0.19	10.2	10.2	133.0	69.9	0.50	375	6.4	1.12	124.0	0.1	56%	103%	0.53%	IN PIPE
					0.31	0.00	0.24			195.1	128.1										
Street A	5	6					0.19	10.2	10.3	132.9	69.8	1.00	375	23.7	1.59	175.3	0.2	40%	73%	0.53%	IN PIPE
							0.24			194.9	128.0										

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Townhouse Development
Project Location:	336 King Street East
Developer:	336 Kings Ridge Inc.

Annual Hydrologic Budget

PRE-DEV			
Existing Landuse		Urban Lawns	
Hydrologic Soil Group (HSG)		C	
Infiltration Factor		0.5	
	Pervious	Impervious	Total
Area (ha)	0.20	0.05	0.25
Precipitation (mm)	852	852	
ET (mm)	643	170.4	
Surplus (mm)	209	681.6	
Infiltration (mm)	104.5	0	
Runoff (mm)	104.5	681.6	
Volumes			
ET (m^3)	1267	93	1359
Infiltration (m^3)	206	0	206
Runoff(m^3)	206	370	576

POST-DEV			
Proposed Landuse		Urban Lawns	
Hydrologic Soil Group (HSG)		C	
Infiltration Factor		0.5	
	Pervious	Impervious	Total
Area (ha)	0.09	0.16	0.25
Precipitation (mm)	852	852	
ET (mm)	643	170.4	
Surplus (mm)	209	681.6	
Infiltration (mm)	104.5	0	
Runoff (mm)	104.5	681.6	
Volumes			
ET (m^3)	600	269	869
Infiltration (m^3)	97	0	97
Runoff(m^3)	97	1077	1174

POST-DEV WITH MITIGATION			
	Pervious	Impervious	Total
Area (ha)	0.09	0.16	0.25
Precipitation (mm)	852	852	
ET (mm)	643	170.4	
Surplus (mm)	209	681.6	
Infiltration (mm)	104.5	70	
Runoff (mm)	104.5	611.6	
Volumes			
ET (m^3)	600	269	869
Infiltration (m^3)	97	111	208
Runoff(m^3)	97	966	1064

SUMMARY			
Scenario	ET	Infiltration	Runoff
Pre-Development (1)	1359	206	576
Post-Development (2)	869	97	1174
Post-Development w Mitigation (3)	869	208	1064
Percent Difference (1 and 3)	-36%	1%	85%

Albion Field Centre - Normal Data

Storm Depth (mm)	Number of Days					
	April	May	June	July	August	September
0.2	9.90	10.30	10.20	9.00	9.80	10.80
5	4.20	5.00	4.40	4.90	4.50	4.50
10	2.00	2.30	2.90	2.60	2.80	2.50
25	0.37	0.53	0.61	0.68	0.63	0.68

Storm Depth (mm)	Total # of days	Runoff Coefficient	Equivalent Depth (mm)
0.2	60	0.64	7.7
5	27.5		88.0
10	15.1		96.7
25	3.5		56.0

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Residential Development
Project Location:	336 King Street East, Caledon ON
Developer:	336 King's Ridge Inc.

Water Balance

Site Area (ha)	Depth (mm)	Volume (m^3)
0.25	5.0	12.6
	IA Volume	6.2
	Remaining Retention Volume	6.3

Initial Abstraction	Depth (mm)	Area (ha)	Volume (m^3)
Pervious	5.0	0.09	4.7
Impervious	1.0	0.16	1.6
		Sum	6.2

Test Pit Location	Hydraulic Conductivity From HydroG (cm/s)	Infiltration Rate* (mm/hour)	Correction Factor **	Design Infiltration Rate (mm/hour)
BH3	0.000001	13.49	2.50	5.40

* Infiltration Rate calculated using Figure C11 from TRCA SWM Criteria

**Correction Factor based on Table C3 from TRCA SWM Criteria

Reference - CVC & TRCA LID SWM Guidelines

Drawdown Time

Volume (V)	6.3	m^3
Percolation Rate (P)	5.4	mm/hr
Porosity (n)	0.4	
Time (T)	48.0	hr
Area (A)	61.0	m^2
Max. Depth (d)	0.65	m

$$A = \frac{1000V}{PnT}$$

$$d = \frac{PT}{1000n}$$

Infiltration Trench Design

Provided Area (A)	144.9	m^2
Provided Depth (d)	0.23	m
Porosity (n)	0.4	
Provided Volume (V)	13.33	m^3

Therefore, a minimum of 61.0 m^2 is required to infiltrate the water within 48 hours. The proposed design incorporates approximately 145 m^2 of infiltration area and can accommodate 13 m^3 of retention volume.

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

AM Proj #	17-1419
Project Title:	Townhouse Development
Project Location:	336 King Street East, Caledon ON
Developer:	336 King's Ridge Inc.

Water Quality

Surface	Proccess	TSS Removal Efficciency	Area of Site	% Area of Site	TSS Removal
		(%)	(ha)	(%)	(%)
Asphalt	Jellyfish (JF4-1-1)	80	0.09	34	27
Rooftop	Inherent	80	0.07	29	23
Landscape	Inherent	80	0.09	37	30
		Total	0.25	100	80

STANDARD OFFLINE
Jellyfish Filter Sizing Report

Project Information

Date	Friday, June 29, 2018
Project Name	336 King St. E
Project Number	
Location	Bolton

Jellyfish Filter Design Overview

This report provides information for the sizing and specification of the Jellyfish Filter. When designed properly in accordance to the guidelines detailed in the Jellyfish Filter Technical Manual, the Jellyfish Filter will exceed the performance and longevity of conventional horizontal bed and granular media filters.

Please see ***www.ImbriumSystems.com*** *for more information.*

Jellyfish Filter System Recommendation

The Jellyfish Filter model JF4-1-1 is recommended to meet the water quality objective by treating a flow of 7.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 85 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	1	1	1.2	7.6	85

The Jellyfish Filter System

The patented Jellyfish Filter is an engineered stormwater quality treatment technology featuring unique membrane filtration in a compact stand-alone treatment system that removes a high level and wide variety of stormwater pollutants. Exceptional pollutant removal is achieved at high treatment flow rates with minimal head loss and low maintenance costs. Each lightweight Jellyfish Filter cartridge contains an extraordinarily large amount of membrane surface area, resulting in superior flow capacity and pollutant removal capacity.

Maintenance

Regular scheduled inspections and maintenance is necessary to assure proper functioning of the Jellyfish Filter. The maintenance interval is designed to be a minimum of 12 months, but this will vary depending on site loading conditions and upstream pretreatment measures. Quarterly inspections and inspections after all storms beyond the 5-year event are recommended until enough historical performance data has been logged to comfortably initiate an alternative inspection interval.

Please see ***www.ImbriumSystems.com*** *for more information.*

Thank you for the opportunity to present this information to you and your client.

Performance

Jellyfish efficiently captures a high level of Stormwater pollutants, including:

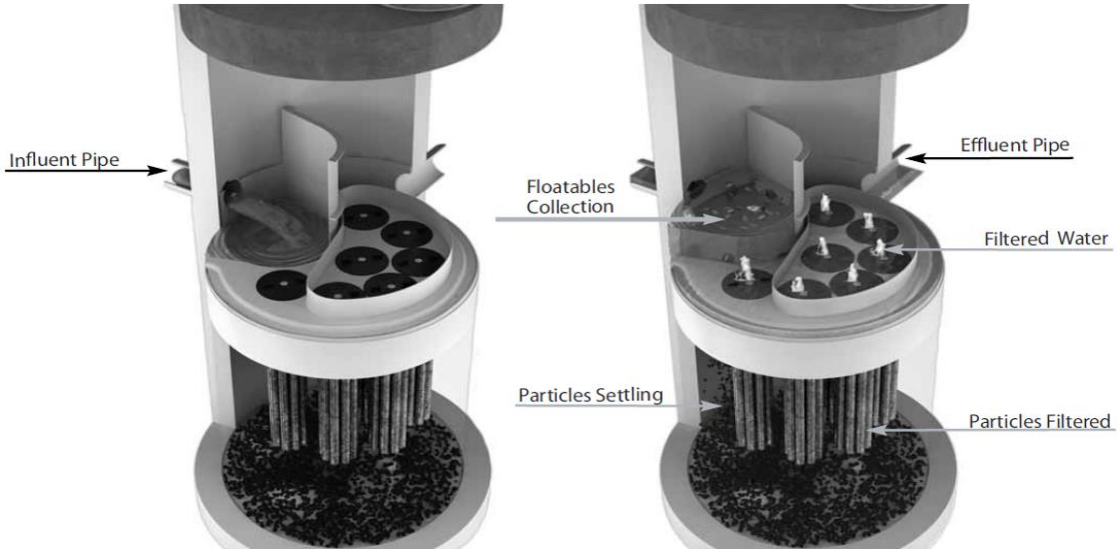
- ☑ 89% of the total suspended solids (TSS) load, including particles less than 5 microns
- ☑ 59% TP removal & 51% TN removal
- ☑ 90% Total Copper, 81% Total Lead, 70% Total Zinc
- ☑ Particulate-bound pollutants such as nutrients, toxic metals, hydrocarbons and bacteria
- ☑ Free oil, Floatable trash and debris

Field Proven Peformance

The Jellyfish filter has been field-tested on an urban site with 25 TARP qualifying rain events and field monitored according to the TARP field test protocol, demonstrating:

- A median TSS removal efficiency of 89%, and a median SSC removal of 99%;
- The ability to capture fine particles as indicated by an effluent d50 median of 3 microns for all monitotred storm events, and a median effluent turbidity of 5 NTUs;
- A median Total Phosphorus removal of 59%, and a median Total Nitrogen removal of 51%.

Jellyfish Filter Treatment Functions



Pre-treatment and Membrane Filtration

Jellyfish® Filter

Project Information

Date:	Friday, June 29, 2018
Project Name:	336 King St. E
Project Number:	
Location:	Bolton

Designer Information

Company:	Aplin & Martin Consultants Ltd.
Contact:	Rebecca Turbitt
Phone #:	

Notes

Rainfall

Name:	TORONTO CENTRAL
State:	ON
ID:	100
Record:	1982 to 1999
Co-ords:	45°30'N, 90°30'W

Drainage Area

Total Area:	0.26 ha
Runoff Coefficient:	0.65

Upstream Detention

Peak Release Rate:	n/a
Pretreatment Credit:	n/a

Design System Requirements

Flow Loading	90% of the Average Annual Runoff based on 18 years of TORONTO CENTRAL rainfall data:	**5.5 L/s**
Sediment Loading	Treating 90% of the average annual runoff volume, 1005 m³, with a suspended sediment concentration of 60 mg/L.	**60 kg**

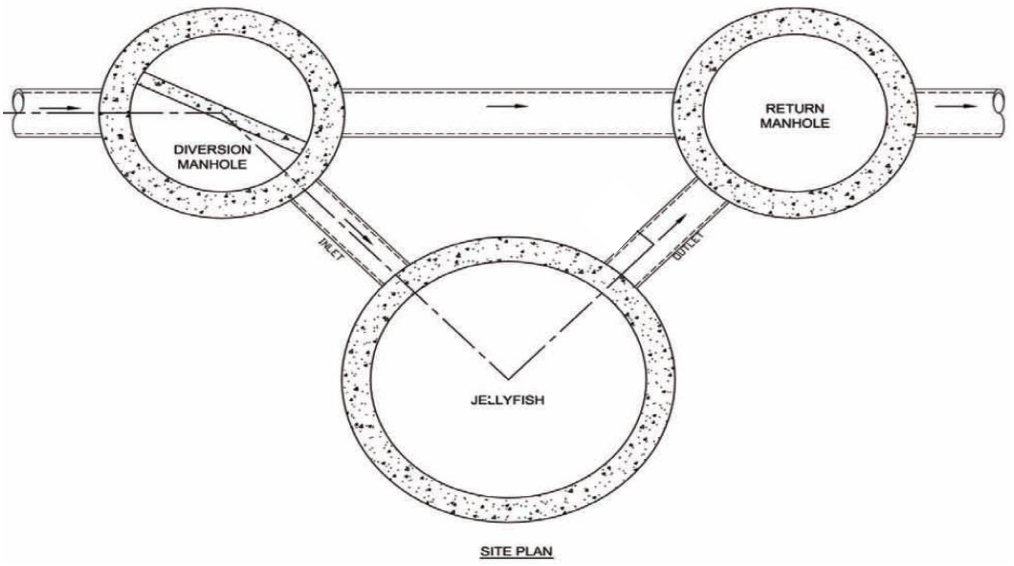
Recommendation

The Jellyfish Filter model JF4-1-1 is recommended to meet the water quality objective by treating a flow of 7.6 L/s, which meets or exceeds 90% of the average annual rainfall runoff volume based on 18 years of TORONTO CENTRAL rainfall data for this site. This model has a sediment capacity of 85 kg, which meets or exceeds the estimated average annual sediment load.

Jellyfish Model	Number of High-Flo Cartridges	Number of Draindown Cartridges	Manhole Diameter (m)	Wet Vol Below Deck (L)	Sump Storage (m³)	Oil Capacity (L)	Treatment Flow Rate (L/s)	Sediment Capacity (kg)
JF4-1-1	**1**	**1**	**1.2**	**2313**	**0.34**	**379**	**7.6**	**85**
JF4-2-1	2	1	1.2	2313	0.34	379	12.6	142
JF6-3-1	3	1	1.8	5205	0.79	848	17.7	199
JF6-4-1	4	1	1.8	5205	0.79	848	22.7	256
JF6-5-1	5	1	1.8	5205	0.79	848	27.8	313
JF6-6-1	6	1	1.8	5205	0.79	848	28.6	370
JF8-6-2	6	2	2.4	9252	1.42	1469	35.3	398
JF8-7-2	7	2	2.4	9252	1.42	1469	40.4	455
JF8-8-2	8	2	2.4	9252	1.42	1469	45.4	512
JF8-9-2	9	2	2.4	9252	1.42	1469	50.5	569
JF8-10-2	10	2	2.4	9252	1.42	1469	50.5	626
JF10-11-3	11	3	3.0	14456	2.21	2302	63.1	711
JF10-12-3	12	3	3.0	14456	2.21	2302	68.2	768
JF10-12-4	12	4	3.0	14456	2.21	2302	70.7	796
JF10-13-4	13	4	3.0	14456	2.21	2302	75.7	853
JF10-14-4	14	4	3.0	14456	2.21	2302	78.9	910
JF10-15-4	15	4	3.0	14456	2.21	2302	78.9	967
JF10-16-4	16	4	3.0	14456	2.21	2302	78.9	1024
JF10-17-4	17	4	3.0	14456	2.21	2302	78.9	1081
JF10-18-4	18	4	3.0	14456	2.21	2302	78.9	1138
JF10-19-4	19	4	3.0	14456	2.21	2302	78.9	1195
JF12-20-5	20	5	3.6	20820	3.2	2771	113.6	1280
JF12-21-5	21	5	3.6	20820	3.2	2771	113.7	1337
JF12-22-5	22	5	3.6	20820	3.2	2771	113.7	1394
JF12-23-5	23	5	3.6	20820	3.2	2771	113.7	1451
JF12-24-5	24	5	3.6	20820	3.2	2771	113.7	1508
JF12-25-5	25	5	3.6	20820	3.2	2771	113.7	1565
JF12-26-5	26	5	3.6	20820	3.2	2771	113.7	1622
JF12-27-5	27	5	3.6	20820	3.2	2771	113.7	1679

Jellyfish Filter Design Notes

- Typically the Jellyfish Filter is designed in an offline configuration, as all stormwater filter systems will perform for a longer duration between required maintenance services when designed and applied in off-line configurations. Depending on the design parameters, an optional internal bypass may be incorporated into the Jellyfish Filter, however note the inspection and maintenance frequency should be expected to increase above that of an off-line system. Speak to your local representative for more information.



Jellyfish Filter Typical Layout

- Typically, 18 inches (457 mm) of driving head is designed into the system, calculated as the difference in elevation between the top of the diversion structure weir and the invert of the Jellyfish Filter outlet pipe. Alternative driving head values can be designed as 12 to 24 inches (305 to 610mm) depending on specific site requirements, requiring additional sizing and design assistance.
- Typically, the Jellyfish Filter is designed with the inlet pipe configured 6 inches (150 mm) above the outlet invert elevation. However, depending on site parameters this can vary to an optional configuration of the inlet pipe entering the unit below the outlet invert elevation.
- The Jellyfish Filter can accommodate multiple inlet pipes within certain restrictions.
- While the optional inlet below deck configuration offers 0 to 360 degree flexibility between the inlet and outlet pipe, typical systems conform to the following:

Model Diameter (m)	Minimum Angle Inlet / Outlet Pipes	Minimum Inlet Pipe Diameter (mm)	Minimum Outlet Pipe Diameter (mm)
1.2	**62º**	**150**	**200**
1.8	59º	200	250
2.4	52º	250	300
3.0	48º	300	450
3.6	40º	300	450

- The Jellyfish Filter can be built at all depths of cover generally associated with conventional stormwater conveyance systems. For sites that require minimal depth of cover for the stormwater infrastructure, the Jellyfish Filter can be applied in a shallow application using a hatch cover. The general minimum depth of cover is 36 inches (915 mm) from top of the underslab to outlet invert.
- If driving head caclulations account for water elevation during submerged conditions the Jellyfish Filter will function effectively under submerged condtions.
- Jellyfish Filter systems may incorporate grated inlets depending on system configuration.
- For sites with water quality treatment flow rates or mass loadings that exceed the design flow rate of the largest standard Jellyfish Filter manhole models, systems can be designed that hydraulically connect multiple Jellyfish Filters in series or alternatively Jellyfish Vault units can be designed.

STANDARD SPECIFICATION
STORMWATER QUALITY – MEMBRANE FILTRATION TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

Specifies requirements for construction and performance of an underground stormwater quality membrane filtration treatment device that removes pollutants from stormwater runoff through the unit operations of sedimentation, floatation, and membrane filtration.

1.2 REFERENCE STANDARDS

ASTM C 891: Specification for Installation of Underground Precast Concrete Utility Structures
ASTM C 478: Specification for Precast Reinforced Concrete Manhole Sections
ASTM C 443: Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM D 4101: Specification for Copolymer steps construction

CAN/CSA-A257.4-M92
Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets

CAN/CSA-A257.4-M92
Precast Reinforced Circular Concrete Manhole Sections, Catch Basins and Fittings

Canadian Highway Bridge Design Code

1.3 SHOP DRAWINGS

Shop drawings for the structure and performance are to be submitted with each order to the contractor. Contractor shall forward shop drawing submittal to the consulting engineer for approval. Shop drawings are to detail the structure's precast concrete and call out or note the fiberglass (FRP) internals/components.

1.4 PRODUCT SUBSTITUTIONS

No product substitutions shall be accepted unless submitted 10 days prior to project bid date, or as directed by the engineer of record. Submissions for substitutions require review and approval by the Engineer of Record, for hydraulic performance, impact to project designs, equivalent treatment performance, and any required project plan and report (hydrology/hydraulic, water quality, stormwater pollution) modifications that would be required by the approving jurisdictions/agencies. Contractor to coordinate with the Engineer of Record any applicable modifications to the project estimates of cost, bonding amount determinations, plan check fees for changes to approved documents, and/or any other regulatory requirements resulting from the product substitution.

1.5 HANDLING AND STORAGE

Prevent damage to materials during storage and handling.

PART 2 – PRODUCTS

2.1 GENERAL

2.1.1 The device shall be a cylindrical or rectangular, all concrete structure (including risers), constructed from precast concrete riser and slab components or monolithic precast structure(s), installed to conform to ASTM C 891 and to any required state highway, municipal or local specifications; whichever is more stringent. The device shall be watertight.

2.1.2 Cartridge Deck The cylindrical concrete device shall include a fiberglass deck. The rectangular concrete device shall include a coated aluminum deck. In either instance, the insert shall be bolted and sealed watertight inside the precast concrete chamber. The deck shall serve as: (a) a horizontal divider between the lower treatment zone and the upper treated effluent zone; (b) a deck for attachment of filter cartridges such that the membrane filter elements of each cartridge extend into the lower treatment zone; (c) a platform for maintenance workers to service the filter cartridges (maximum manned weight = 450 pounds (204 kg)); (d) a conduit for conveyance of treated water to the effluent pipe.

2.1.3 Membrane Filter Cartridges Filter cartridges shall be comprised of reusable cylindrical membrane filter elements connected to a perforated head plate. The number of membrane filter elements per cartridge shall be a minimum of eleven 2.75-inch (70-mm) diameter elements. The length of each filter element shall be a minimum 15 inches (381 mm). Each cartridge shall be fitted into the cartridge deck by insertion into a cartridge receptacle that is permanently mounted into the cartridge deck. Each cartridge shall be secured by a cartridge lid that is threaded onto the receptacle, or similar mechanism to secure the cartridge into the deck. The maximum treatment flow rate of a filter cartridge shall be controlled by an orifice in the cartridge lid, or on the individual cartridge itself, and based on a design flux rate (surface loading rate) determined by the maximum treatment flow rate per unit of filtration membrane surface area. The maximum design flux rate shall be 0.21 gpm/ft² (0.142 lps/m²).

Each membrane filter cartridge shall allow for manual installation and removal. Each filter cartridge shall have filtration membrane surface area and dry installation weight as follows (if length of filter cartridge is between those listed below, the surface area and weight shall be proportionate to the next length shorter and next length longer as shown below):

Filter Cartridge Length (in / mm)	Minimum Filtration Membrane Surface Area (ft2 / m2)	Maximum Filter Cartridge Dry Weight (lbs / kg)
15	106 / 9.8	10.5 / 4.8
27	190 / 17.7	15.0 / 6.8
40	282 / 26.2	20.5 / 9.3
54	381 / 35.4	25.5 / 11.6

2.1.4 Backwashing Cartridges The filter device shall have a weir extending above the cartridge deck, or other mechanism, that encloses the high flow rate filter cartridges when placed in their respective cartridge receptacles within the cartridge deck. The weir, or other mechanism, shall collect a pool of filtered water during inflow events that backwashes the high flow rate cartridges when the inflow

event subsides. All filter cartridges and membranes shall be reusable and allow for the use of filtration membrane rinsing procedures to restore flow capacity and sediment capacity; extending cartridge service life.

2.1.5 Maintenance Access to Captured Pollutants The filter device shall contain an opening(s) that provides maintenance access for removal of accumulated floatable pollutants and sediment, removal of and replacement of filter cartridges, cleaning of the sump, and rinsing of the deck. Access shall have a minimum clear vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

2.1.6 Bend Structure The device shall be able to be used as a bend structure with minimum angles between inlet and outlet pipes of 90-degrees or less in the stormwater conveyance system.

2.1.7 Double-Wall Containment of Hydrocarbons The cylindrical precast concrete device shall provide double-wall containment for hydrocarbon spill capture by a combined means of an inner wall of fiberglass, to a minimum depth of 12 inches (305 mm) below the cartridge deck, and the precast vessel wall.

2.1.8 Baffle The filter device shall provide a baffle that extends from the underside of the cartridge deck to a minimum length equal to the length of the membrane filter elements. The baffle shall serve to protect the membrane filter elements from contamination by floatables and coarse sediment. The baffle shall be flexible and continuous in cylindrical configurations, and shall be a straight concrete or aluminum wall in rectangular configurations.

2.1.9 Sump The device shall include a minimum 24 inches (610 mm) of sump below the bottom of the cartridges for sediment accumulation, unless otherwise specified by the design engineer. Depths less than 24 inches may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

2.2 PRECAST CONCRETE SECTIONS

All precast concrete components shall be manufactured to a minimum live load of HS-20 truck loading or greater based on local regulatory specifications, unless otherwise modified or specified by the design engineer, and shall be watertight.

2.3 JOINTS All precast concrete manhole configuration joints shall use nitrile rubber gaskets and shall meet the requirements of ASTM C443, Specification C1619, Class D or engineer approved equal to ensure oil resistance. Mastic sealants or butyl tape are not an acceptable alternative.

2.4 GASKETS Only profile neoprene or nitrile rubber gaskets in accordance to CSA A257.3-M92 will be accepted. Mastic sealants, butyl tape or Conseal CS-101 are not acceptable gasket materials.

2.5 FRAME AND COVER Frame and covers must be manufactured from cast-iron or other composite material tested to withstand H-20 or greater design loads, and as approved by the

local regulatory body. Frames and covers must be embossed with the name of the device manufacturer or the device brand name.

2.6 DOORS AND HATCHES If provided shall meet designated loading requirements or at a minimum for incidental vehicular traffic.

2.7 CONCRETE All concrete components shall be manufactured according to local specifications and shall meet the requirements of ASTM C 478.

2.8 FIBERGLASS The fiberglass portion of the filter device shall be constructed in accordance with the following standard: ASTM D-4097: Contact Molded Glass Fiber Reinforced Chemical Resistant Tanks.

2.9 STEPS Steps shall be constructed according to ASTM D4101 of copolymer polypropylene, and be driven into preformed or pre-drilled holes after the concrete has cured, installed to conform to applicable sections of state, provincial and municipal building codes, highway, municipal or local specifications for the construction of such devices.

2.10 INSPECTION All precast concrete sections shall be inspected to ensure that dimensions, appearance and quality of the product meet local municipal specifications and ASTM C 478.

PART 3 – PERFORMANCE

3.1 GENERAL

3.1.1 Verification – The stormwater quality filter must be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV).

3.1.2 Function - The stormwater quality filter treatment device shall function to remove pollutants by the following unit treatment processes; sedimentation, floatation, and membrane filtration.

3.1.3 Pollutants - The stormwater quality filter treatment device shall remove oil, debris, trash, coarse and fine particulates, particulate-bound pollutants, metals and nutrients from stormwater during runoff events.

3.1.4 Bypass - The stormwater quality filter treatment device shall typically utilize an external bypass to divert excessive flows. Internal bypass systems shall be equipped with a floatables baffle, and must avoid passage through the sump and/or cartridge filtration zone.

3.1.5 Treatment Flux Rate (Surface Loading Rate) – The stormwater quality filter treatment device shall treat 100% of the required water quality treatment flow based on a maximum design treatment flux rate (surface loading rate) across the membrane filter cartridges of 0.21 gpm/ft² (0.142 lps/m²).

3.2 FIELD TEST PERFORMANCE

At a minimum, the stormwater quality filter device shall have been field tested and verified with a minimum 25 TARP qualifying storm events and field monitoring shall have been conducted according to the TARP 2009 NJDEP TARP field test protocol, and have received NJCAT verification.

3.2.1 Suspended Solids Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median TSS removal efficiency of 85% and a minimum median SSC removal efficiency of 95%.

3.2.2 Runoff Volume – The stormwater quality filter treatment device shall be engineered, designed, and sized to treat a minimum of 90 percent of the annual runoff volume determined from use of a minimum 15-year rainfall data set.

3.2.3 Fine Particle Removal - The stormwater quality filter treatment device shall have demonstrated the ability to capture fine particles as indicated by a minimum median removal efficiency of 75% for the particle fraction less than 25 microns, an effluent d_{50} of 15 microns or lower for all monitored storm events.

3.2.4 Turbidity Reduction - The stormwater quality filter treatment device shall have demonstrated the ability to reduce the turbidity from influent from a range of 5 to 171 NTU to an effluent turbidity of 15 NTU or lower.

3.2.5 Nutrient (Total Phosphorus & Total Nitrogen) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Phosphorus removal of 55%, and a minimum median Total Nitrogen removal of 50%.

3.2.6 Metals (Total Zinc & Total Copper) Removal - The stormwater quality filter treatment device shall have demonstrated a minimum median Total Zinc removal of 55%, and a minimum median Total Copper removal of 85%.

3.3 INSPECTION and MAINTENANCE

The stormwater quality filter device shall have the following features:

3.3.1 Durability of membranes are subject to good handling practices during inspection and maintenance (removal, rinsing, and reinsertion) events, and site specific conditions that may have heavier or lighter loading onto the cartridges, and pollutant variability that may impact the membrane structural integrity. Membrane maintenance and replacement shall be in accordance with manufacturer's recommendations.

3.3.2 Inspection which includes trash and floatables collection, sediment depth determination, and visible determination of backwash pool depth shall be easily conducted from grade (outside the structure).

3.3.3 Manual rinsing of the reusable filter cartridges shall promote restoration of the flow capacity and sediment capacity of the filter cartridges, extending cartridge service life.

3.3.4 The filter device shall have a minimum 12 inches (305 mm) of sediment storage depth, and a minimum of 12 inches between the top of the sediment storage and bottom of the filter cartridge tentacles, unless otherwise specified by the design engineer. Variances may have an impact on the total performance and/or longevity between cartridge maintenance/replacement of the device.

3.3.5 Sediment removal from the filter treatment device shall be able to be conducted using a standard maintenance truck and vacuum apparatus, and a minimum one point of entry to the sump that is unobstructed by filter cartridges.

3.3.6 Maintenance access shall have a minimum clear height that provides suitable vertical clear space over all of the filter cartridges. Filter cartridges shall be able to be lifted straight vertically out of the receptacles and deck for the entire length of the cartridge.

3.3.7 Filter cartridges shall be able to be maintained without the requirement of additional lifting equipment.

PART 4 – EXECUTION

4.1 INSTALLATION

4.1.1 PRECAST DEVICE CONSTRUCTION SEQUENCE

The installation of a watertight precast concrete device should conform to ASTM C 891 and to any state highway, municipal or local specifications for the construction of manholes, whichever is more stringent. Selected sections of a general specification that are applicable are summarized below.

4.1.1.1 The watertight precast concrete device is installed in sections in the following sequence:

- aggregate base
- base slab
- treatment chamber and cartridge deck riser section(s)
- bypass section
- connect inlet and outlet pipes
- concrete riser section(s) and/or transition slab (if required)
- maintenance riser section(s) (if required)
- frame and access cover

4.1.2 The precast base should be placed level at the specified grade. The entire base should be in contact with the underlying compacted granular material. Subsequent sections, complete with joint seals, should be installed in accordance with the precast concrete manufacturer's recommendations.

4.1.3 Adjustment of the stormwater quality treatment device can be performed by lifting the upper sections free of the excavated area, re-leveling the base, and re-installing the sections. Damaged sections and gaskets should be repaired or replaced as necessary to restore original condition and watertight seals. Once the stormwater quality treatment device has been constructed, any/all lift holes must be plugged watertight with mortar or non-shrink grout.

4.1.4 Inlet and Outlet Pipes Inlet and outlet pipes should be securely set into the device using approved pipe seals (flexible boot connections, where applicable) so that the structure is watertight, and such that any pipe intrusion into the device does not impact the device functionality.

4.1.5 Frame and Cover Installation Adjustment units (e.g. grade rings) should be installed to set the frame and cover at the required elevation. The adjustment units should be laid in a full bed of mortar with successive units being joined using sealant recommended by the manufacturer. Frames for the cover should be set in a full bed of mortar at the elevation specified.

4.2 MAINTENANCE ACCESS WALL
In some instances the Maintenance Access Wall, if provided, shall require an extension attachment and sealing to the precast wall and cartridge deck at the job site, rather than at the precast facility. In this instance, installation of these components shall be performed according to instructions provided by the manufacturer.

4.3 FILTER CARTRIDGE INSTALLATION Filter cartridges shall be installed in the cartridge deck only after the construction site is fully stabilized and in accordance with the manufacturer's guidelines and recommendations. Contractor to contact the manufacturer to schedule cartridge delivery and review procedures/requirements to be completed to the device prior to installation of the cartridges and activation of the system.

PART 5 – QUALITY ASSURANCE

5.1 FILTER CARTRIDGE INSTALLATION Manufacturer shall coordinate delivery of filter cartridges and other internal components with contractor. Filter cartridges shall be delivered and installed complete after site is stabilized and unit is ready to accept cartridges. Unit is ready to accept cartridges after is has been cleaned out and any standing water, debris, and other materials have been removed. Contractor shall take appropriate action to protect the filter cartridge receptacles and filter cartridges from damage during construction, and in accordance with the manufacturer's recommendations and guidance. For systems with cartridges installed prior to full site stabilization and prior to system activation, the contractor can plug inlet and outlet pipes to prevent stormwater and other influent from entering the device. Plugs must be removed during the activation process.

5.2 INSPECTION AND MAINTENANCE

5.2.1 The manufacturer shall provide an Owner's Manual upon request.

5.2.2 After construction and installation, and during operation, the device shall be inspected and cleaned as necessary based on the manufacturer's recommended inspection and maintenance guidelines and the local regulatory agency/body.

5.3 REPLACEMENT FILTER CARTRIDGES When replacement membrane filter elements and/or other parts are required, only membrane filter elements and parts approved by the manufacturer for use with the stormwater quality filter device shall be installed.

END OF SECTION

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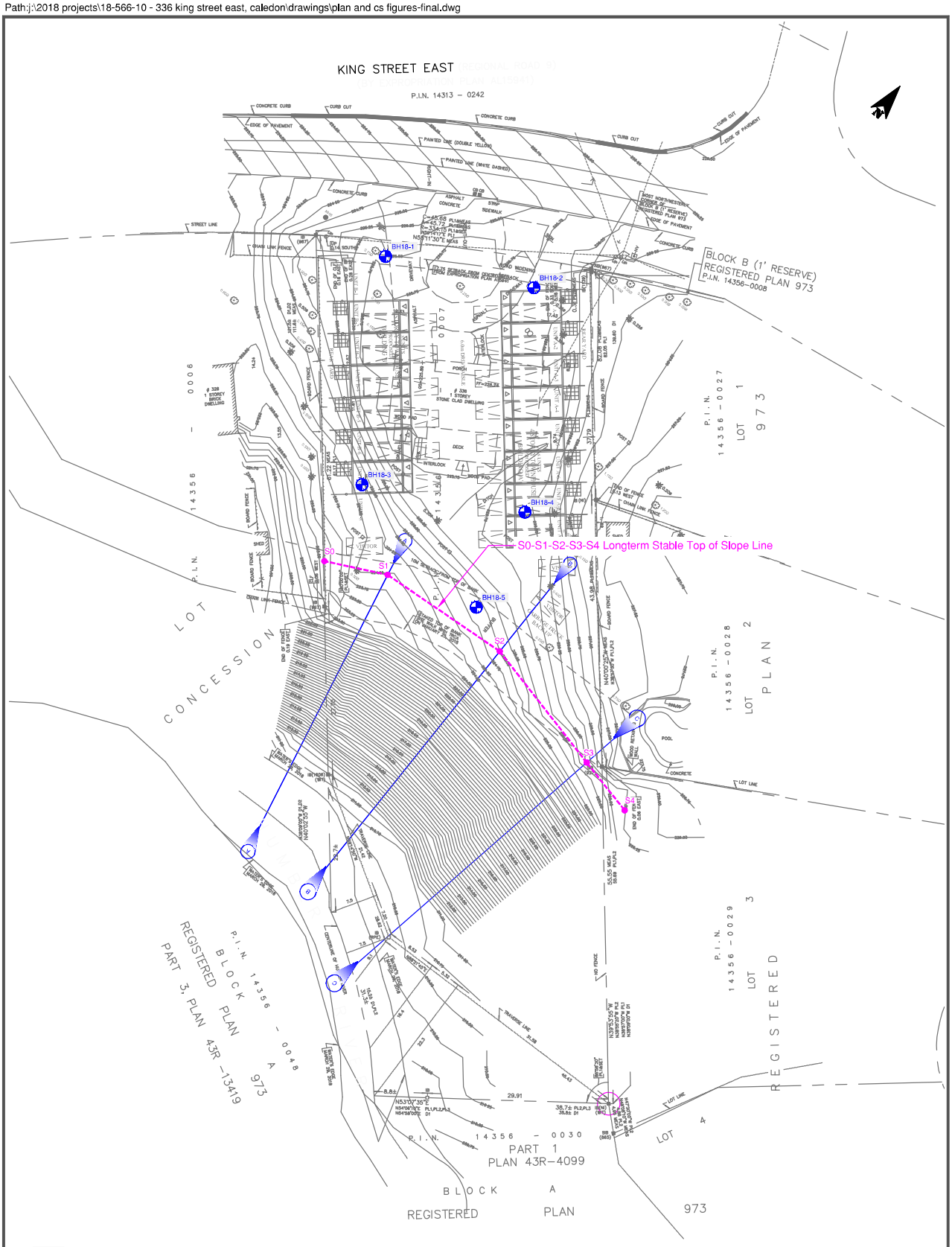


BH18-4 Borehole Location

S1 S4 Long Term Stable Top of Slope Line

0 10 20

DS CONSULTANTS LTD. 6221 Highway 7, UNIT 16 Vaughan, Ontario L4H 0K8 Telephone: (905) 264-9393 www.dsconsultants.ca	Project: 336 KING ST EAST, CALEDON, ON		
	Title: BOREHOLE AND CROSS-SECTION LOCATIONS		
Client: 336 KINGS RIDGE INC	Approved By: A.S	Drawn By: S.Y	Date: August 2018
	Scale: As Shown	Project No: 18-566-10	Drawing No. 1

LOG OF BOREHOLE BH18-1

PROJECT: Geotechnical Investigation - Proposed Townhouses
CLIENT: 336 Kings Ridge Inc.
PROJECT LOCATION: 336 King Street E, Caledon, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May-10-2018

REF. NO.: 18-566-10
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" BLOWS 0.3 m	ELEVATION
225.8					
225.6 0.2	**ASPHALTIC CONCRETE:**50mm				
225.3 0.5	**GRANULAR BASE:**450mm	1	AS		
	SILTY CLAY: trace sand, occasional gravel & sand seams, brown to grey, moist, very stiff to hard	2	SS	8	225
		3	SS	28	224
		4	SS	42	223
		5	SS	36	222
		6	SS	69	221
219.7 6.1	**SILT:** some clay, trace sand, grey, moist, very dense	7	SS	68	219
218.2 7.6	**SILTY SAND:** trace clay, grey, wet, dense	8	SS	40	218
217.8 8.0	**SILT:** some clay, trace sand, grey, moist, dense				
8.2	**END OF BOREHOLE**				

W. L. 220.1 m
May 21, 2018

Notes:
1) Water level at 7 mbgs upon completion.
2) Water Level Readings:

Date	Water Depth (mbgs)
May 21, 2018	5.6

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
3	54	43	

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS CONSULTANTS LTD.

LOG OF BOREHOLE BH18-2

PROJECT: Geotechnical Investigation - Proposed Townhouses
CLIENT: 336 Kings Ridge Inc.
PROJECT LOCATION: 336 King Street E, Caledon, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May-10-2018

REF. NO.: 18-566-10
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
225.9 / 0.0	**ASPHALTIC CONCRETE:**50mm				
225.8 / 0.1		1	AS		
225.4 / 0.5	**GRANULAR BASE:**500mm				
0.6	**SILTY CLAY:** trace sand, occasional gravel & sand seams, brown to grey, moist, very stiff to hard	2	SS	14	225
		3	SS	32	224
		4	SS	45	223
		5	SS	33	222
		6	SS	58	221
219.8 / 6.1	**SILT:** some clay, trace sand, grey, moist, dense	7	SS	48	220
218.3 / 7.6	**SILTY SAND:** trace clay, grey, wet, dense	8	SS	42	219
217.7 / 8.2	**SILT:** some clay, trace sand, grey, moist, dense				218
	END OF BOREHOLE				

Notes:
1) Water level at 7.6m during drilling.

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε_f=3% Strain at Failure

DS SOIL LOG 18-566-10 336 KING STREET E, CALEDON, ON.GPJ DS.GDT 18-8-10

LOG OF BOREHOLE BH18-3

PROJECT: Geotechnical Investigation - Proposed Townhouses
CLIENT: 336 Kings Ridge Inc.
PROJECT LOCATION: 336 King Street E, Caledon, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May-10-2018

REF. NO.: 18-566-10
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
224.1 / 0.0	**TOPSOIL:** 400mm				224
223.7 / 0.4	**SILTY CLAY:** trace sand, brown, moist, stiff to hard	1	SS	6	
		2	SS	11	223
		3	SS	17	
		4	SS	33	222
		5	SS	49	
219.5 / 4.6	**SILT:** some clay, trace sand, grey, wet, very dense	6	SS	54	221
					220
218.0 / 6.3	**SILTY SAND:** trace clay, grey, wet, very dense	7	SS	60	218
	SILT: trace to some clay, trace sand, grey, moist to very moist, very dense				217
215.9 / 8.2	**END OF BOREHOLE**	8	SS	56	216

W. L. 219.5 m
May 28, 2018

Notes:
1) 50mm dia. monitoring well installed in the borehole upon completion.
2) Water Level Readings:

Date	Water Depth (mbgs)
May 28, 2018	4.6

DYNAMIC CONE PENETRATION RESISTANCE PLOT
SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; $\circ^{\varepsilon=3\%}$ Strain at Failure

DS SOIL LOG 18-566-10 336 KING STREET E, CALEDON, ON.GPJ DS.GDT 18-8-10

LOG OF BOREHOLE BH18-4

PROJECT: Geotechnical Investigation - Proposed Townhouses
CLIENT: 336 Kings Ridge Inc.
PROJECT LOCATION: 336 King Street E, Caledon, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150mm
Date: May-10-2018

REF. NO.: 18-566-10
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
225.7					
0.0 / 225.3	**TOPSOIL:**400mm	1	SS	5	
0.4	**SILT:** some clay, trace to some sand, brown to grey, moist, compact to very dense	2	SS	20	225
		3	SS	31	224
	grey, wet below 2.3 m	4	SS	33	223
		5	SS	36	222
	some clay to clayey below 4.6 m	6	SS	38	221
		7	SS	88	220
					219
217.5		8	SS	53	218
8.2	**END OF BOREHOLE**				

Notes:
1) 50mm dia. monitoring well installed in the borehole upon completion.
2) Water Level Readings:

Date	Water Depth (mbgs)
May 28, 2018	1.0

W. L. 224.7 m
May 28, 2018

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

METHANE AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
3	12	73	12

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG 18-566-10 336 KING STREET E, CALEDON, ON.GPJ DS.GDT 18-8-10

LOG OF BOREHOLE BH18-5

PROJECT: Geotechnical Investigation - Proposed Townhouses
CLIENT: 336 Kings Ridge Inc.
PROJECT LOCATION: 336 King Street E, Caledon, ON
DATUM: Geodetic
BOREHOLE LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Auger
Diameter: 150 mm
Date: Aug-03-2018

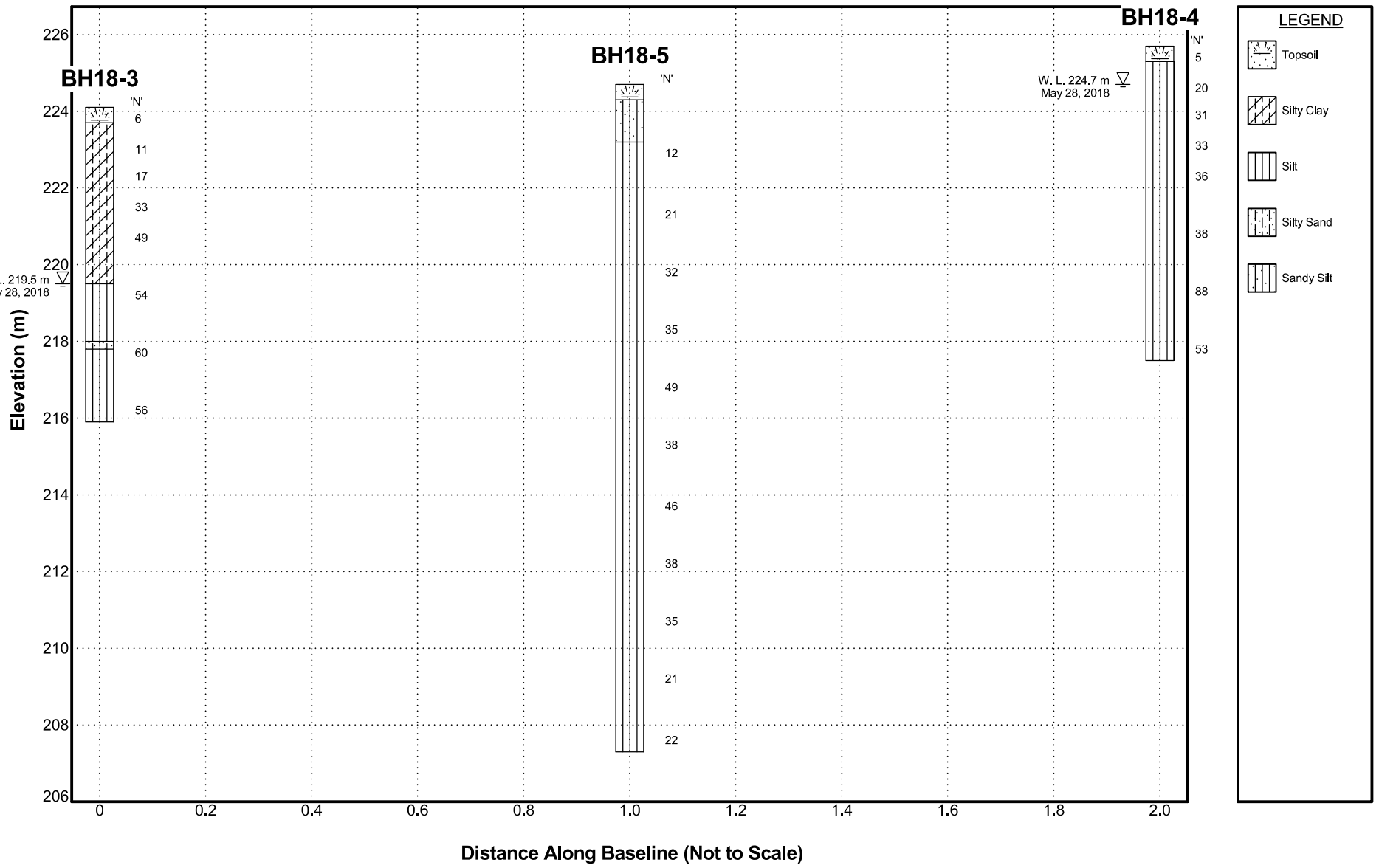
REF. NO.: 18-566-10
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	METHANE AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
224.7												
0.0 / 224.3	**TOPSOIL:** 400 mm			AS								
0.4 / 223.2	**SANDY SILT:** trace clay, trace roots/organics, dark grey to brown, moist, compact (possible fill)											
1.5	**SILT :** trace clay, trace sand, brown to grey, moist to wet, compact to dense		1	SS	12		223		○			
			2	SS	21		222		○			
	grey and dense below 4.6 m		3	SS	32		221		○			
			4	SS	35		220		○			
	wet below 7.6 m		5	SS	49		219		○			
			6	SS	38		218		○			
			7	SS	46		217		○			
			8	SS	38		216		○			
			9	SS	35		215		○			
			10	SS	21		214	wet spoon	○			
			11	SS	22		213	wet spoon	○			
207.3							212					
17.4	**END OF BOREHOLE** Notes: 1) Borehole wet at bottom upon completion.						211					
							210					
							209					
							208					

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε_f=3% Strain at Failure

DS SOIL LOG 18-566-10 336 KING STREET E, CALEDON, ON.GPJ DS.GDT 18-8-10



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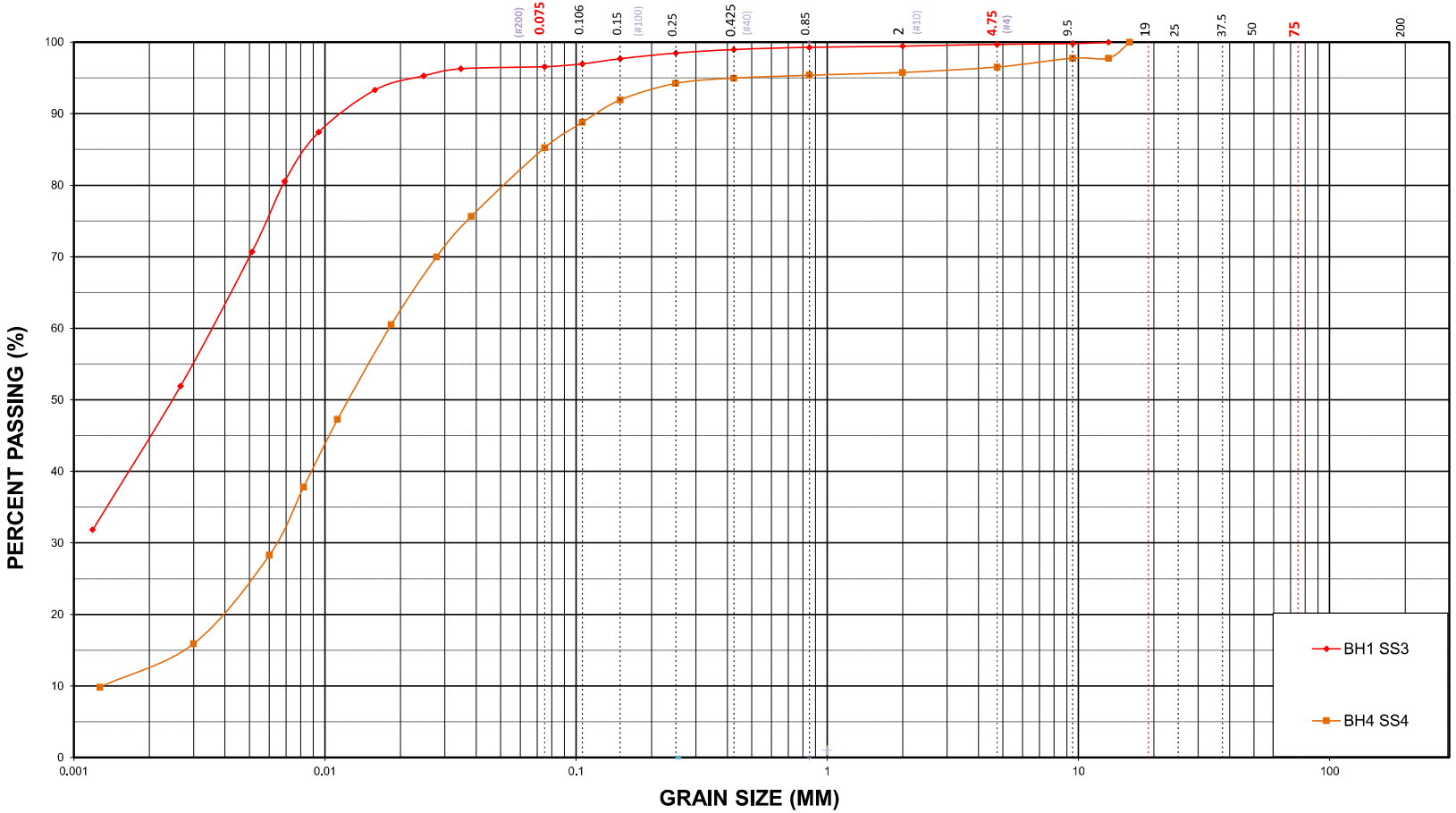
Generalized Sub-surface Profile

DRAWING NO.	7
JOB NO.	18-566-10
DATE	August, 2018

DS FENCE (M) 18-566-10 336 KING STREET E, CALEDON, ON.GPJ DS.GDT 18-8-10

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

Specification and Comments:

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project:	**Proposed Residential Development**	Project No.:	**18-566-10**
Client:	**Georgian Group**	Date:	**May-25-2018**
Location:	**336 King Street E, Caledon,ON.**	Figure No.:	8

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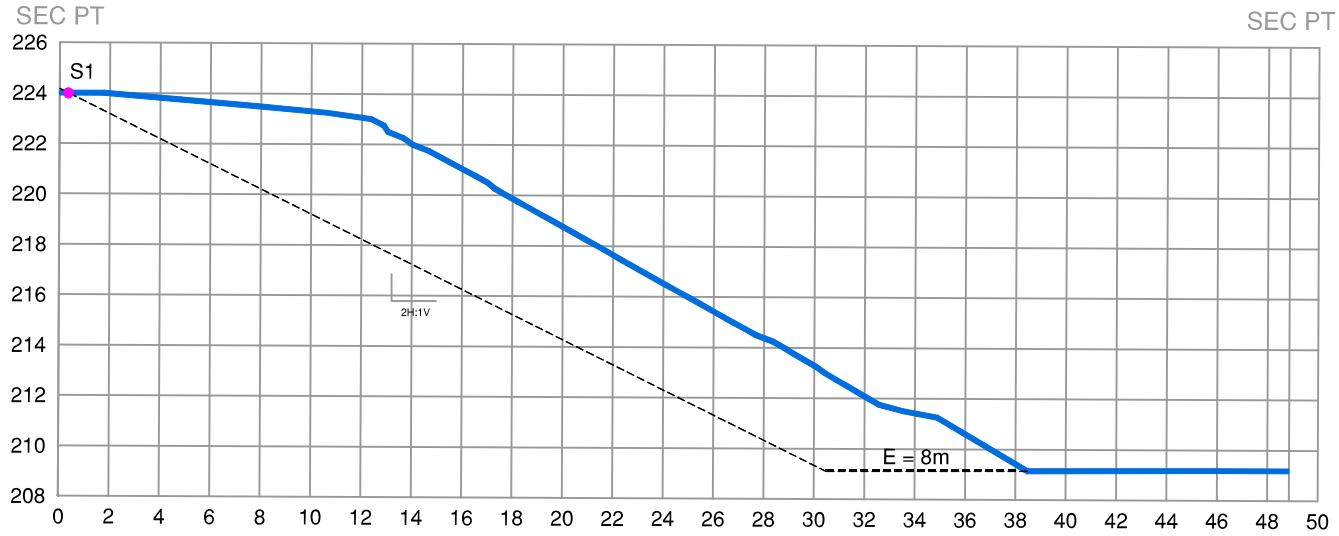

SECTION A-A

S1 ● Long Term Stable Top of Slope

0 5 10

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: 336 KING ST EAST, CALEDON, ON			
Title: EXISTING SLOPE AT CROSS-SECTION A-A			
Client: GEORGIAN GROUP	Approved By: A.S	Drawn By: S.Y	Date: August 2018
	Scale: As Shown	Project No: 18-566-10	Drawing No. 9

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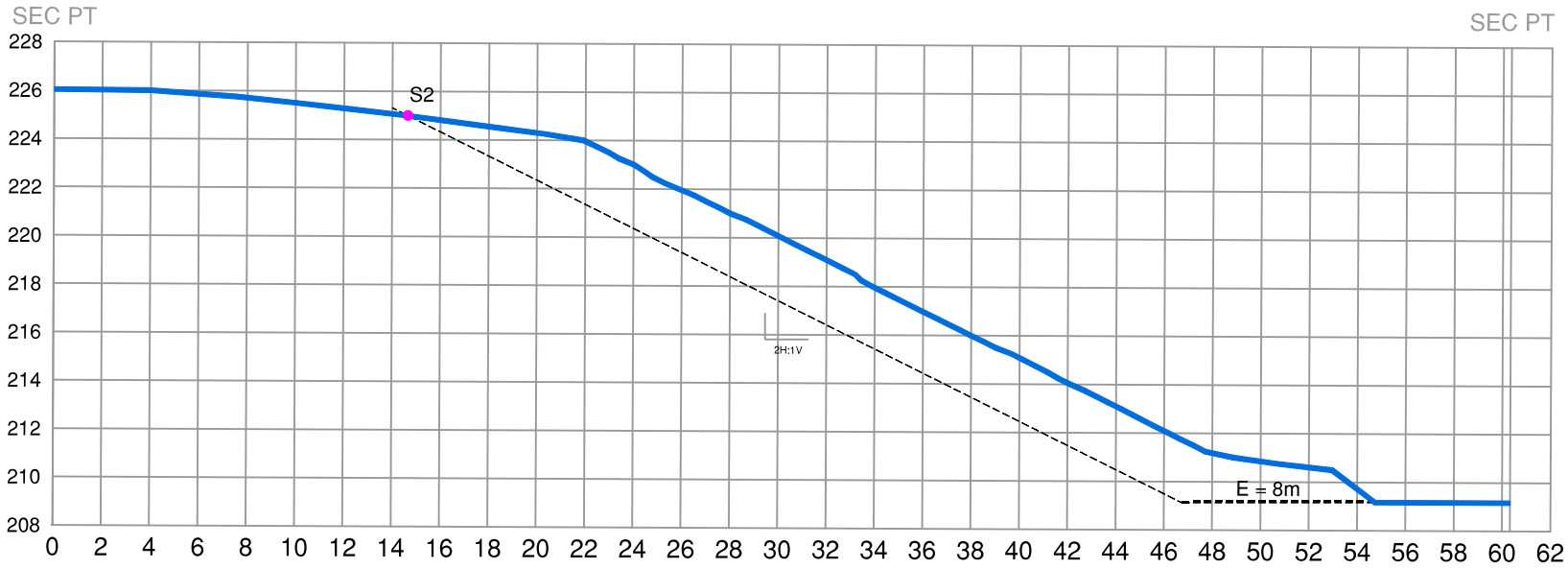

SECTION B-B

S2 ● Long Term Stable Top of Slope

0 5 10

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project: 336 KING ST EAST, CALEDON, ON			
Title: EXISTING SLOPE AT CROSS-SECTION B-B			
Client: GEORGIAN GROUP	Approved By: A.S	Drawn By: S.Y	Date: August 2018
	Scale: As Shown	Project No: 18-566-10	Drawing No. 10

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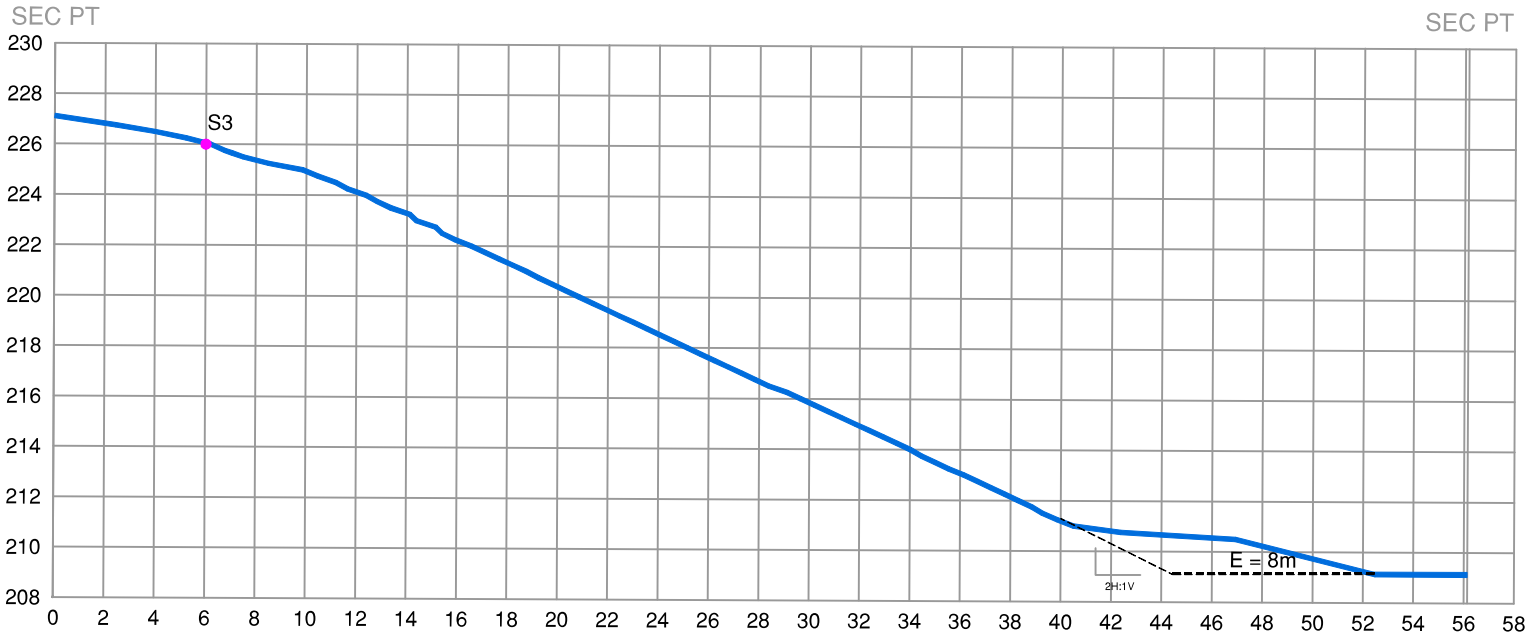


SECTION C-C

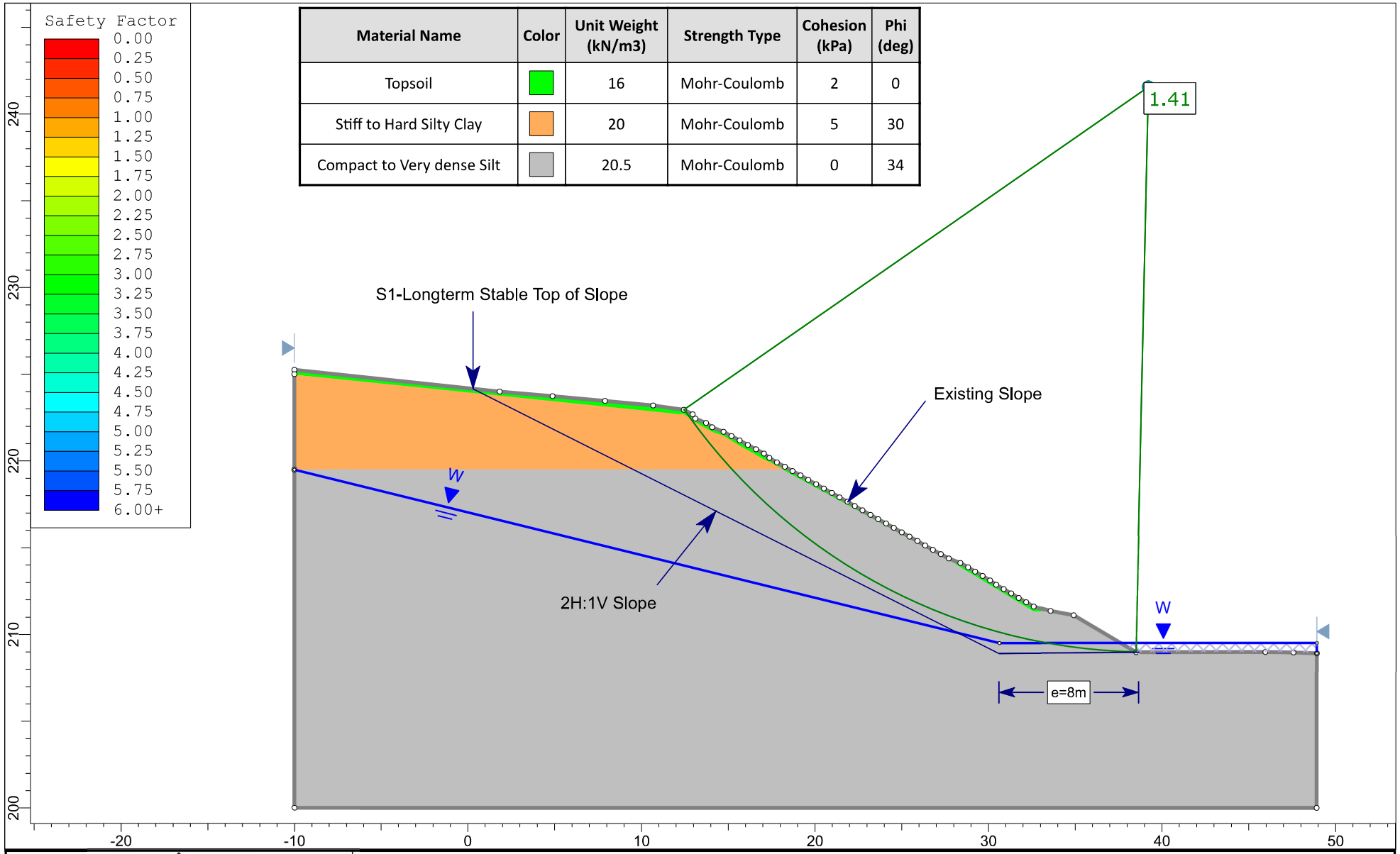
S3 ● Long Term Stable Top of Slope

0 5 10

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
Vaughan, Ontario L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

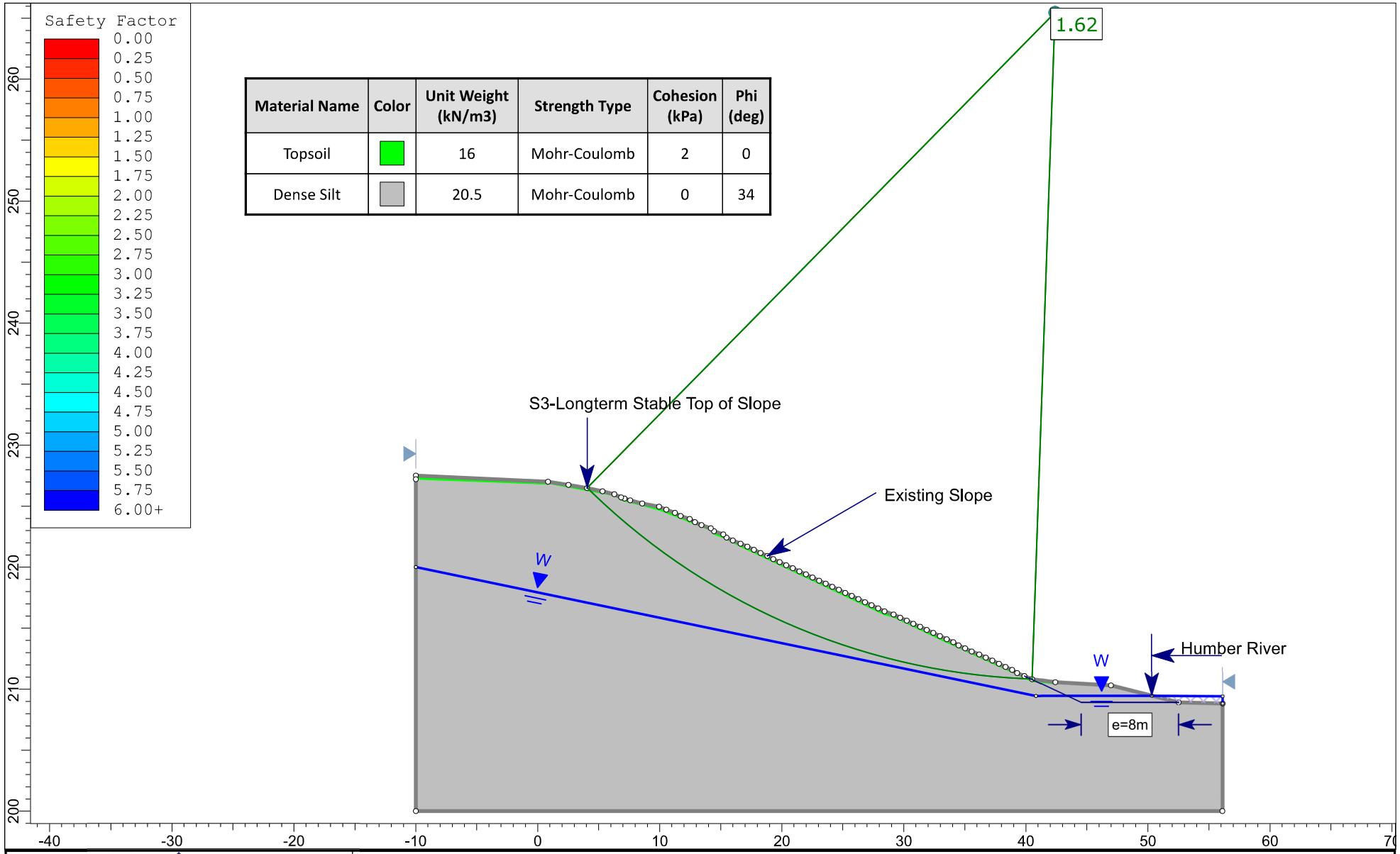
Project: 336 KING ST EAST, CALEDON, ON			
Title: EXISTING SLOPE AT CROSS-SECTION C-C			
Client: GEORGIAN GROUP	Approved By: A.S	Drawn By: S.Y	Date: August 2018
	Scale: As Shown	Project No: 18-566-10	Drawing No. 11

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Topsoil		16	Mohr-Coulomb	2	0
Stiff to Hard Silty Clay		20	Mohr-Coulomb	5	30
Compact to Very dense Silt		20.5	Mohr-Coulomb	0	34



SLIDEINTERPRET 7.029

Project	Project No.-18-566-30-Slope Stability Analyses-336 King Street E., Caledon, ON				
Analysis Description	Existing Slope at Section A-A				
Drawn By	AS	Scale	1:309	Company	DS Consultants Ltd
Date	2018-08-09, 1:38:57 PM			File Name	Drawing 12.slim

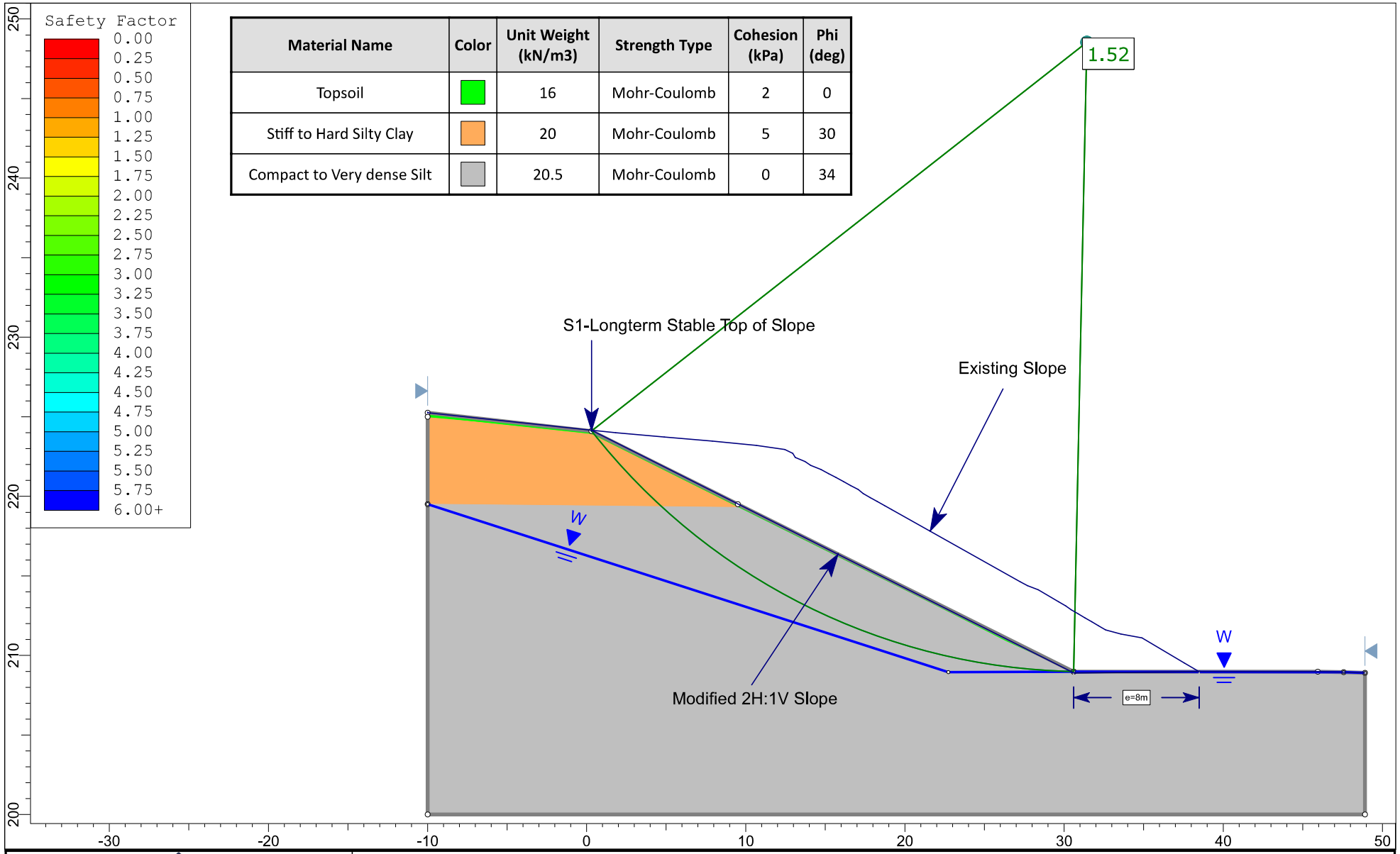


Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Topsoil		16	Mohr-Coulomb	2	0
Dense Silt		20.5	Mohr-Coulomb	0	34

SLIDEINTERPRET 7.029

Project	Project No. 18-566-30 - Slope Stability Assessment-336 King St. E, Caledon, ON			
Analysis Description	Existing Slope at Section C-C			
Drawn By	AS	*Scale*	1:439	*Company* DS Consultants Ltd
Date	2018-08-09, 1:14:40 PM			*File Name* Drawing 13.slim

Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (deg)
Topsoil		16	Mohr-Coulomb	2	0
Stiff to Hard Silty Clay		20	Mohr-Coulomb	5	30
Compact to Very dense Silt		20.5	Mohr-Coulomb	0	34



SLIDEINTERPRET 7.029

Project	Project No. 18-566-30 Slope Stability Assessment- 336 King Street E, Caledon, ON			
Analysis Description	Analyses of modified 2H:1V Slope at Section A-A			
Drawn By	AS	Scale	1:337	Company DS Consultants Ltd.
Date	2018-08-09, 1:38:57 PM			File Name Drawing 14.slim

APPENDIX E

Engineering Plans

KINGS RIDGE

COMMON ELEMENT CONDOMINIUM TOWNHOUSE DEVELOPMENT

336 KING STREET EAST, CALEDON ON

TOWN OF CALEDON PUBLIC WORKS
AND ENGINEERING DEPARTMENT
CRAIG CAMPBELL, C.E.T. DIRECTOR

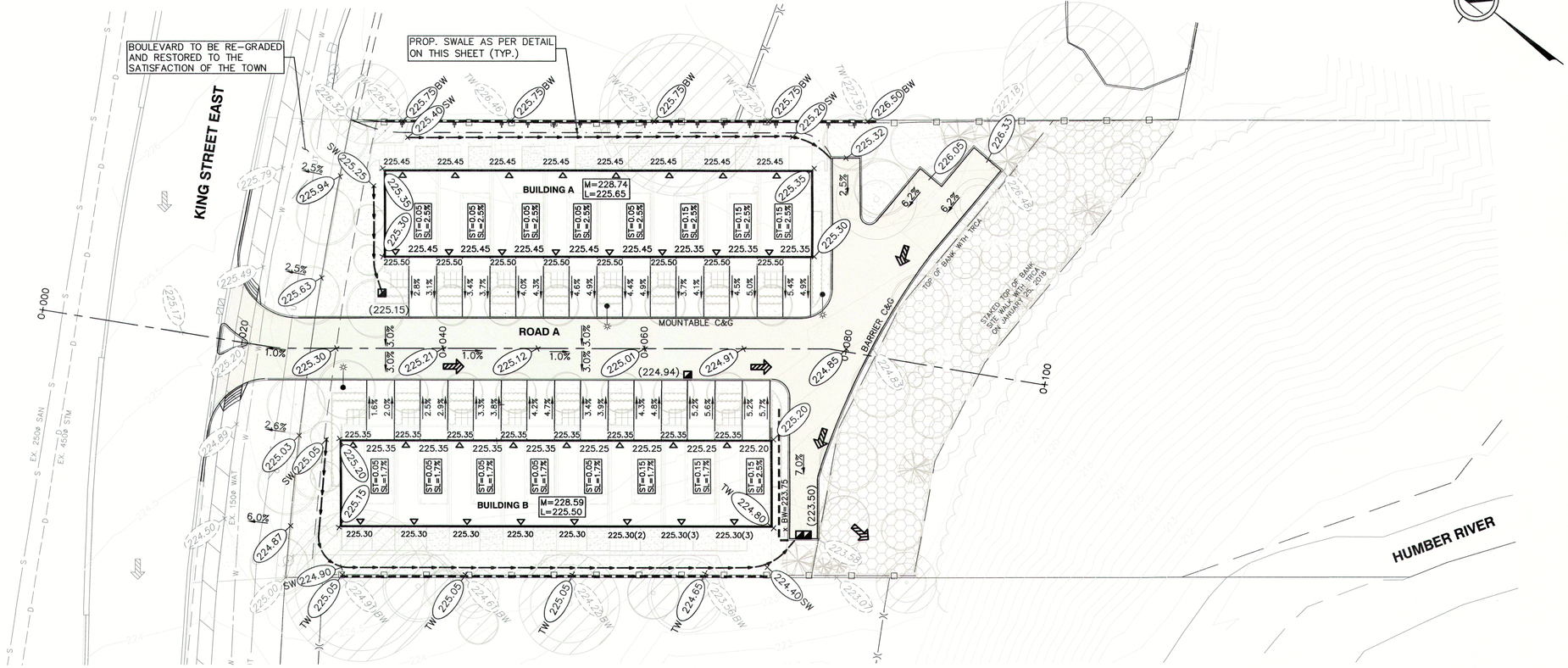
REGIONAL MUNICIPALITY OF PEEL
ENVIRONMENTAL, TRANSPORTATION,
AND PLANNING SERVICES
MITCH ZAMOJE, COMMISSIONER

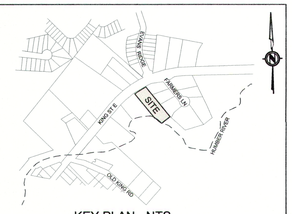
APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

336 KING'S RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

LIST OF DRAWINGS





KEY PLAN - NTS

LEGEND

EXISTING ELEVATION	+46.44
PROPOSED ELEVATION	+47.95
TOP OF WALL ELEVATION	+47.95 TW
BOTTOM OF WALL ELEVATION	+47.95 BW
PROPOSED SWALE ELEVATION	+47.95 SW
EXISTING GROUND CONTOUR	
M – MAIN FLOOR ELEVATION (m) L – LOWER FLOOR ELEVATION (m)	M=228.59 L=225.50
ST – GARAGE STEP SL – GARAGE SLOPE	ST=0.05 SL=1.0%
RETAINING WALL (TO BE DESIGNED BY OTHERS)	
GRADE	2.0%
ASPHALT	
BARRIER CURB AND GUTTER	
MOUNTABLE CURB AND GUTTER	
TOP OF BANK	
BOTTOM OF BANK	
PROPOSED SWALE	
PROPOSED CATCH BASIN	
PROPOSED DOUBLE CATCH BASIN	
PROPOSED OVERLAND FLOW ROUTE	
EXISTING OVERLAND FLOW ROUTE	
BUILDING ENTRANCE	
STREET LIGHT (BY OTHERS)	
EXISTING TREES TO REMAIN	

REV	DATE	DESCRIPTION	BY	APP
1	28/09/2018	ISSUED FOR SITE PLAN APPLICATION	ADF	CAB

LICENSED PROFESSIONAL ENGINEER
C. A BLAHUT
100516699
Sept 28, 2018
PROVINCE OF ONTARIO
ENGINEER STAMP

PLAN OF SURVEY AND PARTIAL TOPOGRAPHY OF PART OF LOT 8 CONCESSION 7 (GEOGRAPHIC TOWNSHIP OF ALBION) TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL
LEGAL DESCRIPTION

SEE BELOW
BENCHMARK

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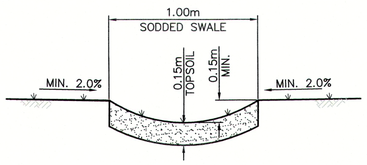
CLIENT
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT
KINGS RIDGE
COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE
SITE GRADING PLAN



TYPICAL SWALE DETAIL
N.T.S.

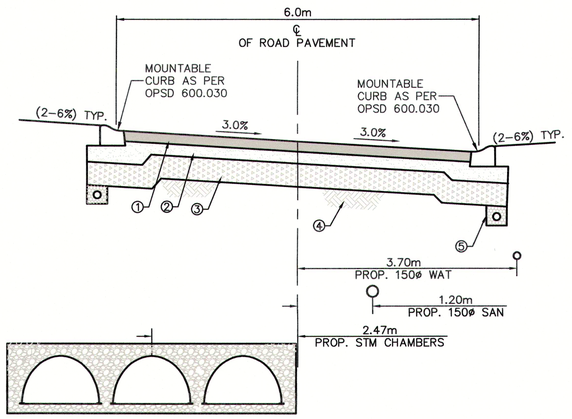
ROAD STRUCTURE: ROAD A

1. MIN. 105mm ASPHALTIC CONCRETE IN TWO LIFTS
   – 40mm OF HL3
   – 65mm OF HL8
2. MIN. 150mm GRANULAR 'A'
3. MIN. 300mm GRANULAR 'B'
4. APPROVED SUBGRADE OR SUBGRADE FILL AS REQUIRED.
5. 100mmø SUB-DRAINS AS PER APPROVED TOWN OF CALEDON STANDARD NO.219.

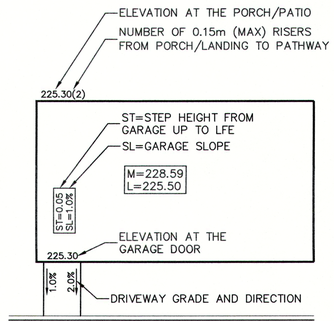
NOTE:

APPROVED SUBGRADE AND ALL BASE MATERIALS TO BE COMPACTED TO 95% MODIFIED PROCTOR DENSITY AT OPTIMUM MOISTURE CONTENT.

ALL ROADWORKS TO BE CONSTRUCTED IN ACCORDANCE WITH GEOTECHNICAL REPORT COMPLETED BY DS CONSULTANTS LTD. DATED MAY 28, 2018.



TYPICAL ONSITE ROAD SECTION
N.T.S.



TYPICAL UNIT DETAIL
N.T.S.

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO FIRST ORDER VERTICAL BENCHMARK NUMBER 00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD-1928:1978).

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NOTICE TO CONTRACTOR
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DESIGN ADF	DATE SEPTEMBER, 2018	SCALE 1:250	
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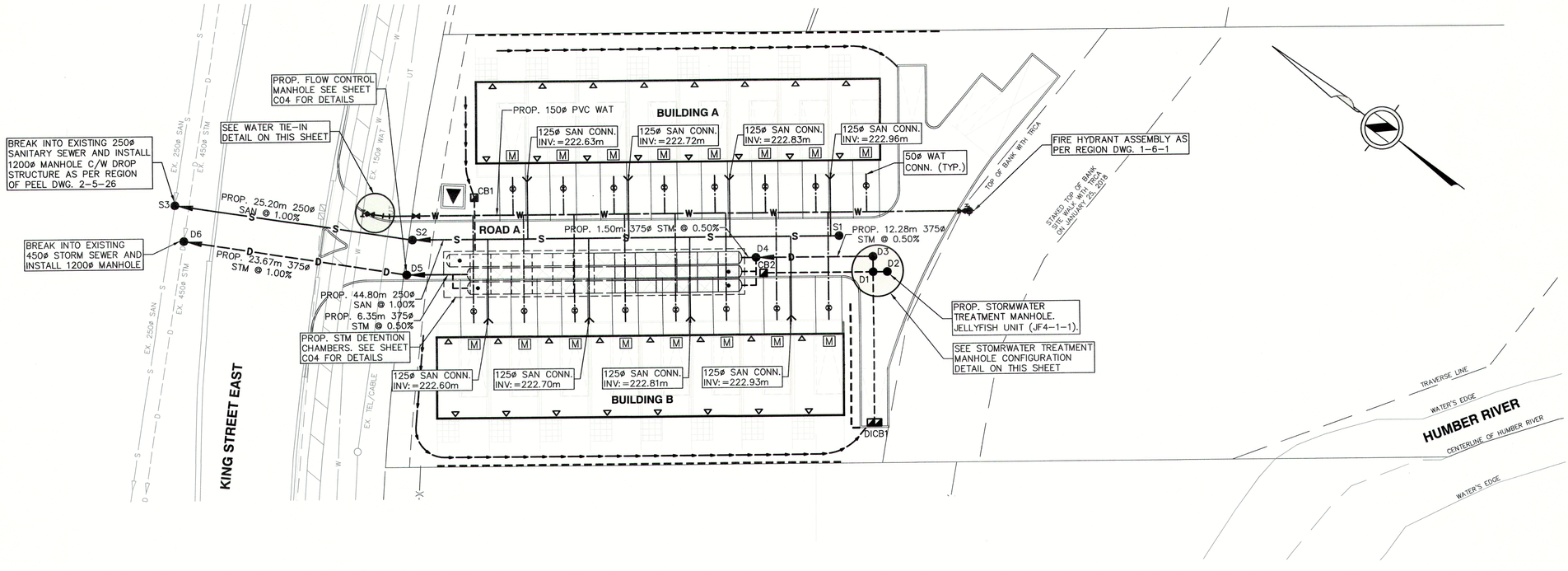
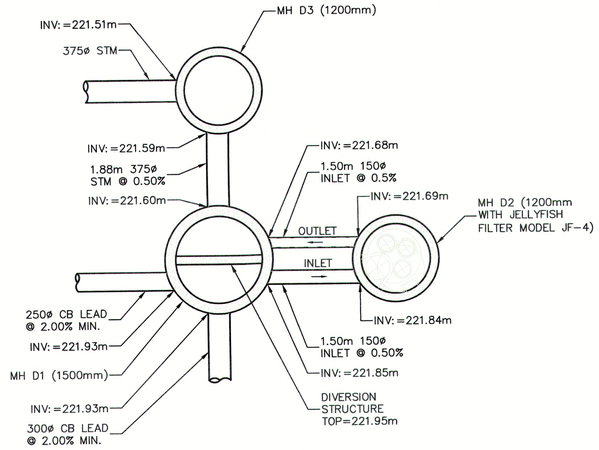
CHECKED CAB	DRAWING NO. C02	REV. 1	
APPROVED CAB			

0 2 1:250 12m

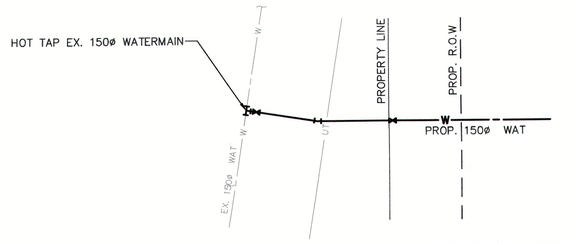




MH D1, D2 & D3 – STM WATER TREATMENT UNIT AND DIVERSION STRUCTURE DETAIL

N.T.S.

NOTE: CONTRACTOR TO PROVIDE SHOP DRAWING OF TREATMENT AND CONTROL MANHOLE TO ENGINEER FOR APPROVAL.



1-150ø TAPPING TEE & VALVE
1-150Hx150H 11.25° BEND C/W JOINT RESTRAINT
1-150HxH GATE VALVE

WATER TIE-IN DETAIL

SCALE = 1:100

STORM MANHOLE TABLE				
MH NAME	RIM ELEV.	INVERTS	SIZE	OPSD
D1	RIM=224.63m	SW INV.=221.93m NW INV.=221.93m NE INV.=221.60m SE INV.=221.68m SE INV.=221.85m	1500mmø	701.011
D2	RIM=224.59m	NW INV.=221.69m NW INV.=221.84m	1200mmø	JF-4
D3	RIM=224.76m	SW INV.=221.59m NW INV.=221.51m	1200mmø	701.010
D4	RIM=224.94m	SE INV.=221.45m NW INV.=221.42m SW INV.=221.80m	1200mmø	701.010
D5	RIM=225.18m	SE INV.=221.32m NW INV.=221.29m	1200mmø	701.010
D6	RIM=225.66m	SE INV.=221.05m SW INV.=220.95m NE INV.=220.95m	1200mmø	701.010

SANITARY MANHOLE TABLE				
MH NAME	RIM ELEV.	INVERTS	SIZE	PEEL REGION
S1	RIM=224.92m	NW INV.=222.63m	1200mmø	2-5-3
S2	RIM=225.30m	SE INV.=222.18m NW INV.=222.13m	1200mmø	2-5-3
S3	RIM=225.66m	SE INV.=221.88m SW INV.=220.85m NE INV.=220.85m	1200mmø	2-5-3

CATCH BASIN TABLE				
CB NAME	RIM ELEV.	INVERTS	SIZE	OPSD
CB1	RIM=225.15m	SW INV.=223.75m	600x600mm	705.010
CB2	RIM=224.94m	SE INV.=222.15m	600x600mm	705.010
DICB1	RIM=223.50m	NE INV.=222.25m	600x600mm	705.020

KEY PLAN - NTS

LEGEND

- PROPERTY LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED STORM SEWER
- PROPOSED CATCH BASIN LEAD
- PROPOSED WATERMAIN
- PROPOSED WATER SERVICE
- PROPOSED SWALE
- PROPOSED RETAINING WALL
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- PROPOSED DOUBLE INLET CATCH BASIN
- PROPOSED MANHOLE
- WATER METER (INSIDE BUILDING)
- PROPOSED CURB STOP
- PROPOSED GATE VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED TRANSFORMER

REV	DATE	DESCRIPTION	BY	APP
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C. A. BLAHUT
100516699
SEPT 28, 2018
PROVINCE OF ONTARIO
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LEGAL DESCRIPTION

SEE BELOW
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CLIENT

336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT

KINGS RIDGE
COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE

SITE SERVICING PLAN

BENCHMARK

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DESIGN ADF	DATE SEPTEMBER, 2018	SCALE 1:250	
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CHECKED CAB	DRAWING NO. C03	REV. 1	
APPROVED CAB			

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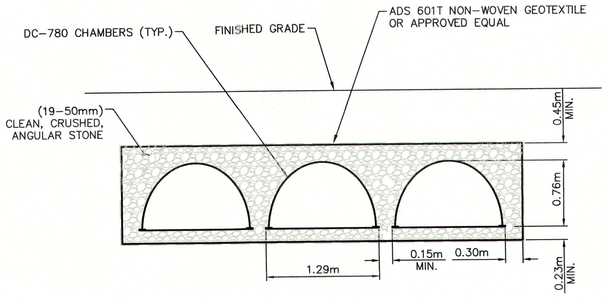
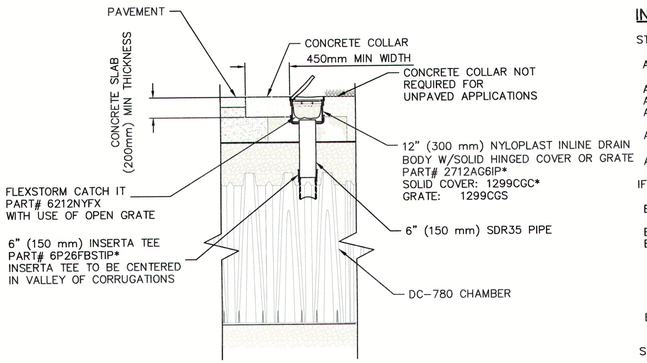
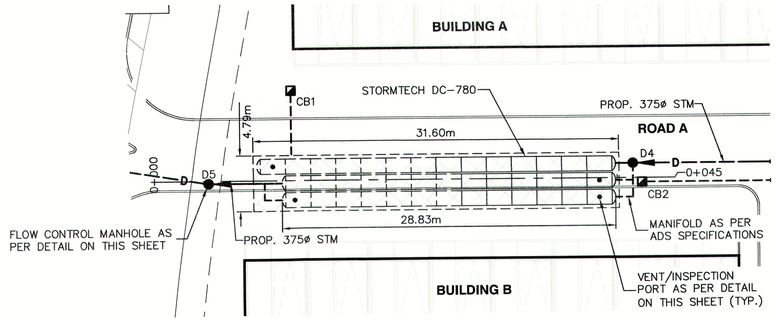


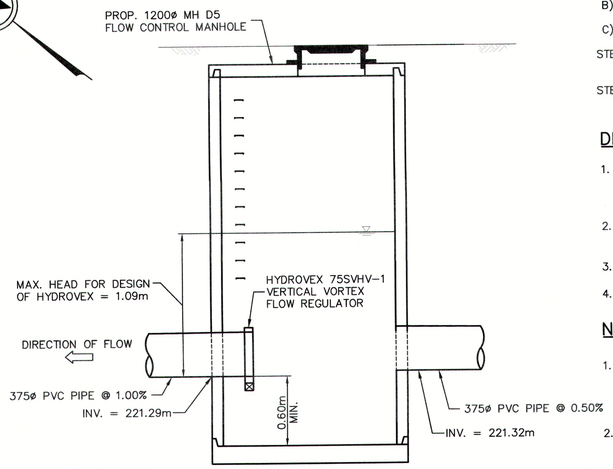
STORMWATER CHAMBER DETAILS
DC-780
N.T.S.



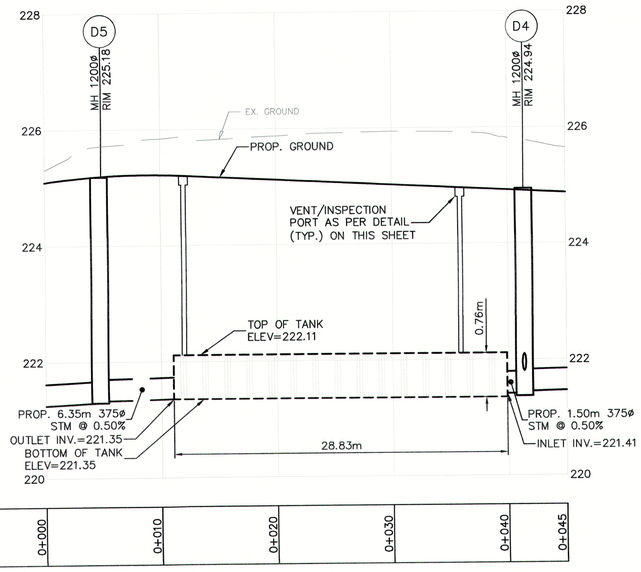
INSPECTION PORT DETAIL
N.T.S.



MODULE LAYOUT PLAN-DETENTION TANK
SCALE: 1:250

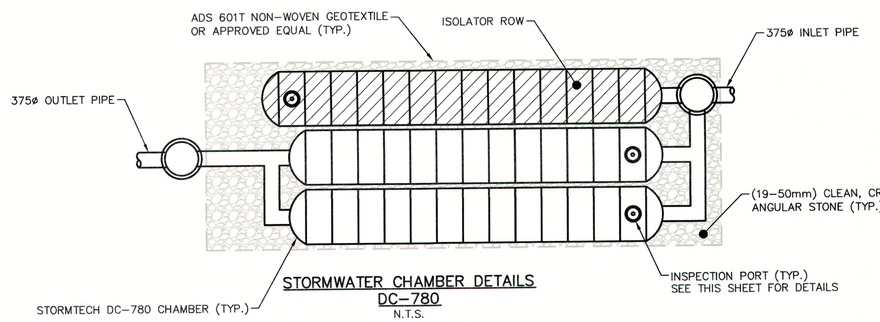


FLOW CONTROL MANHOLE D5 DETAIL
N.T.S.



DETENTION TANK DETAIL
SCALE:
H: 1:250
V: 1:50

CONTRACTOR TO PROVIDE DETAILED SHOP DRAWINGS OF FLOW CONTROL MANHOLE, INTERNAL COMPONENTS AND DETENTION TANK FOR APPROVAL BY THE ENGINEER OF RECORD



STORMWATER CHAMBER DETAILS
DC-780
N.T.S.

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT

A) INSPECTION PORTS (IF PRESENT)

A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2

IF NOT, PROCEED TO STEP 3.

B) ALL ISOLATOR ROWS

B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS

A) FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED

B) APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN

C) VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

DETENTION TANK NOTES:

1. STORMTECH MODULES TO BE SUPPLIED BY:
ADVANCED DRAINAGE SYSTEM (ADS)
VIVEK SHARMA (647-463-9803)
2. CONTRACTOR TO CONTACT SUPPLIER AFTER AWARD TO MAKE ARRANGEMENTS FOR SUPPLY AND DELIVERY OF PRODUCT.
3. MINIMUM COVER OVER DETENTION TANK TO BE 0.45m.
4. ALL ELEVATIONS SHOWN ARE GEODETIC AND IN METERS.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

STORMWATER DETENTION NOTES:

PARAMETERS: BASED ON ONSITE DESIGN REQUIREMENTS:

- MIN. REQUIRED STORAGE VOLUME: 91.73m³

PROVIDED STORAGE:

1. STORMWATER TANK STORAGE VOLUME= 52.05m³
2. STORAGE VOLUME PROVIDED BY GRAVEL SURROUND = 54.27m³ (ASSUMING 0.4 VOID RATIO)
3. TOTAL STORAGE PROVIDED = 106.32m³

KEY PLAN - NTS

LEGEND

EXISTING STORM — D —
PROPOSED STORM SEWER —D— — —
EX. PROPERTY LINE ———
EXISTING STORM MANHOLE ○
PROPOSED STORM MANHOLE ●
EXSTING CATCHBASIN ☒

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PROJECT
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COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE
SITE SERVICING PLAN

DESIGN ADF	DATE SEPTEMBER, 2018	SCALE 1:250	
DRAWN ADF	PROJECT NO. 17-1419		
CHECKED CAB	DRAWING NO. C04	REV. 1	
APPROVED CAB			

0 2 1:250 12m

BENCHMARK

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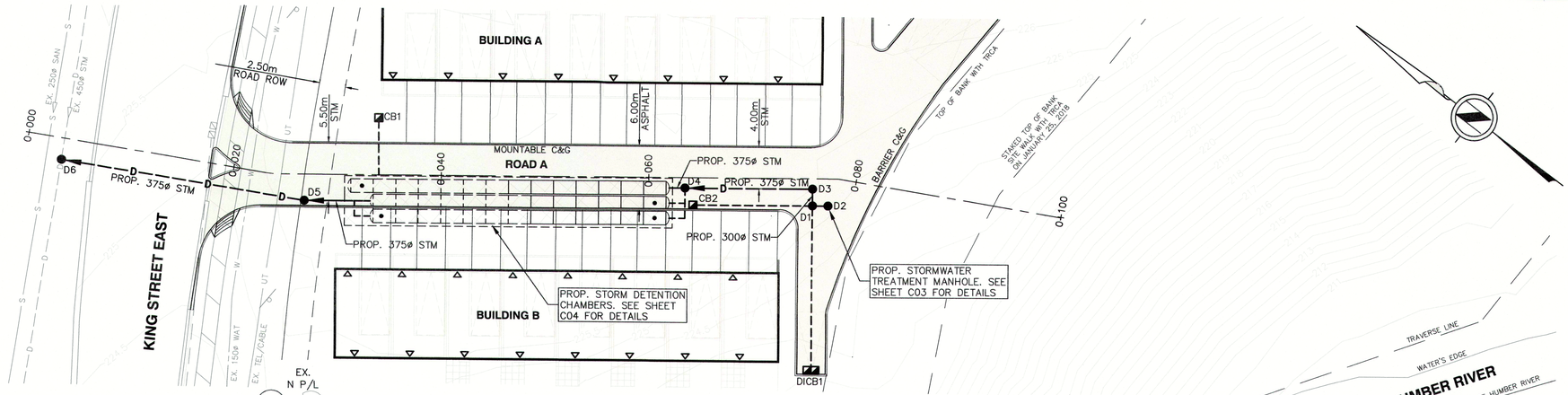

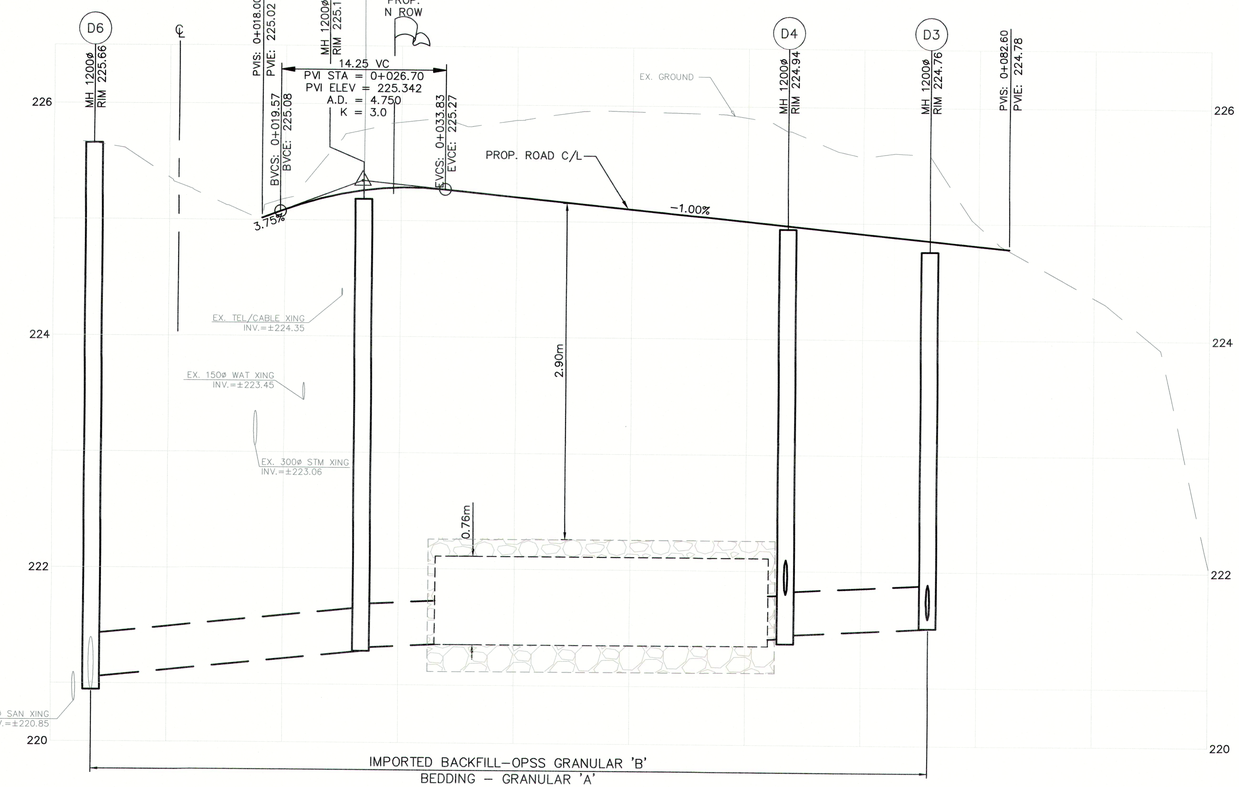

CENTRELINE ROAD ELEVATIONS	EXISTING			225.09			225.21			225.01		224.81	222.04
	PROPOSED												
STORM LENGTH, SIZE, TYPE AND INVERT ELEVATIONS		221.05 SE 220.95 NE 220.95 SW	23.67m–375ø PVC SDR 35 STM @ 1.00%	221.32 SE 221.29 NW	STORMTECH DC 780 CHAMBERS 6.35m–375ø PVC SDR 35 STM @ 0.50%		1.50m–375ø PVC SDR 35 STM @ 0.50%	221.45 SE 221.42 NW 221.80 SW	12.28m–375ø PVC SDR 35 STM @ 0.50%	221.59 SW 221.51 NW			
CHAINAGE	0+000	0+003.49	0+020	0+026.80	0+040		0+060	0+063.48	0+075.80	0+080		0+100	

SEE SHEET C02 FOR TYPICAL ROAD SECTION.

STORM MANHOLE TABLE

MH NAME	RIM ELEV.	INVERTS	SIZE	OPSD
D1	RIM=224.63m	SW INV.=221.93m NW INV.=221.93m NE INV.=221.60m SE INV.=221.68m SE INV.=221.85m	1500mmø	701.011
D2	RIM=224.59m	NW INV.=221.69m NW INV.=221.84m	1200mmø	JF–4
D3	RIM=224.76m	SW INV.=221.59m NW INV.=221.51m	1200mmø	701.010
D4	RIM=224.94m	SE INV.=221.45m NW INV.=221.42m SW INV.=221.80m	1200mmø	701.010
D5	RIM=225.18m	SE INV.=221.32m NW INV.=221.29m	1200mmø	701.010
D6	RIM=225.66m	SE INV.=221.05m SW INV.=220.95m NE INV.=220.95m	1200mmø	701.010

CATCH BASIN TABLE

CB NAME	RIM ELEV.	INVERTS	SIZE	OPSD
CB1	RIM=225.15m	SW INV.=223.75m	600x600mm	705.010
CB2	RIM=224.94m	SE INV.=222.15m	600x600mm	705.010
DICB1	RIM=223.50m	NE INV.=222.25m	600x600mm	705.020

BENCHMARK

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BENCHMARK LOCATED ON THE EAST SIDE OF HWY 50, 0.8 KM SOUTH OF JUNCTION OF HWY 50 AND KING ST IN THE TOWN OF CALEDON (BOLTON), 55.2 M NORTH OF ELLWOOD DR AND 104 M EAST OF CENTRELINE OF HWY 50. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF GYMNASIUM AT ELLWOOD MEMORIAL PUBLIC SCHOOL, 1.7 M NORTH OF S.W. CORNER AND 12 CM BELOW BRICKWORK.

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KEY PLAN - NTS

LEGEND

- PROPERTY LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED CATCH BASIN LEAD
- EXISTING MANHOLE
- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- PROPOSED DOUBLE INLET CATCH BASIN
- PROPOSED MANHOLE
- ASPHALT
- BARRIER CURB AND GUTTER
- MOUNTABLE CURB AND GUTTER

REV	DATE	DESCRIPTION	BY	APP
1	28/09/2018	ISSUED FOR SITE PLAN APPLICATION	ADF	CAB

LICENSED PROFESSIONAL ENGINEER C.A. BLAHUT 100516699 Sept 28, 2018 PROVINCE OF ONTARIO

ENGINEER STAMP

PLAN OF SURVEY AND PARTIAL TOPOGRAPHY OF PART OF LOT 8 CONCESSION 7 (GEOGRAPHIC TOWNSHIP OF ALBION) TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL

LEGAL DESCRIPTION

SEE BELOW

BENCHMARK

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING

Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

CLIENT

336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT

KINGS RIDGE
COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE

STORM SEWER & ROAD WORKS ROAD A

DESIGN	ADF	DATE	SEPTEMBER, 2018
DRAWN	ADF	PROJECT NO.	17–1419
CHECKED	CAB	DRAWING NO.	C05
APPROVED	CAB	REV.	1

SCALE H: 1:250 V: 1:25

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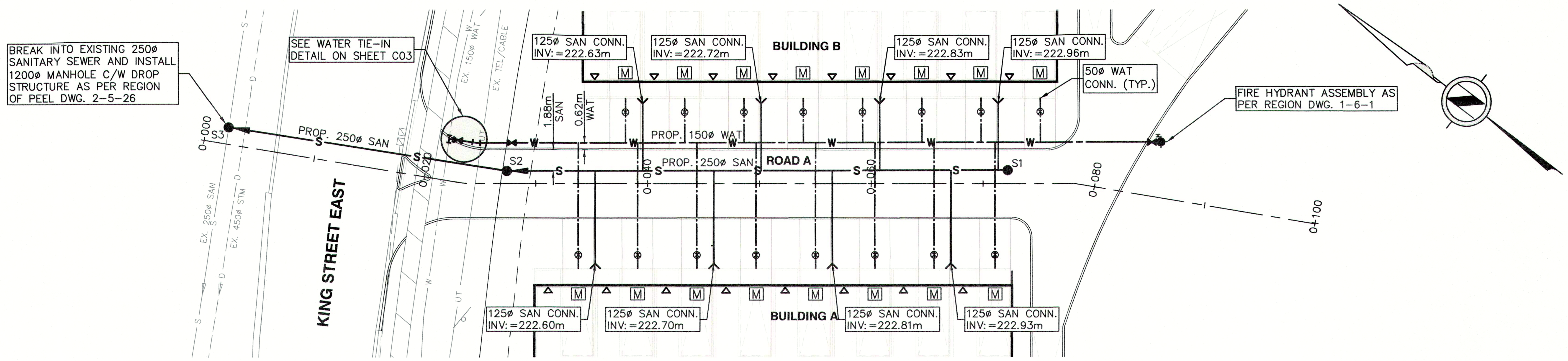
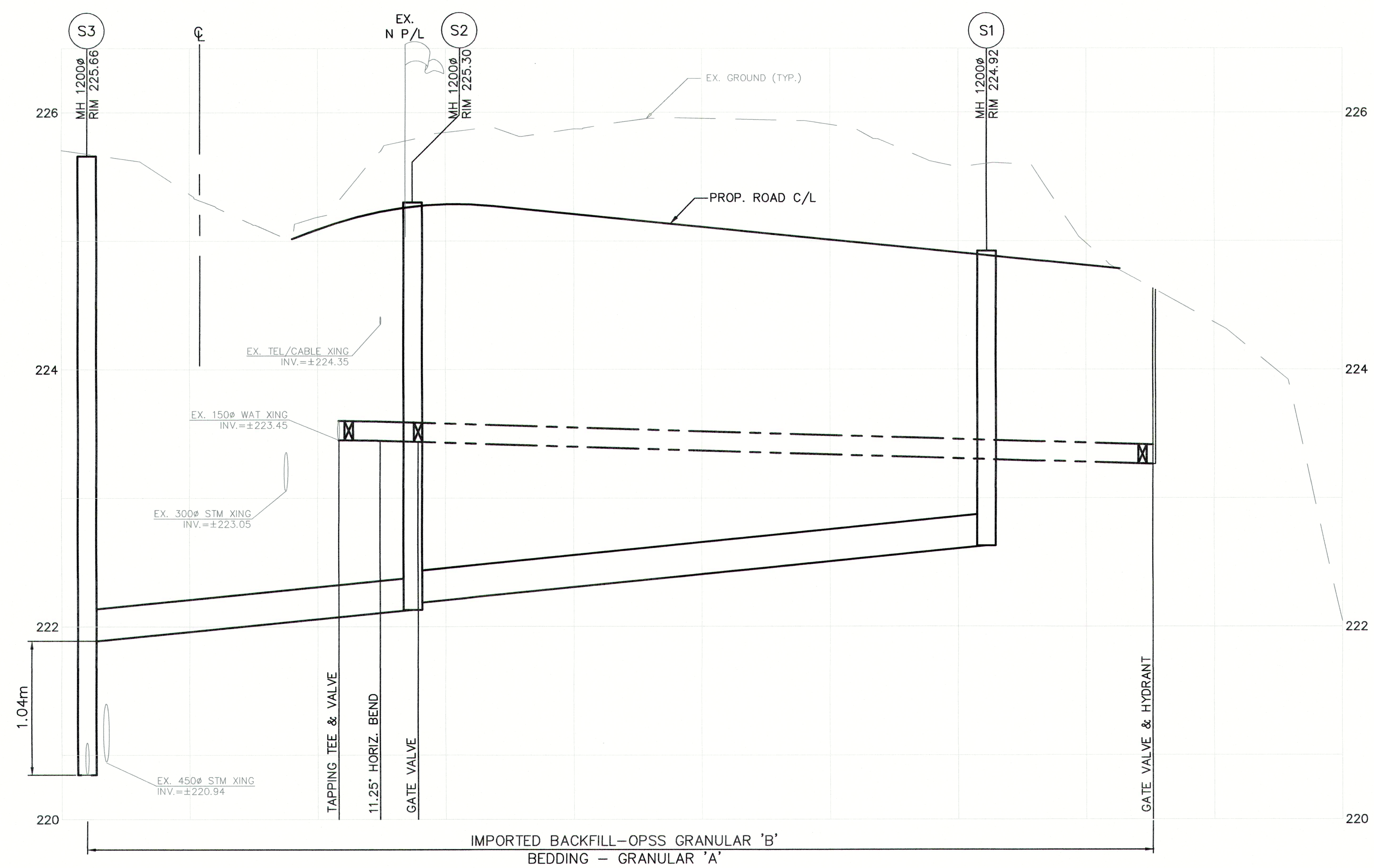


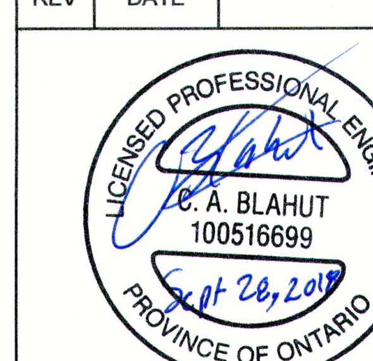
LEGEND

- PROPERTY LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SERVICE
- PROPOSED WATERMAIN
- PROPOSED WATER SERVICE
- PROPOSED MANHOLE
- EXISTING MANHOLE
- EXSTING CATCH BASIN
- PROPOSED CURB STOP
- PROPOSED GATE VALVE
- PROPOSED FIRE HYDRANT
- WATER METER (INSIDE BUILDING)



WATERMAIN LENGTH, SIZE, TYPE AND INVERT ELEVATIONS	2.47m–150ø PVC DR 18 WAT @ 0.20%; 223.45; 223.45; 61.23m–150ø PVC DR 18 WAT @ 0.30%; 223.27
SANITARY LENGTH, SIZE, TYPE AND INVERT ELEVATIONS	221.88 SE; 220.85 SW; 220.85 NE; 25.20m–250ø PVC DR 35 SAN @ 1.00%; 222.18 SE; 222.13 NW; 44.80m–250ø PVC DR 35 SAN @ 1.00%; 222.63 NW
CHAINAGE	0+000; 0+001.99; 0+020; 0+021.62; 0+022.42; 0+024.96; 0+027.42; 0+027.82; 0+040; 0+060; 0+072.22; 0+080; 0+085.20; 0+100

REV	DATE	DESCRIPTION	BY	APP
1	28/09/2018	ISSUED FOR SITE PLAN APPLICATION	ADF	CAB



ENGINEER STAMP

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LEGAL DESCRIPTION

SEE BELOW
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336 KING STREET EAST, CALEDON ON

DRAWING TITLE
WATERWORKS & SANITARY SEWERS ROAD A

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DESIGN ADF	DATE SEPTEMBER, 2018	SCALE H: 1:250 V: 1:25
DRAWN ADF	PROJECT NO. 17–1419	
CHECKED CAB	DRAWING NO. C06	REV. 1
APPROVED CAB		

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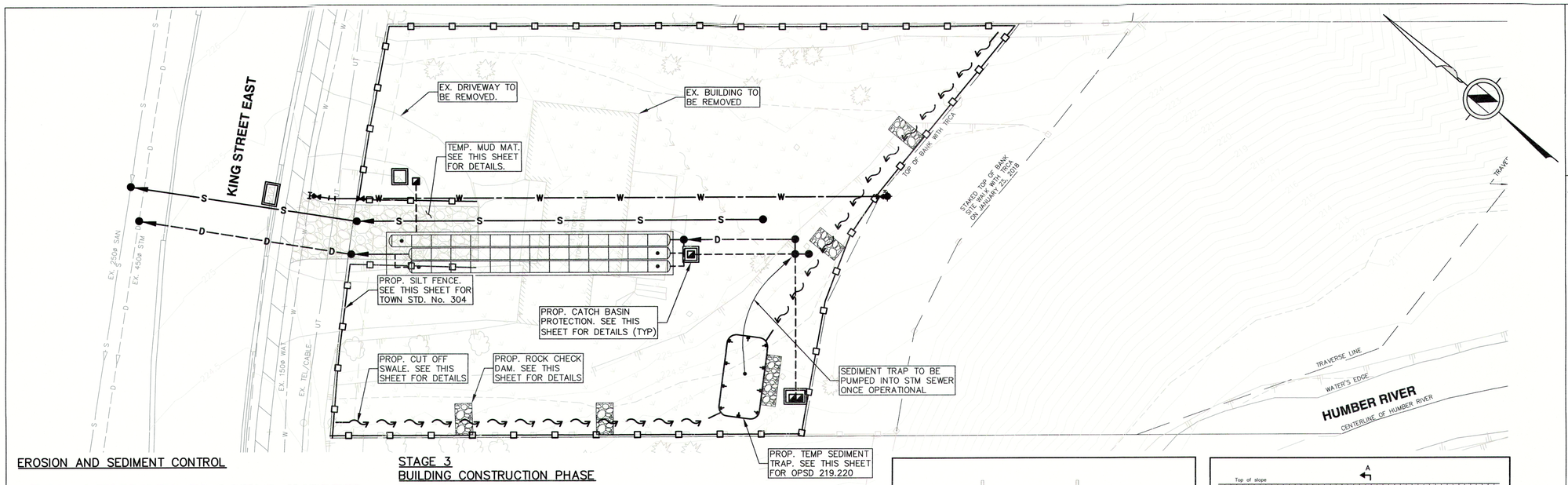
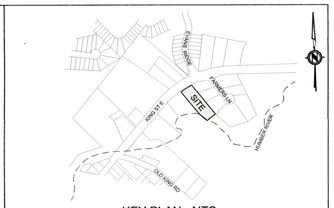




KEY PLAN - NTS

LEGEND

- TEMP. MUD MAT
- SILT FENCE
- CUT OFF SWALE
- EXISTING CONTOURS
- INLET CONTROL FOR PROP. CATCH BASINS
- INLET CONTROL FOR EX. CATCH BASINS
- ROCK CHECK DAM (15m SPACING TYP.)
- DISTURBED GROUND TO BE COVERED WITH STRAW

EROSION AND SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTION OR BOTH.
2. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREA. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS AND A TORONTO REGION CONSERVATION AUTHORITY ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE AND REFUELING WILL BE CONDUCTED A MINIMUM OF 30 M FROM THE WATER.

NOTES: STAGE 1 SITE CLEARING AND GRUBBING PHASE

SEDIMENT & EROSION CONTROL DURING THE CLEARING PHASE IS TO BE COMPLETED BY THE CONTRACTOR AS FOLLOWS:

1. CONTRACTOR TO INSTALL SILT FENCE ALONG PROPERTY LINES AS SHOWN.
2. CONTRACTOR TO INSTALL MUD MAT ENTRANCE OFF KING STREET EAST.
3. ALL TRUCK TRAFFIC LEAVING SITE MUST EXIT THROUGH MUD MAT.
4. THE CONTRACTOR SHALL LIMIT TRAFFIC OVER THE SITE TO AREAS OF IMMEDIATE CONSTRUCTION ONLY, THROUGH THE USE OF HAUL ROADS AND MARKING OFF 'NO GO' AREAS WITH SILT OR BARRIER FENCE.
5. ALL FRONTAGE ROADS SHALL BE SWEPT AS REQUIRED.
6. TEMPORARY STOCKPILES OF EXCAVATED MATERIAL ARE TO BE PROTECTED WITH POLY SHEETING (OR SIMILAR) AND SURROUNDED BY SILT FENCE TO MINIMIZE SOIL EROSION DUE TO RAINFALL EVENTS AS PER DETAIL ON THIS SHEET.
7. CONTRACTOR TO PROTECT EXISTING TREES AS NECESSARY IN ACCORDANCE WITH THE TREE PRESERVATION PLAN.

STAGE 2 CONSTRUCTION OF THE ROADS AND UNDERGROUND UTILITIES PHASE

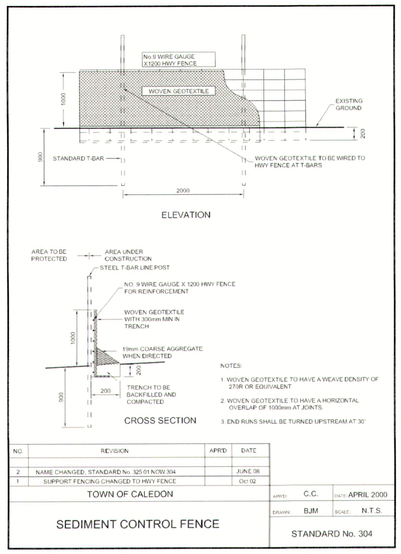
1. CONTRACTOR TO INSTALL INLET PROTECTION BAGS AS PER DETAIL ON THIS DRAWING AROUND ALL CATCH BASINS TO PREVENT SILT FROM ENTERING THE STORM SEWER SYSTEM; CLEAN AND REPLACE AS NECESSARY.
2. AFTER INSTALLATION OF SEDIMENT CONTROL FACILITIES, THE CONTRACTOR SHALL INSPECT THE SILTATION CONTROL FACILITIES TO ENSURE PROPER OPERATIONS. ESC MONITOR SHALL CONDUCT REGULAR INSPECTIONS OF THE SILTATION CONTROL FACILITIES.
3. TEMPORARY STOCKPILES OF EXCAVATED MATERIAL ARE TO BE PROTECTED WITH POLY SHEETING (OR SIMILAR) AND SURROUNDED BY SILT FENCE TO MINIMIZE SOIL EROSION DUE TO RAINFALL EVENTS IF THEY ARE TO BE EXPOSED FOR MORE THAN 14 DAYS.
4. IF ANY EXCAVATIONS NEED DE-WATERING, EXCAVATION TO BE PUMPED TO AN INSTALLED SEDIMENT TRAP.

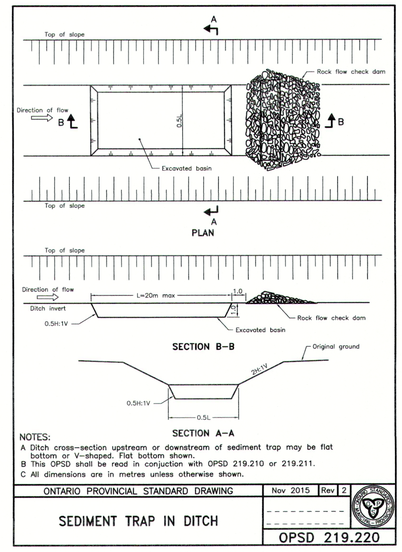
STAGE 3 BUILDING CONSTRUCTION PHASE

1. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT FACILITIES ONCE EVERY 7 DAYS AND PRIOR TO THE ONSET OF A SIGNIFICANT RAINFALL.
2. CATCH BASINS SHALL BE CLEANED A MINIMUM OF ONCE EVERY 7 DAYS.
3. INTERNAL AND EXTERNAL ROADS SHALL BE SWEPT AS REQUIRED.

DECOMMISSIONING

1. ALL CATCH BASIN SEDIMENT TRAPS SHALL BE REMOVED AFTER CONSTRUCTION WORKS HAVE BEEN COMPLETED.
2. ANY POINTS OF ENTRY OTHER THAN THE PROPOSED DRIVEWAYS SHALL BE REMOVED AND AREA REINSTATED AS PER THE DESIGN DRAWINGS AFTER CONSTRUCTION WORKS HAVE BEEN COMPLETED.
3. ALL SILT FENCES AND TREE PROTECTION FENCING SHALL BE REMOVED AFTER CONSTRUCTION WORKS HAVE BEEN COMPLETED.





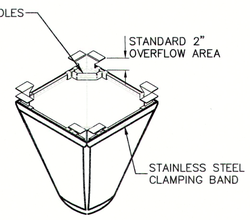
FLEXSTORM CATCH-IT FILTERS FOR TEMPORARY INLET PROTECTION

NOTES:

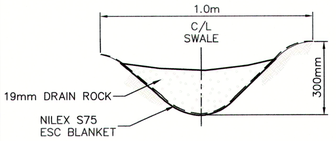
1. ALL FRAMING IS CONSTRUCTED OF CORROSION RESISTANT STEEL (ZINC PLATED OR GALVANIZED) FOR 7 YEAR MINIMUM SERVICE LIFE.
2. UPON ORDERING CONFIRMATION OF THE DOT CALLOUT, PRECAST OR CASTING MAKE AND MODEL, OR DETAILED DIMENSIONAL FORMS MUST BE PROVIDED TO CONFIGURE AND ASSEMBLE YOUR CUSTOMIZED FLEXSTORM INLET FILTER. PART NUMBER ALONE IS NOT SUFFICIENT.
3. FOR WRITTEN SPECIFICATIONS AND MAINTENANCE GUIDELINES VISIT WWW.INLETFILTERS.COM

INSTALLATION:

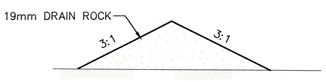
1. REMOVE GRATE
2. DROP FLEXSTORM INLET FILTER ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE
3. REPLACE GRATE



SEDIMENT CONTROL AT CATCH BASINS
N.T.S.

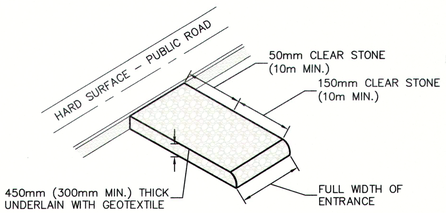


CUT-OFF SWALE DETAIL
N.T.S.



NOTE: FLOCCULANT SOCK TO BE INSTALLED WITH CHECK DAMS.

ROCK CHECK DAM DETAIL
N.T.S.



TEMPORARY MUD MAT
N.T.S.

REV	DATE	DESCRIPTION	BY	APP
1	28/09/2018	ISSUED FOR SITE PLAN APPLICATION	ADF	CAB

LICENSED PROFESSIONAL ENGINEER C. A. BLAHUT 100516699 PROVINCE OF ONTARIO — ENGINEER STAMP

PLAN OF SURVEY AND PARTIAL TOPOGRAPHY OF PART OF LOT 8 CONCESSION 7 (GEOGRAPHIC TOWNSHIP OF ALBION) TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL
LEGAL DESCRIPTION

SEE BELOW
BENCHMARK

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CLIENT
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT
KINGS RIDGE
COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE
EROSION AND SEDIMENT CONTROL PLAN

BENCHMARK

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DESIGN	ADF
DRAWN	RJT
CHECKED	CAB
APPROVED	CAB
DATE	SEPTEMBER, 2018
PROJECT NO.	17-1419
DRAWING NO.	C07
REV.	1
SCALE	1:250

0 2 1:250 12m

CALEDON GRADING AND DRAINAGE NOTES:

1. CONSTRUCTION FOR THIS PROJECT TO COMPLY WITH THE MOST CURRENT VERSION OF THE DEVELOPMENT STANDARDS, POLICIES AND GUIDELINES, PREPARED BY THE TOWN OF CALEDON, PUBLIC WORKS DEPARTMENT AND THE ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS.
2. ALL PROPOSED CONSTRUCTION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
3. WITHIN A MINIMUM OF FORTY–EIGHT HOURS PRIOR TO COMMENCING CONSTRUCTION WITHIN THE MUNICIPAL RIGHTOF–WAY, THE CONTRACTOR MUST CONTACT THE FOLLOWING:

   THE TOWN OF CALEDON PUBLIC WORKS DEPARTMENT 905–584–2272
   THE REGION OF PEEL 905–791–7800
   ENBRIDGE CONSUMERS GAS 905–758–7924
   HYDRO ONE 519–941–1211
   BELL CANADA 416–296–6929
   ROGERS CABLE 905–897–3914

4. ALL DRAINAGE TO BE SELF–CONTAINED AND DISCHARGED TO A LOCATION APPROVED BY THE PUBLIC WORKS AND ENGINEERING DEPARTMENT.
5. SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED PRIOR TO ANY CONSTRUCTION ON THE SITE AND SHALL BE INSPECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD TO THE SATISFACTION OF THE TOWN OF CALEDON AND THE APPLICABLE CONSERVATION AUTHORITY.
6. A MINIMUM OF 1.5M CLEARANCE IS TO BE PROVIDED FROM THE LIMITS OF ALL SIDEWALKS AND DRIVEWAYS TO EXISTING UTILITY STRUCTURES WITHIN THE MUNICIPAL RIGHT–OF–WAY. IF THIS CLEARANCE IS NOT MAINTAINED, THE STRUCTURES SHALL BE RELOCATED AT THE APPLICANT'S EXPENSE.
7. STREET CURBS ARE TO BE CONTINUOUS WITHIN THE PROPOSED ENTRANCE.
8. ANY CHANGES TO GRADES OR SERVICING FROM THE ORIGINALLY APPROVED SITE PLAN MUST BE APPROVED BY THE TOWN OF CALEDON PUBLIC WORKS DEPARTMENT.
9. STRUCTURAL DESIGN OF THE FIRE ROUTE IS REQUIRED TO SUPPORT AN 18–TON VEHICLE. AS SUCH THE DRAWING IS TO SHOW AREAS OF HEAVY ASPHALT AND LIGHT ASPHALT AND IS TO PROVIDE DESIGN INFORMATION.
10. ALL BOULEVARDS TO BE RESTORED WITH 150MM MINIMUM OF TOPSOIL AND SOD TO THE SATISFACTION OF THE TOWN OF CALEDON PUBLIC WORKS DEPARTMENT.
11. THE MINIMUM PAVEMENT DESIGN FOR THE ASPHALT DRIVEWAY APRON WITHIN THE MUNICIPAL ROAD ALLOWANCE SHALL BE AS FOLLOWS:

    40MM HL3 ASPHALT
    50MM HL8 ASPHALT
    150MM GRANULAR 'A'
    300MM GRANULAR 'B'

    THE CONSULTANT SHOULD REVIEW THE ABOVE WITH RESPECT TO THE EXPECTED USAGE.
12. SERVICE CONNECTION BACKFILL TO BE DISCUSSED WITH THE TOWN OF CALEDON.

GENERAL NOTES:

1. CONTRACTOR TO VERIFY THE LOCATION AND INVERTS OF EXISTING WATER, STORM AND SANITARY CONNECTIONS TO THE SITE. REPORT TO THE ENGINEER ANY DISCREPANCIES PRIOR TO START OF CONSTRUCTION.
2. ALL BUILDINGS & ROADS ARE TO BE LOCATED BY CO–ORDINATES AS CALCULATED BY A ONTARIO LAND SURVEYOR.
3. THE CONTRACTOR MUST CONTACT THE ENGINEER PRIOR TO CONSTRUCTION TO SCHEDULE AN ON–SITE PRE–CONSTRUCTION MEETING DURING WHICH CONSTRUCTION METHODS, TIMING, AND INSPECTION WILL BE DISCUSSED.

LOT GRADING:

1. ALL DIMENSIONS AND ELEVATIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. ALL ELEVATIONS ARE TO GEODETIC DATUM.
3. ALL EXCAVATION, FILL PLACEMENT AND COMPACTION TO BE IN ACCORDANCE WITH GEOTECHNICAL CONSULTANTS REPORT.
4. CONTRACTOR TO EMPLOY GEOTECHNICAL CONSULTANT FOR PERFORMANCE OF IN PLACE TESTING DURING THE PREPARATION OF THE SUBGRADE AND CONSTRUCTION OF THE ROAD STRUCTURE TO VERIFY THE ADEQUACY OF PROPOSED ROAD STRUCTURE AND SUBGRADE.
5. CHANGES TO GRADE SHALL BE FORMED BY SMOOTH CURVES.
6. ALL BUILDINGS EXIT TO GRADE FROM THE LOWER FLOOR.

ROADWORKS NOTES:

1. SINGLE – STAGE CURB & GUTTER TO COMPLY WITH OPSD 600.040 COMPLETE WITH 2 – 15M BARS.
2. TWO– STAGE CURB & GUTTER TO COMPLY WITH OPSD 600.070.
3. SIDEWALKS TO COMPLY WITH OPSD 310.010 AND ARE TO BE 1.5 METRES WIDE ON A 150mm COMPACTED GRANULAR "A" BASE. MINIMUM THICKNESS AS FOLLOWS:
   - NORMAL THICKNESS 125mm.
   - RESIDENTIAL DRIVEWAY 150mm
   - COMMERCIAUINDUSTRIAL DRIVEWAY 200mm

   (REINFORCEMENT AS PER OPSS IF REQUIRED)
4. NATIVE SUBGRADE SHALL HAVE A CROSSFALL OF 3% AND THE MATERIAL SHALL BE APPROVED BY A SOILS CONSULTANT AND IS SUBJECT TO APPROVAL BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
5. THE ROAD BASE SHALL INCORPORATE 100mm DIAMETER SUBDRAIN WITH FACTORY INSTALLED FILTER FABRIC AS PER TOWN OF CALEDON STANDARD No. 240.
6. ALL CURB RADII TO BE MINIMUM OF 10.0 METRES RESIDENTIAL AND 15.0 METRES INDUSTRIAL AT THE EDGE OF ASPHALT.
7. NATIVE SUBGRADE TO BE COMPACTED TO MINIMUM 95% STANDARD PROCTOR MAXIMUM DRY DENSITY AND SHALL BE PROOF ROLLED.
8. GRADE AND CROSS FALL ADJUSTMENT OF MAINTENANCE HOLE AND CATCH BASIN FRAMES WILL BE MADE USING PRODUCTS SPECIFICALLY MANUFACTURED FOR THAT PURPOSE AS PER OPSD 704.010.
9. NON–COMPRESSIBLE BACK FILL WILL BE USED DURING REBUILDING, ADJUSTING, OR ANY OTHER APPLICABLE CATCH BASIN OR MAINTENANCE HOLE WORKS.
10. CURB AND SIDEWALK CONCRETE SHALL BE 30MPa AT 28 DAYS WITH 7% ± 1.5% ENTRAINED AIR AND NOT LESS THAN 355 kg/m³ OF CEMENT. (PER OPSS 315 AND 353)

WATERMAIN NOTES:

1. WATERMAINS SHALL BE INSTALLED WITH BEDDING AS PER REGION OF PEEL STANDARD DRAWING 1–5–1.
2. ALL WATERMAINS TO HAVE 1.7m MINIMUM COVER.
3. CONTRACTOR TO CONFIRM LOCATIONS & SIZES OF ALL EXISTING SERVICES PRIOR TO CONSTRUCTION AND ENSURE CIVIL DRAWINGS MATCH MECHANICAL DRAWINGS. ANY DISCREPANCIES MUST BE REPORTED TO BOTH ENGINEERS IMMEDIATELY.
4. ALL WATERMAIN MATERIAL TO BE PVC DR 18 IN COMPLIANCE WITH AWWA C900–16 SPECIFICATIONS OR APPROVED EQUIVALENT.
5. ALL WATER SERVICE CONNECTION TO BE MIN 50mm DIAMETER, UNLESS OTHERWISE SPECIFIED AND INSTALLED IN ACCORDANCE WITH REGION OF PEEL STANDARD DRAWING 1–7–1.
6. BLOW–OFFS TO BE INSTALLED AS PER REGION OF PEEL STANDARD DRAWING 1–7–2.
7. THRUST BLOCKS TO BE INSTALLED AT ALL BENDS AS PER REGION OF PEEL STANDARD DRAWING 1–5–5, 1–5–6 AND 1–5–7.

STORM SEWER NOTES:

1. STORM SEWER TO BE PROVIDED ON ALL ROADS WITH CURB AND GUTTER.
2. PLACE ALL CATCH BASIN LATERALS AT 2% GRADE UNLESS OTHERWISE NOTED. PIPE SIZE MINIMUM 250mm DIA. SINGLE, 300mm DIA. DOUBLE.
3. STORM SEWERS SHALL BE CONSTRUCTED WITH BEDDING AS PER OPSD 802.030 FOR RIGID PIPE OR OPSD 802.010 WITH GRANULAR 'A' FOR FLEXIBLE PIPE UNLESS APPROVED OTHERWISE BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
4. MAINTENANCE HOLE TOPS (FRAMES) AND CATCHBASIN (FRAMES) ARE TO BE SET TO BASE COURSE ASPHALT AND THEN ADJUSTED TO FINAL GRADE WHEN THE TOP LIFT OF ASPHALT IS PLACED.
5. STORM SEWER TO BE LOCATED OFFSET 1.5m SOUTH OR WEST OF CENTRELINE UNLESS OTHERWISE SPECIFIED.
6. ALL CONNECTIONS TO THE STORM MAIN SHALL BE MADE WITH A STORM MANHOLE OR APPROVED FACTORY TEE CONNECTION AS PER OPSD 708.01 OR 708.03.
7. PIPE MATERIAL TO BE REINFORCED CONCRETE WITH A STRENGTH OF 50 N/m/mm CERTIFIED TO C.S.A. STANDARD A247.2–1982, CLASS 50–D (PREVIOUSLY C.S.A. STANDARD A257.2–1974 CLASS II) OR PVC CERTIFIED TO C.S.A. STANDARDS 182.2 AND 182.4 MAX. PVC PIPE DIA. IS 600mm BIG O BOSS 2000 POLYETHYLENE PIPE WITH GASKETED BELL AND SPIGOT JOINTS CERTIFIED C.S.A. B182.6 FOR STORM SEWERS UP TO 900mm DIA. WHERE ONLY CONNECTION STD CATCHBASINS ARE CONSIDERED.
8. STORM SEWER TO BE MINIMUM 300mm DIA. WITH JOINTS CONFORMING TO C.S.A. STANDARD A257.3.
9. ALL PIPE BEDDING MUST CONFORM TO OPSD MAXIMUM COVER TABLE. NO FLEXIBLE PIPE SEWERS WILL BE INSTALLED WITH A DEPTH COVER GREATER THAN 6m UNLESS SPECIFICALLY APPROVED BY THE DIRECTOR OF PUBLIC WORKS AND ENGINEERING.
10. ALL PIPE HANDLING INSTRUCTIONS MUST BE IN STRICT COMPLIANCE WITH MANUFACTURERS INSTALLATION GUIDES AND THE OCPA OR UNIBELL GUIDELINES.

SANITARY SEWER NOTES:

1. SANITARY SEWERS SHALL BE INSTALLED WITH BEDDING AS PER REGION OF PEEL STANDARD DRAWING 2–3–1.
2. SANITARY SEWER PIPES TO BE PVC DR35 IN COMPLIANCE WITH ASTM D 3034 & CSA B182.2 SPECIFICATIONS.
3. SANITARY SERVICE CONNECTIONS TO BE MIN 125mm DIAMETER @ 1.0% AND PVC SDR28 IN COMPLIANCE WITH ASTM D 3034 & CSA B182.1 SPECIFICATIONS.
4. CONTRACTOR TO CONFIRM LOCATION AND INVERTS OF EXISTING SANITARY SEWER CONNECTIONS PRIOR TO CONSTRUCTION.
5. ALL MANHOLES TO BE 1200mm DIAMETER AND CONFORM TO REGION OF PEEL STANDARD DRAWING 2–5–1, 2–5–2 AND 2–5–3.
8. ALL SANITARY SEWERS THAT DO NOT MEET 1.0m MINIMUM COVER TO BE INSULATED AS PER OPSD 1109.030.

KEY PLAN - NTS

LEGEND

REV	DATE	DESCRIPTION	BY	APP
1	28/09/2018	ISSUED FOR SITE PLAN APPLICATION	ADF	CAB

LICENSED PROFESSIONAL ENGINEER
C. A. BLAHUT
100516699
PROVINCE OF ONTARIO
ENGINEER STAMP

PLAN OF SURVEY AND PARTIAL TOPOGRAPHY OF PART OF LOT 8 CONCESSION 7 (GEOGRAPHIC TOWNSHIP OF ALBION) TOWN OF CALEDON, REGIONAL MUNICIPALITY OF PEEL
LEGAL DESCRIPTION

SEE BELOW
BENCHMARK

APLIN MARTIN
ENGINEERING ARCHITECTURE PLANNING SURVEYING
Aplin & Martin Consultants Ltd.
405 - 55 St. Clair Ave. West, O.N. Canada M4V 2Y7
Tel: (416) 644-1900, Fax: (416) 644-1889, Email: general@aplinmartin.com

CLIENT
336 KINGS RIDGE INC.
1175 MEYERSIDE DRIVE, SUITE 2
MISSISSAUGA, ON L5T 1H3

PROJECT
KINGS RIDGE
COMMON ELEMENT CONDOMINIUM
TOWNHOUSE DEVELOPMENT
336 KING STREET EAST, CALEDON ON

DRAWING TITLE
STANDARD NOTES

BENCHMARK

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO FIRST ORDER VERTICAL BENCHMARK NUMBER 00819758057 HAVING AN ORTHOMETRIC ELEVATION OF 251.929 METRES. ELEVATIONS ARE REFERENCED TO THE CANADIAN GEODETIC VERTICAL DATUM OF 1928, 1978 ADJUSTMENT (CGVD–1928:1978).

BENCHMARK LOCATED ON THE EAST SIDE OF HWY 50, 0.8 KM SOUTH OF JUNCTION OF HWY 50 AND KING ST IN THE TOWN OF CALEDON (BOLTON), 55.2 M NORTH OF ELLWOOD DR AND 104 M EAST OF CENTRELINE OF HWY 50. TABLET IS SET HORIZONTALLY IN WEST FACE OF CONCRETE FOUNDATION OF GYMNASIUM AT ELLWOOD MEMORIAL PUBLIC SCHOOL, 1.7 M NORTH OF S.W. CORNER AND 12 CM BELOW BRICKWORK.

NOTICE TO CONTRACTOR
IT IS THE RESPONSIBILITY OF THE CONTRACTOR'S SURVEYOR TO VERIFY THAT ALL LEGAL SURVEY DIMENSIONS SHOWN ON THE ENGINEERS DRAWINGS AGREE WITH THOSE ON THE REGISTERED LEGAL SURVEY PLAN. SHOULD THERE BE ANY DISCREPANCIES, THEN IMMEDIATELY NOTIFY THE ENGINEER OF RECORD

THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY & HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

DESIGN ADF	DATE SEPTEMBER, 2018	SCALE N/A	
DRAWN ADF	PROJECT NO. 17–1419		
CHECKED CAB	DRAWING NO. C08	REV. 1	
APPROVED CAB			

0 2 1:250 12m