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Kanata Lakes Condominium Development – Block 3 124 Battersea Crescent, Ottawa

Design Brief

Engineering excellence. Planning precision. Inspired landscapes.

KANATA LAKES
CONDOMINIUM DEVELOPMENT – BLOCK 3
124 Battersea Crescent
Ottawa, Ontario

DESIGN BRIEF

Prepared For:

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December 20, 2016

Novatech File: 110105-1
Ref: R-2016-186

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December 20, 2016

City of Ottawa
Infrastructure Approvals Division
110 Laurier Street West, 4th Floor
Ottawa, ON
K1P 1J1

Attention: **Mr. Nadège Balima, P.Eng.**
Project Manager, Infrastructure Approvals

Reference: **Kanata Lakes**
Condominium Development – Block 3
Design Brief

Our File No.:110105-1

Enclosed for your review and approval are six (6) copies of the Design Brief issued as part of the Site Plan Application and Zoning By-law Amendment Application for the above noted project (formerly referred to as Heritage Hills).

Please contact the undersigned should you have any questions or comments pertaining to the enclosed report.

Yours truly,

NOVATECH

Drew Blair

Drew Blair, P.Eng.
Project Manager

cc Jean-Luc Rivard, Brigil Homes

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1.0 INTRODUCTION

This Design Brief has been prepared in support of the Site Plan Revision and Minor Zoning By-Law Amendment Applications for Block 3 of the Kanata Lakes Condominium Development (formerly referred to as Heritage Hills), located at 124 Battersea Crescent within the Broughton Subdivision in the City of Ottawa.

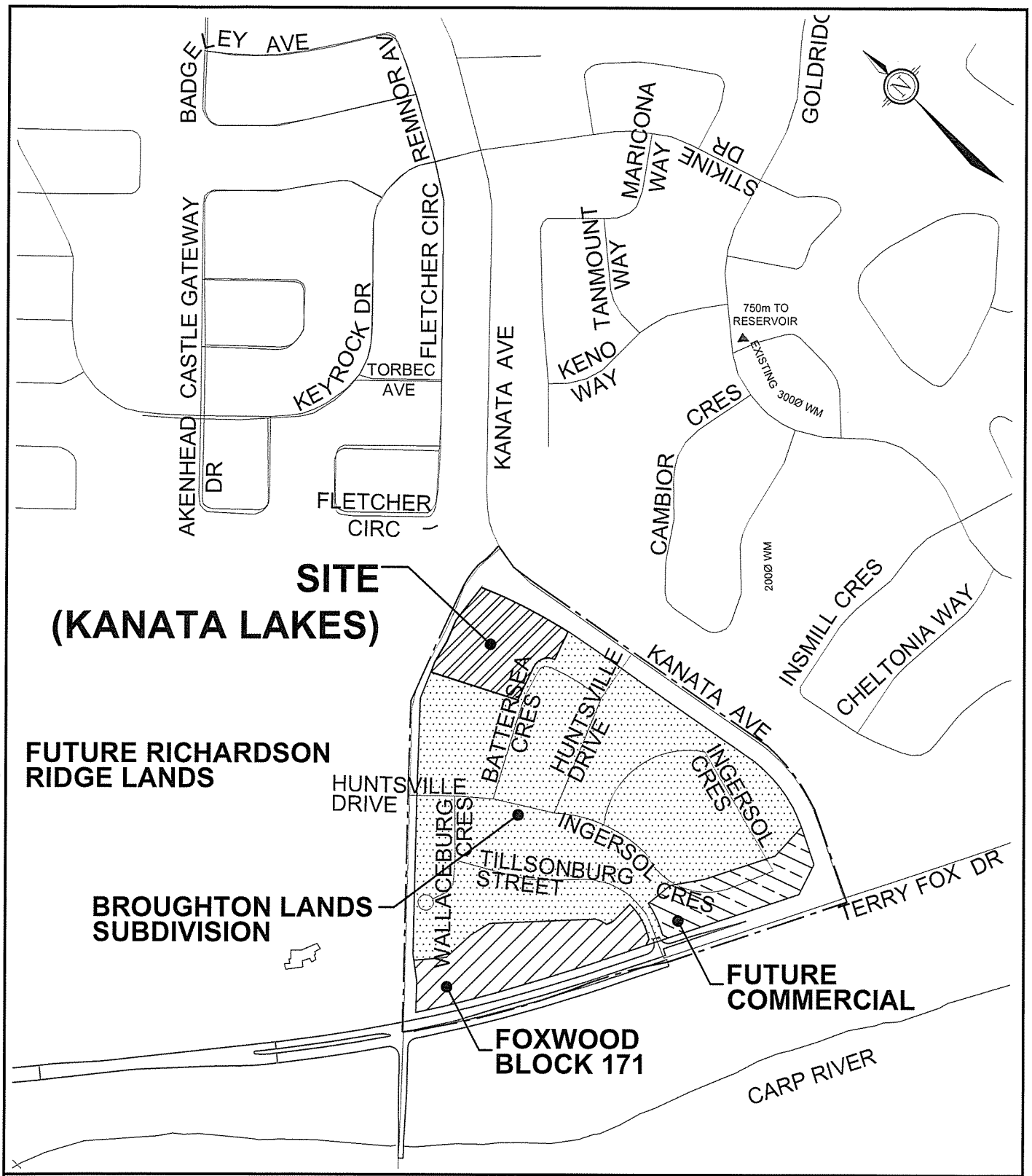
1.1 The Site

The Kanata Lakes Condominium Site is 1.39 hectares with frontage on Battersea Crescent to the south, Kanata Avenue to the east, the closed road allowance of Richardson Side Road to the north and a park to the west. Refer to **Figure 1a** – Aerial Photo and **Figure 1b** – Key Plan.

Figure 1a – Key Plan

1.2 Project History

The Kanata Lakes Condominium Development was created as part of the Broughton Subdivision in August 2010. The site was originally approved in January 2013 as a condominium development with eight apartment buildings, each with 12 or 16 units, surrounding surface parking split between two levels by a retaining wall down the centre of the site, with access to Battersea Crescent from two private streets, Kirkland Private and Earlton Private.



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KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

KEY PLAN

NTS | DEC 2016 | 110105 | FIGURE 1b

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A revised Site Plan was approved in October 2016, which replaced the proposed 12 and 16 unit apartment buildings with a 79 unit apartment condominium with underground parking and elevators.

At present (December 2016), two condo buildings with 12 and 16 units have been constructed as per the 2013 approved Site Plan, as well as the community building and allocated surface parking. The 79 unit apartment condominium (Block 4) is currently under construction.

1.3 Proposed Development (Block 3)

The proposed development of Block 3 will consist of a 79 unit condominium apartment building with the same layout as the 79 unit building on Block 4. The proposed development of Block 3 will utilize existing infrastructure where possible. An existing fire hydrant will provide fire protection for the proposed development. Refer to the Figure 2 – Site Plan.

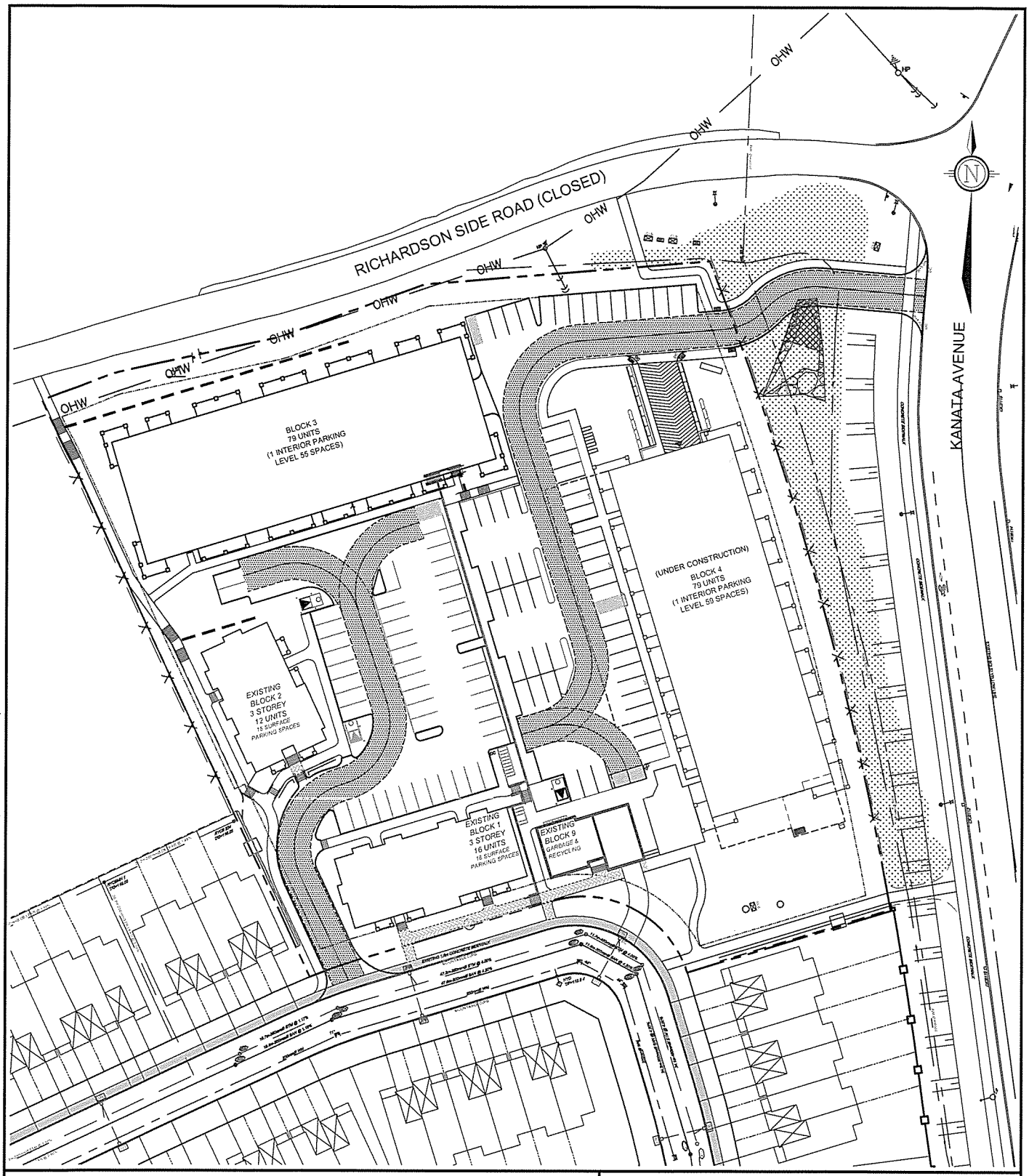
1.4 Additional Reports

This Design Brief provides information on the considerations and approach by which Novatech has designed and evaluated the proposed servicing system for the Kanata Lakes lands. This report should be read in conjunction with the following:

- *Kanata Lakes Condominium Development Stormwater Management Report – Block 3 (Novatech, dated December 20, 2016; R-2016-182).*
- *Kanata Lakes Noise Control Study – Block 3 (Novatech, dated December 20, 2016; R-2016-183).*
- *Planning Rationale and Design Statement in Support of a Site Plan Revision Application & Minor Zoning By-law Amendment Application for 124 Battersea Crescent, Kanata Lakes – Brigil Group (Novatech, dated December 20, 2016)*
- *Broughton Lands Residential Development (Phases 1 and 2) Design Brief (Novatech, dated July 18, 2008 (Phases 1 and 2), R-2007-111)*
- *Broughton subdivision – Phase 3B Transportation Impact Study – Addendum #3 (May 30, 2015)*
- *Updated Subsurface Investigation – Blocks A and B, Heritage Hills Development, 124 Battersea Crescent, Ottawa, Ontario (Houle Chevrier, dated December 20, 2016, Ref No: 62970.01).*

1.5 Consultations and Approvals

The subject property is designated General Urban Area in the City of Ottawa Official Plan. The General Urban Area designation permits all types and densities of housing as well as employment, retail, service, industrial, cultural, leisure, green space, entertainment and institutional uses. New residential development proposed in established neighbourhoods is encouraged to relate to the existing community character so that it enhances and builds upon desirable established patterns and built form. The subdivision conforms to these policies of the Official Plan.



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KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

SITE PLAN

DEC 2016 110105 FIGURE 2

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There have been multiple consultations with the City regarding this proposed development which have preceded and followed the proposed site being granted draft approval under the title 3223701 Canada Inc. (Brigil Platinum), 124 Battersea Crescent Condominiums, File No.: D07-04-12-0005. Site plan approval was later given under File No.: D07-12-11-0059. Since that time a new site plan has been issued and will require additional site plan approval.

1.6 Planning Context

The subject property is zoned R4Z [1203] in the City of Ottawa Zoning By-law 2008-250. The purpose of the R4 Zone is to allow a wide mix of residential building forms ranging from detached to low-rise apartment dwellings. The Z subzone imposes development standards which promote efficient land use and compact form while showcasing newer design approaches. Urban exception 1203 provides modified setback requirements and specifies that there is no minimum landscaped open space requirement. Exception 1203 also imposes maximum lot coverage of 55%, a maximum building height of 19m and a maximum density of 100 dwelling units/ hectare. The proposed low-rise residential apartment use is permitted as of right within the R4Z subzone zone. The proposed development for Kanata Lakes complies with present zoning, both in terms of permitted uses and performance standards.

2.0 PRE-DEVELOPMENT CONDITIONS

2.1 The Site

The proposed site will utilize existing infrastructure, where possible, to minimize costs for the proposed development. The site has sanitary sewer, storm sewer and watermain throughout the site for the purpose of servicing 8 blocks (former site plan). The west side of the site containing the existing 12 unit and 16 unit buildings will remain unaffected by the proposed 79 unit building. The east side of the site (east of retaining wall) will largely remain unchanged and will continue to service the 79 unit building that is under construction. The existing parking lot on the east side will largely remain untouched. The grade is relatively steep on the north side sloping to the south. The site also gently slopes from west to east on the easterly portion of the site.

2.2 Existing Drainage

The site generally slopes in a south easterly direction. The stormwater from the western portion of the site currently sheet drains southward toward the parking lot where it is captured by existing catchbasins and catchbasin manholes. The drainage from the easterly portion of the site sheet drains towards a ditch along the west side of Kanata Avenue and a small area to the ditch along the north side of the property. Both ditches flow along Kanata Avenue to an existing storm sewer which crosses under Terry Fox Drive to outlet to the Carp River. Refer to Figure 3 – Existing Conditions Plan for details.

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KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

EXISTING CONDITIONS PLAN

DEC 2016 110105 FIGURE 3

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2.3 Geotechnical Investigation

Houle Chevrier Engineering Ltd. conducted a geotechnical investigation in support of an existing (under construction) 79 unit block (B) (4-storey with underground parking) and a proposed 79 unit block (A) condominium development at this site. The first field investigation was carried out on February 25, 2008 and consisted of excavating ten (10) test pits (Numbered 1 to 10) to refusal on bedrock except for test pit 7. A second investigation was carried out between May 1 and 5, 2008 consisting of three (3) boreholes to refusal on bedrock. The principal findings of the geotechnical investigations are as follows:

- A surficial layer of topsoil of thickness from 0.02m to 0.2m for test pits 1, 3, 5, 9 and 10. Test pits 6, 7 and 8 and boreholes 1 and 2 encountered a surficial layer of topsoil of thickness from 0.1m to 0.5m. Test pits 2 and 4 had a layer of peat of thickness 0.5 to 0.7m respectively.
- A silty sand layer of thickness 0.2m to 0.6m was encountered below the topsoil in test pits 6, 7 and 8.
- Test pits 6, 7 and 8 and boreholes 1 and 2 encountered a layer of silty clay of thickness from 0.7m (test pit 6) to 4.1m (borehole 1) and extends to depths of about 1.1m to 4.6m below ground surface.
- A deposit of glacial till was found above the underlying bedrock in test pits 2, 5, 6, 7, 8 and 9 and boreholes 1 and 2. The till encountered varied in thickness from 0.1m to 4.8m.
- Based on geological mapping, the bedrock in this area consists of gabbro, diorite and quartzite.
- Refusal to excavation on inferred bedrock was met in test pits and boreholes at depths ranging from 0.02m to 4.7m below ground surface.
- Groundwater inflow was observed in test pits 2, 4, 5 and 7 at depths of between 0 and 1.3m below ground surface. No groundwater inflow was observed at the remaining test pits during the short period they remained excavated.

The report provides engineering guidelines based on Houle Chevrier's interpretation of the test pit and borehole information and project requirements. Refer to the final Geotechnical Report *Updated Subsurface Investigation Block A and B, Heritage Hills Development 124 Battersea Crescent dated December 20, 2016 (Ref No. 62970.01) by Houle Chevrier Engineering Ltd.* for complete details.

3.0 STORM SEWER SYSTEM

Storm servicing of the Kanata Lakes site is provided using a dual drainage system: Minor system flows will be conveyed by the proposed storm sewers and major system flows will be conveyed along defined overland flow routes. The minor system was designed using the Rational Method to convey peak flows associated with the 1:5 year event. Major system flows will be conveyed overland to Broughton Subdivision and along Kanata Avenue's roadside ditch.

3.1 Minor System

The minor system for the condominium development was designed using the Rational Method to convey peak flows associated with the 1:5 year uncontrolled event. Based on the approved *Stormwater Management Report, Broughton Lands Subdivision Phases 1 and 2, July 21, 2008, by Novatech Engineering*, the post-development 1:100 year event release rate is to be controlled to an allowable release rate of 188.0 L/s. Inlet control devices (ICDs) in two catchbasin manholes will control the release rate from some areas of the site as well as uncontrolled flow from the remaining areas, when combined together, will total less than the allowable release rate up to and including the 100 year design event.

The minor system outlet for the development is the Battersea Crescent storm sewer system, which conveys flows through Broughton Subdivision and ultimately outlets to the RRSR SWM Facility located adjacent to the Carp River on the south side of Terry Fox Drive. A small portion of the site (areas on the north and east side of the site) will drain directly towards an existing road side ditch along Kanata Avenue and will be conveyed to the Carp River outlet. Refer to the *Kanata Lakes Condominium Development – Block 3, Stormwater Management Report (Novatech, December 20, 2016)* for details. for details. For storm sewer layout, refer to Figure 4 – Storm Alignment.

There are two (2) existing storm sewer connections on Battersea Crescent; one 250mm-diameter STM pipe connected at the west entrance to the storm sewer on Battersea Crescent and one 375mm-diameter STM pipe connected in front of Block 9 to the storm sewer on Battersea Crescent. The west side of the site will utilize existing 250mm-diameter STM pipe for site drainage and remain untouched. The east side of the site will utilize a combination of existing 375mm-diameter STM pipe and proposed 375mm-diameter and 1050mm-diameter superpipe for site drainage and storage.

Storm sewer design sheets and storm drainage area plans are provided in Appendix B.

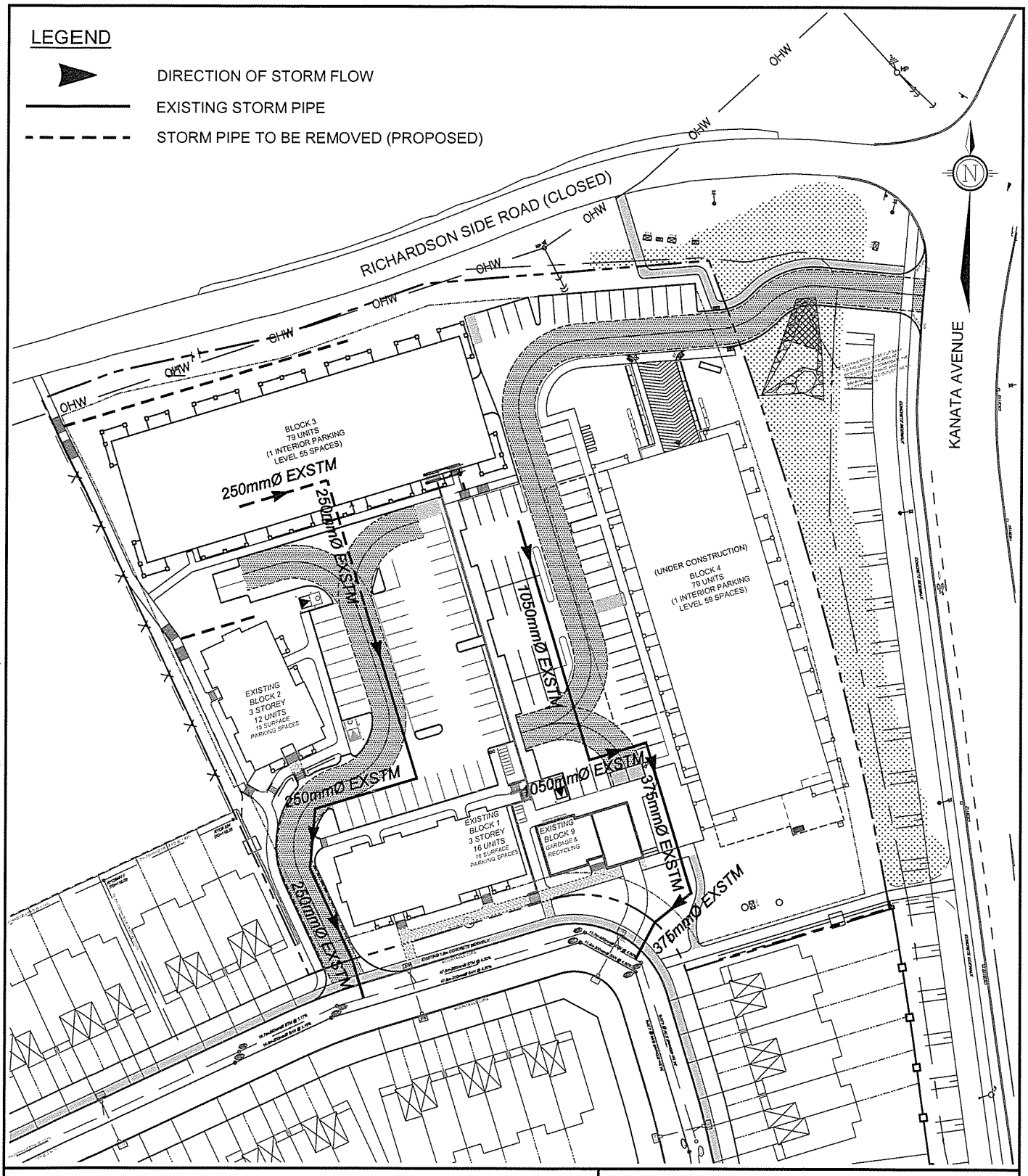
3.2 Major System (Overland Flow)

The site grading has been designed to provide a major overland flow route in case of blockage of the minor system, or for storm runoff that exceeds the capacity of the storm sewer system. The overland flow route will occur along the parking lot and roadways and ultimately outlet to Battersea Crescent via the east and west entrances of the development. There is stormwater surface storage in the parking areas and ponding will occur up to a maximum depth of 0.30m before cascading overland towards Battersea Crescent.

The major overland flow route for some areas (north and east of the site), will runoff to the Kanata Avenue roadside ditch, ultimately conveyed to the Carp River. Refer to the *Kanata Lakes Condominium Development – Block 3, Stormwater Management Report (Novatech, December 20, 2016)* for details.

4.0 STORMWATER MANAGEMENT

To meet the quantity control objective, runoff from storm events which exceed the allowable release rate of 188 L/s will be stored on-site, up to and including the 1:100 year design



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KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

STORM ALIGNMENT

NTS | DEC 2016 | 110105 | FIGURE 4

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event. The required quantity control storage will be provided using a combination of surface storage within the parking areas, rooftop storage, and underground storage. Runoff volumes which exceed the available storage (i.e. greater than the 1:100 year event) will be conveyed overland along the defined major system flow route through the Broughton Subdivision.

Refer to the *Kanata Lakes Condominium Development – Block 3, Stormwater Management Report (Novatech, December 20, 2016)* for details.

5.0 SANITARY SEWER SYSTEM

5.1 Sanitary Flows

The sanitary sewage flows from the condominium development will be directed by gravity sewer pipe (200mm dia.) from the development to the existing sanitary sewer on Battersea Crescent. Refer to Figure 5 –Sanitary Alignment.

The original sanitary flow as calculated in the approved *Design Brief, Broughton Lands Residential Development (Phases 1 and 2), July 18, 2008, by Novatech Engineering*, had a release rate of 1.63 L/s from the Kanata Lakes site (Viva Kanata in the report, refer to Appendix A for excerpt). This was based on (50,000 L/s x 1.38ha x 1.5 Peak Factor)/86,400 = 1.20 L/s, with an infiltration flow of 0.43 L/s. The current proposed Kanata Lakes development has 186 apartments with a design flow of 5.88 L/s based on 2.1 persons per unit for the 12 and 16 unit buildings and 1.8 persons per unit for each of the 79 unit buildings. The variation in persons per unit in the 79 unit buildings is due to a combination of 1 and 2 bedroom units. Previously the 12 and 16 unit buildings consisted only of 2 bedroom units.

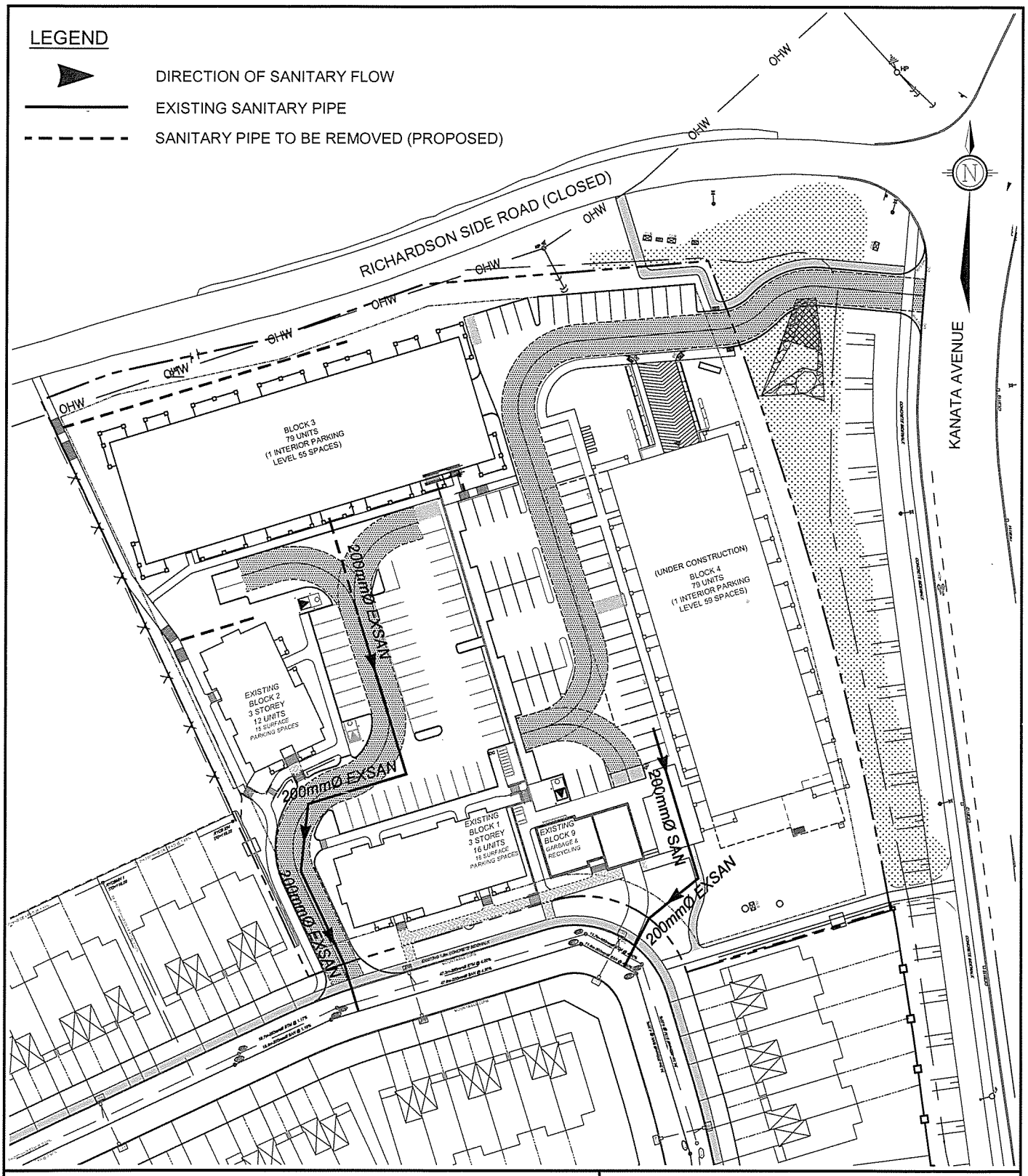
The peak sanitary flows are summarized below in Table 1.

Table 1: Sanitary Flow Summary

Development Condition	Population	Peak Res. Flow (L/s)	Peak Ext. Flow (L/s)	Peak Design Flow (L/s)
Internal Buildings	343.2	5.561	0.310	5.880
Total Flow	343.2	5.561	0.310	5.880

There is an increase in the local flow on Battersea Crescent increased from 4% of capacity to 10% of capacity compared to the approved 2008 sanitary design sheet (referenced as Fut-5 to Cap in 2008 design sheet). Refer to the design sheet in Appendix A.

Further analysis of the outlet sewer on Terry Fox Drive was completed to determine the impact (if any) of the additional flows from the latest Kanata Lakes site plan design on the outlet sewer. The overall sanitary flows tributary to the outlet are comprised of the following:



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KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

SANITARY ALIGNMENT

NTS | DEC 2016 | 110105 | FIGURE 5

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- Broughton Lands Subdivision including flows from Kanata Lakes, Foxwood Block 171 (formerly known as Broughton 3A) and the future commercial site.
- Richardson Ridge Lands and Terry Fox Drive upstream flows.

Refer to Figure 1b – Key Plan for an overall map of site locations.

As identified in the *Design Brief, Broughton Lands Residential Development (Phases 1 and 2), July 18, 2008, by Novatech Engineering*, the overall sanitary flow tributary from the combined sites was 49.34 L/s. In 2010, IBI Group further calculated the overall flow outletting to the Terry Fox Drive sanitary sewer to be 66.31 L/s. The increase in flow was due to two factors:

1. The detailed design for Richardson Ridge Lands was completed.
2. A small portion of the Richardson Ridge Lands outletted through the Broughton Lands Subdivision.

Refer to Table 2 for details.

Table 2: Existing Sanitary Design Flow

Area	Broughton Phase 1 & 2 2008 L/s	Richardson Ridge by IBI 2010 L/s	Broughton Phase 1 & 2 2016 L/s
Broughton Phase 1&2 and Foxwood	18.71	22.69	23.73
Richardson Lands & Terry Fox Drive	32.19	46.74	45.66
*** Total Flow (MH 201)**	49.34	66.31	65.94

* The Total Flow is taken from the Design Sheets in Appendix A and is based on the population flow, total area and the adjusted peaking factor.

As indicated above, as part of the current Kanata Lakes site plan application, a third analysis was completed to determine the impacts to the Terry Fox Drive trunk sewer and determine if the increased density of the Kanata Lakes site beyond the 100 units/hectare can be accommodated. Using the information provided by IBI for the flows from Terry Fox Drive and the Richardson Ridge Lands and the current Broughton Lands flows, the overall sanitary flows have decreased from 66.31 L/s to 65.94 L/s. This decrease in the overall flows to the Terry Fox Drive sanitary trunk sewer lowers the total flows from 93.6% Q/Qfull capacity to 93.1% Q/Qfull capacity. Refer to the updated Sanitary Design Sheets – Revised Broughton Lands Development, December 16, 2016 by Novatech, IBI Sanitary Design Sheets (February 18, 2011) and IBI As-built Sanitary Design Spreadsheets in Appendix A.

The downstream Broughton subdivision sanitary sewer and the Terry Fox Drive sanitary trunk sewer can accommodate the increased density of the final Kanata Lakes site plan of

186 units. The arbitrary limit of 100 units/hectare may be revised as the existing sanitary infrastructure has sufficient capacity to service the proposed 186 units within Kanata Lakes.

5.2 Sanitary Design

The design flows were calculated for the development using estimated populations based on design plans and composition of condominiums.

The minimum pipe size required to convey the sanitary flows is a 200mm diameter PVC pipe at a slope of 0.32%. This minimum sanitary sewer will achieve the minimum cleansing velocity of 0.60 m/s and will have a capacity of 18.9 L/s.

Population estimates and sanitary flows from the site for the proposed development are calculated using design criteria from the City of Ottawa Sewer Design Guidelines.

Design Flow, Residential = 350 L/c/day
Residential Peaking Factor = Harmon Equation
Peak Correction Factor = 4.0
Infiltration Allowance = 0.28 L/s/ha
Condo Residential Dwelling = 2.1 people/unit (existing 12 and 16 unit buildings)
Condo Residential Dwelling = 1.8 people/unit (79 unit buildings)

The sanitary sewer system for Broughton Subdivision, which included provision for servicing of the Kanata Lakes site, was detailed and approved in the *Design Brief, Broughton Lands Residential Development (Phases 1 and 2), July 18, 2008, by Novatech Engineering*. The design sheets have been updated to reflect the current proposed development and are included in Appendix A.

6.0 WATER SUPPLY SYSTEM

A detailed watermain hydraulic analysis, *Hydraulic Network Analysis, Broughton Subdivision dated July 18, 2009 by Novatech Engineering*, was approved by the City of Ottawa which included servicing of the proposed Kanata Lakes site.

The objectives of the original report were as follows:

- Review the existing water supply infrastructure for connection to the proposed network;
- Describe the design criteria necessary for the operation of the network;
- Develop a hydraulic model of the proposed water plant; and
- Evaluate the operating conditions of the proposed hydraulic network.

6.1 Design Criteria

The following design criteria were used to assess the proposed watermain sizes:

Residential

- Two Bedroom Apartments (12 & 16 unit buildings) 2.1 persons/unit
- Average Apartment (79 unit buildings) 1.8 persons/unit
- Max Daily Demand 2.5 x Average Day
- Peak Hour Demand 2.2 x Max Daily Demand

Fire Flow

- Fire Demand 195.69 L/s as per Fire Underwriter's Survey for Public Fire Protection.

System Requirements:

- Maximum Pressure 690 kPa (100 psi)
- Maximum Pressure requiring a Pressure reducing Valve 550 kPa (80 psi)
- Minimum Pressure 275 kPa (40 psi) except during fire flow condition
- Minimum Pressure (fire) 140 kPa (20 psi)

Friction Factors:

Watermain Size:	C-Factor:
200 mm dia.	110

Design Criteria for Water Demand:

Average Daily Demand; Maximum Daily Demand plus Fire Flow; and Peak Hour Demand.

6.2 Existing Water Supply System

A 200mm watermain on Battersea Crescent will service the proposed development. The proposed development currently has two connections to the existing 200mm diameter watermain on Battersea Crescent; one at the west entrance and one in front of Block 9 (garbage and recycling building). The current connections operate independently from each other and were part of an older site plan design. The majority of the 200mm diameter on-site watermain that is already constructed will be utilized.

6.3 Boundary Conditions

The hydraulic grade line (HGL) boundary conditions were obtained from the City of Ottawa based on two connections to Battersea Crescent and an internally looped watermain. The HGL elevations at the 200mm diameter watermain connection points (on Battersea Crescent) are 154.2m for the peak hour flow, 162.8m for the high pressure check, 135.7m

for the maximum day plus fire flow at the west entrance and 137.0 for the maximum day plus fire flow at the east connection point. See Appendix D for correspondence.

6.4 Proposed Water Supply System

The development will be serviced using the existing 200mm diameter watermain on-site. A large portion of the existing on-site watermain on the east side of the site ran underneath the proposed 79 unit building and therefore has been removed and realigned near Block 9. The development now has a looped 200mm diameter watermain underneath the retaining wall connecting to the existing watermain in front of Block 2 on the west side of the site. The existing services (50mm) to Blocks 1 and 2, Block 4 has a 150mm diameter service installed and Block 3 will have a proposed 150mm diameter service installed.

6.5 Hydraulic Modeling

The hydraulic modeling program "EPANET for Windows Version 2.0" was used for the purpose of analyzing the performance of the proposed watermain network under the various operating conditions.

Detailed hydraulic modeling of the proposed system network was conducted for the development and is detailed in the approved *Hydraulic Network Analysis, Broughton Subdivision dated July 18, 2009 by Novatech Engineering.*

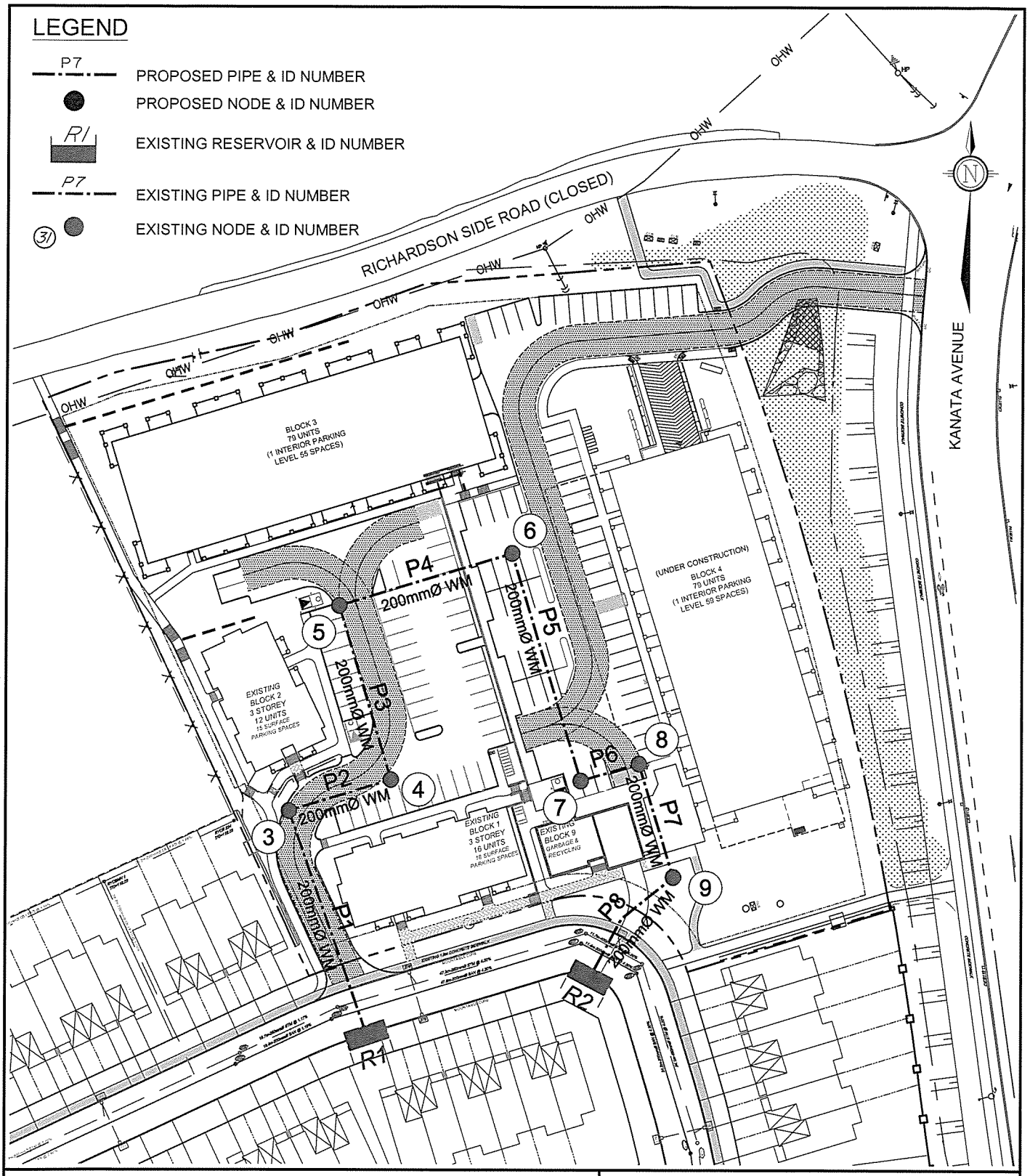
A further review was performed for the site based on the current proposed 186 units of condominiums with a looped system. The results are provided in Appendix C.

The following table summarizes the demands under the various combined operating conditions for the development. Refer to Appendix C for the detailed list of the demands listed by node and operating condition. Refer to Figure 6 for Watermain Layout / Network Plan.

Table 3: Hydraulic Model Demand – Kanata Lakes

Description	Demand
No. of Inhabitants	343.2
Average Daily Flow	1.39 L/s
Max. Daily Flow (MD)	3.48 L/s
Peak Hour Flow (PH)	7.65 L/s

Detailed hydraulic modeling of the proposed system network was conducted for the Kanata Lakes development to confirm the proposed layout has adequate capacity to service the development. The analysis pinpoints the minimum system pressures expected as a result of the maximum daily demand, the maximum daily demand plus fire flow and the peak hour demand design conditions at 2.4m below the proposed ground surface. Refer to Appendix C for the detailed results.



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NTS

KANATA LAKES - BLOCK 3 (124 BATTERSEA CRES., KANATA)

WATERMAIN LAYOUT/ NETWORK PLAN

DEC 2016 110105 FIGURE 6

M:\2010\110105\CAD\Design\Figures\Design Brief\2016 - Block 3\Fig6-WM Network.dwg, WM Plan, Dec 20, 2016 - 10:40am, (GETPROP ERROR)

Table 4: Hydraulic Model Results Kanata Lakes

Operating Condition	Minimum Operating Pressure
Max Daily Demand + Fire Flow	**Watermain**
MD = 1.66 L/s FF= 195.69 L/s at node N5	147.64 kPa 21.41 psi
MD = 0.00 L/s FF= 195.69 L/s at node N6	163.93 kPa 23.78 psi
Peak Hour Demand	
PH = 7.65 L/s (total demand)	388.77 kPa (At Node 5) 56.39 psi
Maximum High Pressure	
MHP = node N9	508.16 kPa 73.70 psi
Maximum Time On Site	
MTS = node N6	2.6 hours

The results indicate that acceptable minimum system pressures will exist throughout the proposed distribution system under all design conditions.

6.6 Watermain Conclusions

The water distribution network as proposed can provide an adequate system pressure for the maximum day plus fire and the peak hour design conditions at all nodes throughout the condominium development at 2.4m below the proposed ground surface. These adequate pressures can be achieved under the current conditions of existing infrastructure.

7.0 ROADWAYS

7.1 Roadway Characteristics

The condominium development will have two separate entrances; one off of Battersea Crescent and one off Kanata Avenue. The roadways servicing the development will consist of 6.7m wide heavy duty asphalt roadways which provide access to the separate parking areas. There are two large vehicle parking areas which provide 109 parking spaces and provides accommodation for 111 bicycle parking spaces. The development also provides 59 interior parking spaces for residents in one 79 unit building (Block 4) and 55 interior parking spaces for residents in the other 79 unit building (Block 3).

Each roadway is designed to accommodate emergency vehicles.

7.2 Traffic

The traffic requirements for the development were previously analyzed as part of Broughton subdivision. The details can be found in the approved *Broughton Subdivision Transportation Impact Study dated October 2008 by Novatech Engineering* and *Broughton Subdivision Transportation Impact Study – Addendum No. 1 dated February 23, 2010 by Novatech Engineering.*

The proposed development has been revised to consist of a total of 186 condominiums from the original approved Traffic Impact Study and Traffic Impact Study – Addendum 1. A second addendum had been produced in support of a Site Plan application for the proposed Kanata Lakes condominiums (120 unit), and its purpose is to identify the traffic impact associated with the new site plan, and determine whether the findings and conclusions of the original Broughton Subdivision TIS (and Addendum #1) were still valid. Refer to the *Broughton Subdivision Transportation Impact Study – Addendum No. 2 dated March 23, 2011 by Novatech Engineering* that was previously submitted electronically to Ed Blaszinski at the City of Ottawa. A traffic third addendum was prepared to modify the number of condominiums and propose a full-access driveway on Kanata Avenue, approximately 190m north of Huntsville Drive. Refer to the *Broughton Subdivision Transportation Impact Study – Addendum No. 3 dated September 8, 2015 by Novatech Engineering* that was previously submitted to Riley Carter at the City of Ottawa. A fourth traffic addendum will analyze the same findings and conclusions to determine if the adjacent road network can accommodate an increase in traffic. This is being submitted under a separate cover.

7.3 Pedestrian Facilities

There are 1.8m wide hard surface sidewalks provided within the development to all condominium blocks at both the front and rear entrances of the buildings. There are also connections to the Battersea Crescent sidewalk, Kanata Avenue sidewalk and will have a sidewalk connection to Richardson Side Road (closed to vehicle traffic).

7.4 Noise

The approved *Broughton Subdivision Noise Control Study, dated January 8, 2010, by Novatech Engineering,* suggested a separate Noise Control Study be prepared in support of a site plan application for any development on the Phase 3B lands within Broughton Subdivision.

The analysis of the roadway traffic along Kanata Avenue indicates that the City of Ottawa's criteria for residential noise will be exceeded, primarily for units in close proximity to Kanata Avenue. Attenuation measures are required and they may include the installation of central air conditioning, forced air ventilation and/or a notice may be placed on title with regards to the noise levels to be expected. The detailed results are included in the Noise Control Study. Refer to *Kanata Lakes 124 Battersea Crescent, Noise Control Study dated*

June 3, 2016 by Novatech & Kanata Lakes 124 Battersea Crescent, Noise Control Study - Block 3, dated December 20, 2016 by Novatech.

8.0 EROSION AND SEDIMENT CONTROL

Erosion and sediment control measures will be implemented during construction in accordance with the "Guidelines on Erosion and Sediment Control for Urban Construction Sites" (Government of Ontario, May 1987).

Typical erosion and sediment control measures recommended include, but are not limited to, the use of silt fences around perimeter of site (OPSD 219.110), catchbasin inserts under catch basin/maintenance hole lids, heavy duty silt fence barrier (OPSD 219.130), straw bale check dams (OPSD 219.180), rock check dams (219.210 or OPSD 219.211), riprap (OPSS 511), mud mats, silt bags for dewatering operations, topsoil and sod to disturbed areas and natural grassed waterways. Dewatering and sediment control techniques will be developed for the individual situations based on the above guidelines and utilizing typical measures to ensure erosion and sediment control is controlled in an acceptable manner and there is no negative impact to adjacent lands, water bodies or water treatment/conveyance facilities.

It will be the responsibility of the Contractor to submit a detailed construction schedule and appropriate staging, dewatering and erosion and sediment control plans to the Contract Administrator for review and approval prior to the commencement of work. A copy of the City of Ottawa Special Provision F-1004 is included in the Appendix which will become part of any contract and which outlines the contractual requirements which includes preparation of a detailed erosion and sediment control plan.

General

- All erosion and sediment control measures are to be installed to the satisfaction of the engineer, the municipality and the conservation authority prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and remain present during all phases of site preparation and construction.
- A qualified inspector should conduct daily visits during construction to ensure that the contractor is working in accordance with the design drawings and that mitigation measures are being implemented as specified.
    - A light duty silt fence barrier is to be installed in the locations shown on the Erosion and Sediment Control Plan.
    - Straw bale barriers are to be installed in drainage ditches.
    - Catchbasin inserts are to be placed under the grates of all proposed and existing catchbasins and structures.
    - After complete build-out, all sewers are to be inspected and cleaned and all sediment and construction fencing is to be removed.
- The contractor shall ensure that proper dust control is provided with the application of water (and if required, calcium chloride) during dry periods.

- The contractor shall immediately report to the engineer or inspector any accidental discharges of sediment material into any ditch or sewer system. Appropriate response measures shall be carried out by the contractor without delay.
- The contractor acknowledges that failure to implement erosion and sediment control measures may result in penalties imposed by any applicable regulatory agency.

9.0 UTILITIES

The development will be serviced by hydro, phone, gas and cable, which will be constructed in a four-party trench, as per the City and utility standard right-of-way cross-sections. Canada Post will service the site with a centralized mail facility. Site lighting will be provided along roadways, walkways and parking areas as per City standards.

10.0 PHASING

The proposed development will be constructed in one phase.

11.0 DEVIATIONS FROM SEWER DESIGN GUIDELINES

Specifics

No deviations from standard design required.

12.0 CONCLUSIONS

- Sanitary service will be provided by existing and proposed 200mm-diameter SAN pipe within the condominium development with existing outlet connections at the west entrance and a connection in front of Block 9 on Battersea Crescent within Broughton Subdivision. The sanitary trunk sewer on Terry Fox Drive can accommodate the proposed 186 units within the Kanata Lakes development.
- Storm service will be provided by via two existing connections to the storm sewer on Battersea Crescent; one 250mm-diameter STM pipe connected at the west entrance to the storm sewer on Battersea Crescent and one 375mm-diameter STM pipe connected in front of Block 9 to the storm sewer on Battersea Crescent. The west side of the site will utilize existing 250mm-diameter STM pipe for site drainage and remain untouched. The east side of the site utilizes a combination of existing 375mm-diameter STM pipe and proposed 375mm-diameter and 1050mm-diameter superpipe for site drainage and storage.
- Storm servicing for the development is provided using a dual drainage system: minor system flows (up to the 5-year event) will be conveyed by storm sewers, while major system flows will be stored at low points in the roadways, parking areas and 1050mm diameter superpipe. Flows that exceed the provided storage will be conveyed overland along defined overland flow routes to Battersea Crescent and the Kanata Avenue ditch.

- Minor system flows from the majority of the development will be conveyed to the storm sewer in Battersea Crescent, with the exception of the landscaped areas within the north and east sides of the site, which will sheet drain directly to the roadside ditch along Kanata Avenue.
- Major system storm flows will be conveyed directly to Battersea Crescent by the east and west entrances of the development.
- Water service will be provided by existing 200mm-diameter watermain from Battersea Crescent connected at the west entrance and in front of Block 9 with a 200mm-diameter looped watermain within the development.
- Local private roadways will be 6.7m wide heavy duty asphalt roadways which provide access to the separate parking areas. Internal pathways will be provided within the development to all condominium blocks with connections to the Battersea Crescent sidewalk, Kanata Avenue sidewalk and will have a sidewalk connection to Richardson Side Road (closed to vehicle traffic).
- Noise attenuation measures such as a noise wall are not required on the site. Building provisions and warning clauses are required. See detailed noise study, *Kanata Lakes 124 Battersea Crescent, Noise Control Study - Block 3, dated December 20, 2016 by Novatech.*.
- Erosion and sediment control measures (i.e. silt fences, catchbasin inserts, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.
- Erosion and sediment control measures associated with construction are to be implemented as outlined in Section 8.0.
- The development will be serviced by hydro, phone, gas and cable, which will be constructed in a four-party trench, as per the City and utility standard right-of-way cross-sections. Canada Post will service the site with a centralized mail facility. Site lighting will be provided along roadways and pathways as per City standards.

NOVATECH

Prepared by:

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Reviewed by:

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PROVINCE OF ONTARIO

Drew Blair, P.Eng
Project Manager

FOR REVIEW ONLY

APPENDIX A

Sanitary Sewer Design

SANITARY DESIGN SHEET
124 BATTERSEA CRESCENT
KANATA LAKES - BLOCK 3
CONDOMINIUM DEVELOPMENT
JOB #110105

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION				INDIVIDUAL AREA AND POPULATION				CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area (ha)	2 Bedroom Condo	Average Condo	Pop.	Area (ha)	Pop.	Peak Factor	Pop. Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Length (m)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (L/s)	Ratio Q/Qfull (%)
West Entrance	4	109	107	0.52	12	79	167.4	0.52	167.4	4.00	2.71	0.15	2.86	29.9	203.2	200	1.19	1.15	37.3	8%
	3	107	105	0.09	16		33.6	0.61	201.0	4.00	3.26	0.17	3.43	18.7	203.2	200	0.59	0.81	26.3	13%
	2	105	103	0.02				0.63	201.0	4.00	3.26	0.18	3.43	12.2	203.2	200	0.90	1.00	32.4	11%
	1	103	101	0.06				0.69	201.0	4.00	3.26	0.19	3.45	18.7	203.2	200	0.91	1.01	32.6	11%
		101	Ex					0.69	201.0	4.00	3.26	0.19	3.45	9.8	203.2	200	14.18	3.97	128.7	3%
East Entrance	5	203	201	0.40		79	142.2	0.40	142.2	4.00	2.30	0.11	2.42	29.2	203.2	200	0.65	0.85	27.6	9%
	6	201	111	0.04				0.44	142.2	4.00	2.30	0.12	2.43	11.6	203.2	200	0.95	1.03	33.3	7%
		111	Ex					0.44	142.2	4.00	2.30	0.12	2.43	10.4	203.2	200	11.53	3.58	116.1	2%

DESIGN PARAMETERS

Population Flow for 12 and 16 Unit Condominium= 2.1 persons/unit
Population Flow for 79 Unit Condominium= 1.8 persons/unit
Residential Average Flow = 350 L/person/day
Max Residential Peak Factor = 4.00

Peak factor based on Harmon Equation = 1+(14/4+Pop/1000)^1/2)*1 - (Maximum of 4.0)
Infiltration Flow = 0.28 L/s/ha
Min. Velocity= 0.6 m/s
Manning's n= 0.013

Total flow outletting to Battersea Crescent sanitary sewer

Project: Kanata Lakes - Block 3 Condominium Development
Client: Brigil Homes
Date: March 28, 2011
Revised: August 31, 2011
Revised: October 31, 2011
Revised: December 14, 2011
Revised: August 31, 2015
Revised: January 20, 2016
Revised: December 20, 2016

Designed: DDB/SAZ
Checked: MSP
Dwg. Reference: 110105-SAN

LICENSED PROFESSIONAL ENGINEER
Drew Blair
D. D. BLAIR
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BROUGHTON SUBDIVISION
JOB #102118

NOVATECH
Engineers, Planners & Landscape Architects

Revised Broughton Lands Development, December 20, 2016, by Novatech

LOCATION				INDIVIDUAL AREA AND POPULATION						CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area (ha)	Dwellings SFH	2 Bedroom Condo	Average Condo	TH	Pop.	Area (ha)	Pop.	Peak Factor	Pop. Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Length (m)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (L/s)	Ratio Q/Qfull (%)
Huntsville Drive	14	113	111	0.26	4			0	13.6	0.26	13.6	4.00	0.22	0.07	0.29	39.9	203.2	200	1.50	1.29	41.9	1%
Battersea Crescent	15	403	405	0.17				6	16.2	0.17	16.2	4.00	0.26	0.05	0.31	19.4	201.2	200	1.19	1.14	36.3	1%
Kanata Lakes	4	HH109	HH107	0.52		12	79		167.4	0.52	167.4	4.00	2.71	0.15	2.86	29.9	203.2	200	1.19	1.15	37.3	8%
West Entrance	3	HH107	HH105	0.09		16			33.6	0.61	201.0	4.00	3.26	0.17	3.43	18.7	203.2	200	0.59	0.81	26.3	13%
	2	HH105	HH103	0.02						0.63	201.0	4.00	3.26	0.18	3.43	12.2	203.2	200	0.90	1.00	32.4	11%
	1	HH103	HH101	0.06						0.69	201.0	4.00	3.26	0.19	3.45	18.7	203.2	200	0.91	1.01	32.6	11%
		HH101	405							0.69	201.0	4.00	3.26	0.19	3.45	9.0	203.2	200	14.18	3.97	128.7	3%
	16	405	407	0.23				6	16.2	1.09	233.4	4.00	3.78	0.31	4.09	47.6	201.2	200	4.20	2.15	68.2	6%
	17	407	409	0.03						1.12	233.4	4.00	3.78	0.31	4.10	11.4	201.2	200	4.20	2.15	68.2	6%
Kanata Lakes	5	HH203	HH201	0.40			79		142.2	0.40	142.2	4.00	2.30	0.11	2.42	29.2	203.2	200	0.65	0.85	27.6	9%
East Entrance	6	HH201	HH111	0.04						0.44	142.2	4.00	2.30	0.12	2.43	11.6	203.2	200	0.95	1.03	33.3	7%
		HH111	409							0.44	142.2	4.00	2.30	0.12	2.43	10.4	203.2	200	11.53	3.58	116.1	2%
	18	409	411	0.18				5	13.5	1.74	389.1	4.00	6.30	0.49	6.79	34.2	201.2	200	4.20	2.15	68.2	10%
	19	411	111	0.20				5	13.5	1.94	402.6	4.00	6.52	0.54	7.07	46.6	201.2	200	5.37	2.43	77.1	9%
Huntsville Drive	13	111	109	0.34	6			0	20.4	2.54	422.2	4.00	6.84	0.71	7.55	41.9	203.2	200	0.32	0.60	19.3	39%
	12	109	107	0.29	6			0	20.4	2.83	442.6	4.00	7.17	0.79	7.96	37.9	203.2	200	0.32	0.60	19.3	41%
	11	107	105	0.34	5			0	17.0	3.17	459.6	3.99	7.43	0.89	8.32	56.4	203.2	200	0.32	0.60	19.3	43%
	10	105	103	0.02	0			0		3.19	459.6	3.99	7.43	0.89	8.33	18.8	203.2	200	0.32	0.60	19.3	43%
Battersea Crescent	14	403	401	0.45				15	40.5	0.45	40.5	4.00	0.66	0.13	0.78	65.9	201.2	200	2.90	1.78	56.7	1%
	Park	403	401	0.90					0.0	1.35	40.5	4.00	0.66	0.38	1.03	65.9	201.2	200	2.90	1.78	56.7	2%
	13	401	305	0.06					0.0	1.41	40.5	4.00	0.66	0.39	1.05	42.5	201.2	200	2.90	1.78	56.7	2%
Richardson Ridge	1D	172A	301	0.74	8				27.2	0.74	27.2	4.00	0.44	0.21	0.65	19.4	201.2	200	1.19	1.14	36.3	2%
Huntsville Drive	8	301	303	0.49	6				20.4	1.23	47.6	4.00	0.77	0.34	1.12	56.2	201.2	200	3.40	1.93	61.4	2%
	9	303	305	0.15	2				6.8	1.38	54.4	4.00	0.88	0.39	1.27	25.8	201.2	200	3.40	1.93	61.4	2%
Huntsville Drive	10	305	307	0.31	6				20.4	3.10	115.3	4.00	1.87	0.87	2.74	40.1	201.2	200	4.50	2.22	70.6	4%
	11	307	309	0.20	4				13.6	3.30	128.9	4.00	2.09	0.92	3.01	23.7	201.2	200	3.60	1.99	63.1	5%
	12	309	CAP	0.06	1				3.4	3.36	132.3	4.00	2.14	0.94	3.08	4.5	201.2	200	4.00	2.09	66.5	5%
	34	CAP	103	0.11	2				6.8	3.47	139.1	4.00	2.25	0.97	3.23	19.9	201.2	200	4.00	2.09	66.5	5%
Ingersoll Crescent	28	525	527	0.26	2			0	6.8	0.26	6.8	4.00	0.11	0.07	0.18	11.5	203.2	200	0.72	0.89	29.0	1%
	29	527	529	0.18	2			0	6.8	0.44	13.6	4.00	0.22	0.12	0.34	19.1	203.2	200	0.72	0.89	29.0	1%
	30	529	531	0.20	3			0	10.2	0.64	23.8	4.00	0.39	0.18	0.56	22.2	203.2	200	0.72	0.89	29.0	2%
	31	531	533	0.14	2			0	6.8	0.78	30.6	4.00	0.50	0.22	0.71	16.6	203.2	200	0.72	0.89	29.0	2%
	32	533	503	0.18	2			0	6.8	0.96	37.4	4.00	0.61	0.27	0.87	44.1	203.2	200	0.72	0.89	29.0	3%

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LOCATION				INDIVIDUAL AREA AND POPULATION						CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area	Dwellings SFH	2 Bedroom Condo	Average Condo	TH	Pop.	Area	Pop.	Peak Factor	Pop. Flow	Infiltration Flow	Total Flow	Length	Dia Act	Dia Nom	Slope	Velocity (Full)	Capacity (Full)	Ratio Q/Qfull
				(ha)						(ha)			(L/s)	(L/s)	(L/s)	(m)	(mm)	(mm)	(%)	(m/s)	(L/s)	(%)
Ingersoll Crescent	27	525	523	0.35	4			0	13.6	0.35	13.6	4.00	0.22	0.10	0.32	50.9	203.2	200	1.20	1.15	37.4	1%
	26	523	521	0.44	6			0	20.4	0.79	34.0	4.00	0.55	0.22	0.77	60.9	203.2	200	1.20	1.15	37.4	2%
	25	521	519	0.09	1			0	3.4	0.88	37.4	4.00	0.61	0.25	0.85	17.7	203.2	200	1.20	1.15	37.4	2%
	24	519	517	0.08	1			0	3.4	0.96	40.8	4.00	0.66	0.27	0.93	11.3	203.2	200	1.20	1.15	37.4	2%
	23	517	515	0.11	1			0	3.4	1.07	44.2	4.00	0.72	0.30	1.02	10.7	203.2	200	0.32	0.60	19.3	5%
	22	515	513	0.18	2			0	6.8	1.25	51.0	4.00	0.83	0.35	1.18	11.8	203.2	200	0.32	0.60	19.3	6%
	21	513	511	0.22	3			0	10.2	1.47	61.2	4.00	0.99	0.41	1.40	22.9	203.2	200	0.32	0.60	19.3	7%
	20	511	509	0.28	4			0	13.6	1.75	74.8	4.00	1.21	0.49	1.70	31.3	203.2	200	0.32	0.60	19.3	9%
	19	509	507	0.22	3			0	10.2	1.97	85.0	4.00	1.38	0.55	1.93	22.9	203.2	200	0.32	0.60	19.3	10%
	18	507	505	0.26	3			0	10.2	2.23	95.2	4.00	1.54	0.62	2.17	31.3	203.2	200	0.32	0.60	19.3	11%
	17	505	503	0.16	2			0	6.8	2.39	102.0	4.00	1.65	0.67	2.32	35.8	203.2	200	0.32	0.60	19.3	12%
Ingersoll Crescent	16	503	501	0.29	4			0	13.6	3.64	153.00	4.00	2.48	1.02	3.50	39.6	203.2	200	0.32	0.60	19.3	18%
	15	501	103	0.36	5			0	17.0	4.00	170.0	4.00	2.75	1.12	3.87	50.6	203.2	200	0.32	0.60	19.3	20%
Huntsville Drive	9	103	213	0.07	0			0	0.0	10.73	768.70	3.87	12.05	3.00	15.06	84.1	203.2	200	2.65	1.72	55.6	27%
Wallaceburg Court	1	609	607	0.65	4				13.6	0.65	13.6	4.00	0.22	0.18	0.40	37.1	201.2	200	0.65	0.84	26.8	1%
	2	607	605	0.09	1				3.4	0.74	17.0	4.00	0.28	0.21	0.48	12.0	201.2	200	0.32	0.59	18.8	3%
	3	605	603	0.26	3				10.2	1.00	27.2	4.00	0.44	0.28	0.72	30.2	201.2	200	0.32	0.59	18.8	4%
Wallaceburg Court	4	601	603	0.39	4				13.6	0.39	13.6	4.00	0.22	0.11	0.33	69.5	201.2	200	4.70	2.27	72.1	0%
Tillsonburg Street	5	603	217	0.36	5				17.0	1.75	57.8	4.00	0.94	0.49	1.43	62.1	201.2	200	4.50	2.22	70.6	2%
	6	217	215	0.35	5				17.0	2.10	74.8	4.00	1.21	0.59	1.80	31.7	201.2	200	4.50	2.22	70.6	3%
	7	215	CAP	0.14	2				6.8	2.24	81.6	4.00	1.32	0.63	1.95	20.6	201.2	200	6.15	2.60	82.5	2%
	8	CAP	213	0.29	5				17.0	2.53	98.6	4.00	1.60	0.71	2.31	23.5	201.2	200	6.15	2.60	82.5	3%
Tillsonburg Street	7	213	211	0.21	4			0	13.6	13.47	871.30	3.84	13.55	3.77	17.32	31.4	203.2	200	5.50	2.47	80.2	22%
	6	211	209	0.32	6			0	20.4	13.79	891.7	3.83	13.84	3.86	17.70	32.2	203.2	200	5.50	2.47	80.2	22%
	5	209	207	0.29	5			0	17.0	14.08	908.7	3.83	14.09	3.94	18.03	33.1	203.2	200	3.20	1.89	61.1	29%
Tillsonburg Street	4	207	205	0.14	2			0	6.8	14.22	915.5	3.82	14.18	3.98	18.16	30.8	203.2	200	3.20	1.89	61.1	30%
Commercial	1		205	1.45						1.45		1.50	1.26	0.41	1.67							
Tillsonburg Street	3	205	203	0.08	0			0	0.0	15.75	915.5	3.82	15.44	4.41	19.85	40.2	381.0	200	0.32	0.91	103.4	19%
		203	201	0.00	0			0	0.0	15.75	915.5	3.82	15.44	4.41	19.85	42.1	381.0	200	0.32	0.91	103.4	19%

SANITARY DESIGN SHEET
BROUGHTON SUBDIVISION
JOB #102118

NOVATECH
Engineers, Planners & Landscape Architects

Revised Broughton Lands Development, December 20, 2016, by Novatech

LOCATION				INDIVIDUAL AREA AND POPULATION						CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area (ha)	Dwellings SFH	2 Bedroom Condo	Average Condo	TH	Pop.	Area (ha)	Pop.	Peak Factor	Pop. Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Length (m)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (L/s)	Ratio Q/Qfull (%)
Foxwood		F113	F111	0.48		24			50.4	0.48	50.4	4.00	0.82	0.13	0.95	62.1	201.2	200	4.50	2.22	70.6	1%
		F111	F105	0.29		12			25.2	0.77	75.6	4.00	1.23	0.22	1.44	31.7	201.2	200	4.50	2.22	70.6	2%
		F109	F107	0.29		24			50.4	0.29	50.4	4.00	0.82	0.08	0.90	62.1	201.2	200	4.50	2.22	70.6	1%
		F107	F105	0.02						0.31	50.4	4.00	0.82	0.09	0.90	31.7	201.2	200	4.50	2.22	70.6	1%
		F105	F103	0.09						1.17	126.0	4.00	2.04	0.33	2.37	62.1	201.2	200	4.50	2.22	70.6	3%
Community Building		F115	F101	0.24		2			4.8	0.24	4.8	4.00	0.08	0.07	0.15	62.1	201.2	200	4.50	2.22	70.6	0%
		F101	F103	0.50		36			75.6	0.74	80.4	4.00	1.30	0.21	1.51	31.7	201.2	200	4.50	2.22	70.6	2%
		F103	201	0.01						1.92	206.4	4.00	3.34	0.54	3.88	62.1	201.2	200	4.50	2.22	70.6	6%
Richardson Ridge and Terry Fox Drive (from IBI Group 2010)			201							42.25	2367.10	3.53	33.83	11.83	45.66	120.0	381.0	375	0.15	0.62	70.8	65%
Terry Fox		201	917	0.17	0			0	0.0	60.09	3489.0	3.39	49.12	16.82	65.94	120.0	381.0	375	0.15	0.62	70.8	93%
		917	915	0.17	0			0	0.0	60.25	3489.0	3.39	49.12	16.87	65.99	120.0	381.0	375	0.15	0.62	70.8	93%
		915	913	0.17	0			0	0.0	60.42	3489.0	3.39	49.12	16.92	66.03	120.0	381.0	375	0.15	0.62	70.8	93%
		913	911	0.17	0			0	0.0	60.58	3489.0	3.39	49.12	16.96	66.08	120.0	381.0	375	0.15	0.62	70.8	93%
		911	909	0.17	0			0	0.0	60.75	3489.0	3.39	49.12	17.01	66.12	120.0	381.0	375	0.15	0.62	70.8	93%
		909	907	0.17	0			0	0.0	60.91	3489.0	3.39	49.12	17.05	66.17	106.5	381.0	375	0.15	0.62	70.8	93%
		907	905	0.17	0			0	0.0	61.08	3489.0	3.39	49.12	17.10	66.22	106.5	381.0	375	0.15	0.62	70.8	94%
		905	903	0.17	0			0	0.0	61.24	3489.0	3.39	49.12	17.15	66.26	120.0	381.0	375	0.15	0.62	70.8	94%
		903	901	0.17	0			0	0.0	61.41	3489.0	3.39	49.12	17.19	66.31	118.0	381.0	375	0.15	0.62	70.8	94%
		901	EX MH	0.17	0			0	0.0	61.57	3489.0	3.39	49.12	17.24	66.35	34.0	381.0	375	0.15	0.62	70.8	94%

DESIGN PARAMETERS

Average Daily Flow =	350	Infiltration Flow=	0.28 L/s/ha
Commercial/Instutional Flow =	50000	Minimum Velocity=	0.6 m/s
Industrial Flow =	35000	Manning's n=	0.013
Max Res Peak Factor =	4.00		
Comm/Inst Peak Factor =	1.50		

Peak factor based on Harmon Equation = 1+(14/4+Pop/1000)^1/2)*1 - (Maximum of 4.0)

Richardson and Baylis Lands areas are preliminary and populations are based on 65 persons/ha
* Viva Kanata population flow determined by 50000 L x 1.38 ha x 1.5 Peak Factor / 86400 s = 1.20 L/s

Project: Broughton Subdivision
Kanata Lakes Condominium Development
Client: Kanata Road Inc. c/o Regional Group
DCR Phoenix
Date: May 28, 2006
Revised August 24, 2007
May 2, 2008
June 13, 2008
July 18, 2008
October 31, 2011
March 21, 2012
November 28, 2014
April 22, 2015
August 31, 2015
December 20, 2016

Designed: ATR/JA/DDB
Checked: MSP
Dwg. Reference: 102118-SAN
110105-SAN

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER ASBUILT DESIGN SHEET

PROJECT: Richardson Ridge
LOCATION: CITY OF OTTAWA
CLIENT: Richardson Ridge

LOCATION			RESIDENTIAL									INSTITUTIONAL COMMERCIAL INDUSTRIAL									TOTAL FLOW	ASBUILT SEWER DESIGN					
			UNIT TYPES					POPULATION		CUMULATIVE FLOW		AREA (ha)										PROPOSED SEWER DESIGN					
Street	From MH	To MH	Singles	Semis	Towns	Stacked	Area (Ha.)	INDIV.	CUM.	Peaking Factor	Peak Flow (l/s)	INSTITUTION Indiv	INSTITUTION Cumm.	COMMERCIAL Indiv	COMMERCIAL Cumm.	INDUSTRIAL Indiv	INDUSTRIAL Cumm.	Pk. Flow (l/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (l/s)	(l/s)	Capacity (l/s)	Pipe Size (mm)	Length (M)	Slope (%)	Velocity(f) M/sec	Avail. Cap. l/s	Avail. Cap. (%)
Phase 1A																													
Grainstone Drive	MH100A	MH101A	5.0					17.0	17.0	4.00	0.28							0.00	0.39	0.39	0.11	0.39	34.56	200	58.03	1.02	1.07	34.17	98.87
Grainstone Drive	MH101A	MH102A	2.0					6.8	23.8	4.00	0.39							0.00	0.27	0.66	0.18	0.57	33.70	200	13.39	0.97	1.04	33.13	98.29
Grainstone Drive	MH102A	MH103A	6.0					20.4	44.2	4.00	0.72							0.00	0.44	1.10	0.31	1.03	30.60	200	40.07	0.80	0.94	29.57	96.64
Grainstone Drive	MH103A	MH104A	5.0					17.0	61.2	4.00	0.99							0.00	0.44	1.54	0.43	1.42	24.91	200	60.06	0.53	0.77	23.49	94.29
Grainstone Drive	MH104A	MH105A	4.0					13.6	74.8	4.00	1.21							0.00	0.62	2.16	0.60	1.81	19.36	200	16.73	0.32	0.60	17.55	90.63
Grainstone Drive	MH105A	MH106A	13.0					44.2	119.0	4.00	1.93							0.00	0.94	3.10	0.87	2.80	19.66	200	100.30	0.33	0.61	16.86	85.77
Drumheller St.	MH109A	MH110A	5.0					17.0	17.0	4.00	0.28							0.00	0.38	0.38	0.11	0.39	50.87	200	60.52	2.21	1.57	50.48	99.24
Drumheller St.	MH110A	MH106A	5.0					17.0	34.0	4.00	0.55							0.00	0.38	0.76	0.21	0.76	24.67	200	69.94	0.52	0.76	23.91	96.91
Grainstone Drive	MH106A	MH107A	6.0					20.4	173.4	4.00	2.81							0.00	0.54	4.40	1.23	4.04	37.95	200	65.12	1.23	1.17	33.91	89.35
Gabbro Cresc.	MH111A	MH112A	2.0					6.8	6.8	4.00	0.11							0.00	0.21	0.21	0.06	0.17	42.74	200	10.92	1.56	1.32	42.57	99.61
Gabbro Cresc.	MH112A	MH107A	5.0					17.0	23.8	4.00	0.39							0.00	0.41	0.62	0.17	0.56	33.87	200	51.67	0.98	1.05	33.31	98.34
Grainstone Drive	MH107A	MH108A	5.0					17.0	214.2	4.00	3.47							0.00	0.46	5.48	1.53	5.00	57.97	200	76.50	2.87	1.79	52.97	91.37
Huntsville Dr.	MH129A	MH128A	2.0					6.8	6.8	4.00	0.11							0.00	0.25	0.25	0.07	0.18	36.05	200	29.86	1.11	1.11	35.87	99.50
Huntsville Dr.	MH128A	MH116A	3.0					10.2	17.0	4.00	0.28							0.00	0.30	0.55	0.15	0.43	33.53	200	30.13	0.96	1.03	33.10	98.71
Huntsville Dr.	MH116A	MH117A	1.0					3.4	20.4	4.00	0.33							0.00	0.20	0.75	0.21	0.54	56.22	200	30.03	2.70	1.73	55.68	99.04
Huntsville Dr.	MH117A	MH118A	3.0					10.2	30.6	4.00	0.50							0.00	0.34	1.09	0.31	0.81	71.53	200	29.74	4.37	2.21	70.72	98.87
Huntsville Dr.	MH118A	MH119A	2.0					6.8	37.4	4.00	0.61							0.00	0.25	1.34	0.38	0.99	83.95	200	30.23	5.02	2.59	82.96	98.83
Huntsville Dr.	MH119A	MH120A	1.0					3.4	40.8	4.00	0.66							0.00	0.20	1.54	0.43	1.09	77.95	200	22.95	5.19	2.40	76.86	98.60
Huntsville Dr.	MH120A	MH121A						0.0	40.8	4.00	0.66							0.00	0.01	1.55	0.43	1.09	19.36	200	15.41	0.32	0.60	18.27	94.35
Huntsville Dr.	MH129A	MH130A	3.0					10.2	10.2	4.00	0.17							0.00	0.42	0.42	0.12	0.29	47.04	200	58.82	1.29	1.45	46.75	99.39
Huntsville Dr.	MH130A	MH131A	4.0					13.6	23.8	4.00	0.39							0.00	0.28	0.70	0.20	0.59	71.12	200	54.85	4.42	2.19	70.53	99.18
Huntsville Dr.	MH131A	MH132A						0.0	23.8	4.00	0.39							0.00	0.03	0.73	0.20	0.59	30.41	200	10.08	0.79	0.94	29.82	98.05
Huntsville Dr.	MH132A	MH133A	5.0					17.0	40.8	4.00	0.66							0.00	0.41	1.14	0.32	0.98	19.05	200	71.14	0.21	0.59	18.07	94.86
Huntsville Dr.	MH133A	MH134A	3.0					10.2	51.0	4.00	0.83							0.00	0.37	1.51	0.42	1.25	20.63	200	59.10	0.36	0.63	19.38	93.90
Huntsville Dr.	MH134A	MH135A	4.0					13.6	64.6	4.00	1.05							0.00	0.48	1.99	0.56	1.61	19.36	200	59.76	0.32	0.60	17.75	91.70
Huntsville Dr.	MH135A	MH136A	1.0					3.4	68.0	4.00	1.10							0.00	0.28	2.27	0.64	1.74	46.79	200	60.45	1.87	1.44	45.05	96.29
Huntsville Dr.	MH136A	MH121A						0.0	68.0	4.00	1.10							0.00	0.50	2.77	0.78	1.88	21.64	200	64.95	0.40	0.67	19.76	91.33
Grainstone Drive	MH121A	MH122A	2.0					6.8	115.6	4.00	1.87							0.00	0.24	4.56	1.28	3.15	19.36	200	38.41	0.32	0.60	16.21	83.75
Grainstone Drive	MH122A	MH123A	2.0					6.8	122.4	4.00	1.98							0.00	0.25	4.81	1.35	3.33	19.95	200	20.89	0.34	0.62	16.62	83.32
Grainstone Drive	MH123A	MH124A	9.0					30.6	153.0	4.00	2.48							0.00	0.77	5.58	1.56	4.04	19.05	200	65.74	0.31	0.59	15.01	78.78
Grainstone Drive	MH124A	MH125A	8.0					27.2	180.2	4.00	2.92							0.00	0.70	6.28	1.76	4.68	19.05	200	65.91	0.31	0.59	14.37	75.44
Grainstone Drive	MH125A	MH126A	2.0					6.8	187.0	4.00	3.03							0.00	0.32	6.60	1.85	4.88	19.36	200	11.02	0.32	0.60	14.48	74.80
Grainstone Drive	MH126A	MH127A	5.0					17.0	204.0	4.00	3.31							0.00	0.48	7.08	1.98	5.29	19.05	200	77.33	0.31	0.59	13.76	72.22
Gabbro Cresc.	MH111A	MH113A	4.0					13.6	13.6	4.00	0.22							0.00	0.39	0.39	0.11	0.33	60.15	200	69.64	3.09	1.85	59.82	99.45
Gabbro Cresc.	MH113A	MH114A	2.0					6.8	20.4	4.00	0.33							0.00	0.24	0.63	0.18	0.51	61.02	200	11.02	3.15	1.88	60.51	99.17
Gabbro Cresc.	MH114A	MH127A	5.0					17.0	37.4	4.00	0.61							0.00	0.40	1.03	0.29	0.90	56.22	200	51.09	2.270	1.73	55.32	98.40
Grainstone Drive	MH127A	MH108A						0.0	241.4	4.00	3.91							0.00	0.01	8.12	2.27	6.18	19.66	200	6.45	0.31	0.61	13.48	68.55
Block 440	MH108A	MH181A						0.0	455.6	3.99	7.37							0.00	0.02	13.62	3.81	11.18	20.81	200	35.51	0.37	0.64	9.63	46.28
Block 440 To Richcraft	MH181A	MH182A						0.0	455.6	3.99	7.37							0.00	0.02	13.64	3.82	11.19	29.23	200	38.52	0.73	0.90	18.04	61.72
Total Phase 1A to Richcraft			134.0					455.6											13.64			11.19							
Phase 1D Huntsville Dr.	MH170A	MH171A	8					27.2	27.2	4.00	0.00							0.00	0.58	0.58	0.16	0.16	73.23	200	50.60	4.58	2.25	73.07	99.78
Huntsville Dr. To Broughton	MH171A	MH172A						0.0	27.2	4.00	0.00							0.00	0.16	0.74	0.21	0.21	68.35	200	39.80	3.99	2.11	68.14	99.70

Designed:	Updated as-built data	18-Jun-13
	Updated as-built data	4-Mar-13
	Updated as-built data	14-Feb-13
	Added as-built data	11-Dec-12
Checked:	Revision #2	Jun-12
	Revision #1	30-Jun-11
	REVISION	DATE

Dwg Reference:	File Ref:	Date:	Sheet No.
11585	11585 - 5.7	8/24/2010	1

Population Per Unit:
- 3.4 For Singles
- 2.7 Townhouses/Semis
- 2.3 Stacked Towns
- 90.0 Low/Medium Density (90 ppHa)

Avg. Per Capita Flow Rate: 350 l/day

Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = pop'n in thousands

Note: Commercial flow was calculated using as an equivalent population.
(area * commercial flow) / avg per capita flow rate

ICI Rates		Peak Factor
Institution	50000 l/ha/day	1.5
Commercial	50000 l/ha/day	1.5
Industrial	35000 l/ha/day	MOE Guidelines

Infiltration Allowance: 0.28 l/sec/Ha

Assumed pipe roughness coefficient = 0.013

J:\11585_RichardRdg\5.7 Calculations\PHASE 1\CCS -11585 Overall Sanitary Sewer 2014-10-06

10/6/2014 1:06 AM

IBI GROUP

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER ASBUILT DESIGN SHEET

PROJECT: Richardson Ridge
LOCATION: CITY OF OTTAWA
CLIENT: Richardson Ridge

LOCATION			RESIDENTIAL									INSTITUTIONAL COMMERCIAL INDUSTRIAL							INFILTRATION ALLOWANCE			TOTAL FLOW	ASBUILT SEWER DESIGN						
			UNIT TYPES					POPULATION		CUMULATIVE FLOW		AREA (ha)											PROPOSED SEWER DESIGN						
Street	From MH	To MH	Singles	Semis	Towns	Stacked	Area (Ha.)	INDIV.	CUM.	Peaking Factor	Peak Flow (l/s)	INSTITUTION Indiv	INSTITUTION Cumm.	COMMERCIAL Indiv	COMMERCIAL Cumm.	INDUSTRIAL Indiv	INDUSTRIAL Cumm.	Pk. Flow (l/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (l/s)	(l/s)	Capacity (l/s)	Pipe Size (mm)	Length (M)	Slope (%)	Velocity(f) M/sec	Avail. Cap. L/s	(%)
External Lands(Richcraft)								198.7	198.7	4.00	3.22								2.26	2.26	0.63								
Future Phase 4								692.0	692.0	3.90	10.93								9.01	9.01	2.52								
Terry Fox Dr. (exisiting)	MH1000A	MH1001A						0.0	890.7	3.83	13.83							0.00	0.35	11.62	3.25	17.08	43.95	300	74.82	0.19	0.60	26.87	61.13
Terry Fox Dr. (exisiting)	MH1001A	MH1002A						0.0	890.7	3.83	13.83							0.00	0.33	11.95	3.35	17.18	43.96	300	70.56	0.19	0.60	26.78	60.93
Terry Fox Dr. (exisiting)	MH1002A	MH1003A						0.0	890.7	3.83	13.83							0.00	0.42	12.37	3.46	17.29	43.94	300	92.77	0.19	0.60	26.65	60.64
Terry Fox Dr. (exisiting)	MH1003A	MH1004A						0.0	890.7	3.83	13.83							0.00	0.56	12.93	3.62	17.45	43.97	300	120.00	0.19	0.60	26.52	60.31
Terry Fox Dr. (exisiting)	MH1004A	MH1005A						0.0	890.7	3.83	13.83							0.00	0.27	13.20	3.70	17.53	44.05	300	59.80	0.19	0.60	26.52	60.21
Terry Fox Dr. (exisiting)	MH1005A	MH1006A						0.0	890.7	3.83	13.83							0.00	0.47	13.67	3.83	17.66	44.01	300	103.52	0.19	0.60	26.35	59.88
Terry Fox Dr. (exisiting)	MH1006A	MH1007A						0.0	890.7	3.83	13.83							0.00	0.33	14.00	3.92	17.75	43.94	300	71.15	0.19	0.60	26.19	59.60
Terry Fox Dr. (exisiting)	MH1007A	MH1008A						0.0	890.7	3.83	13.83							0.00	0.19	14.19	3.97	17.80	79.91	375	42.96	0.19	0.70	62.11	77.72
Phase 1C																													
Huntsville Dr.	MH324A	MH325A	9					30.6	30.6	4.00	0.50							0.00	0.56	0.56	0.16	0.66	34.73	200	60.40	1.03	1.07	34.07	98.11
Huntsville Dr.	MH325A	MH326A	6					20.4	51.0	4.00	0.83							0.00	0.45	1.01	0.28	1.11	61.78	200	48.70	3.26	1.91	60.67	98.20
Huntsville Dr.	MH326A	MH327A	6					20.4	71.4	4.00	1.16							0.00	0.43	1.44	0.40	1.56	70.87	200	50.12	4.29	2.19	69.31	97.79
Huntsville Dr.	MH327A	MH328A	10					34.0	105.4	4.00	1.71							0.00	0.77	2.21	0.62	2.33	72.10	200	83.04	4.44	2.22	69.77	96.77
Total from Phase 3A			41		175	0			522.4	3.96	8.39									5.42									
Huntsville Dr.	MH328A	MH329A	2					6.8	634.6	3.92	10.07							0.00	0.25	7.88	2.21	12.28	76.83	300	39.39	0.58	1.05	64.55	84.02
Huntsville Dr. To Terry Fox Dr.	MH329A	MH1008A	4					13.6	648.2	3.91	10.28							0.00	0.51	8.39	2.35	12.63	47.32	300	75.70	0.22	0.65	34.69	73.31
Terry Fox Dr. (exisiting)	MH1008A	MH1009A						0.0	1538.9	3.67	22.89							0.00	0.32	22.90	6.41	29.30	72.97	375	71.00	0.16	0.64	43.67	59.84
Terry Fox Dr. (exisiting)	MH1009A	MH1010A						0.0	1538.9	3.67	22.89							0.00	0.46	23.36	6.54	29.43	69.39	375	100.74	0.14	0.61	39.96	57.59
Total from Phase 2A		MH1010A	32		52				249.2											4.84		5.40							
Terry Fox Dr. (exisiting)	MH1010A	MH1011A						0.0	1788.1	3.62	26.24							0.00	0.35	28.55	7.99	34.23	68.36	375	78.75	0.14	0.60	34.13	49.92
Preliminary Total from Phase 2B&C		MH1011A	1		68				187.0											3.23		3.93							
Terry Fox Dr. (exisiting)	MH1011A	MH1012A				28		50.4	2025.5	3.58	29.39							0.00	1.05	32.83	9.19	38.58	68.44	375	119.98	0.14	0.60	29.86	43.63
Terry Fox Dr. (exisiting)	MH1012A	MH1013A				28		50.4	2075.9	3.57	30.05							0.00	1.00	33.83	9.47	39.52	68.49	375	77.75	0.14	0.60	28.97	42.30
Terry Fox Dr. (exisiting)	MH1013A	MH1014A				28		50.4	2126.3	3.56	30.71							0.00	0.93	34.76	9.73	40.44	68.46	375	74.96	0.14	0.60	28.02	40.92
Terry Fox Dr. (exisiting)	MH1014A	MH1015A						0.0	2126.3	3.56	30.71							0.00	0.35	35.11	9.83	40.54	68.54	375	74.78	0.14	0.60	28.00	40.85
Phase 1B																													
Grand Manan Circle	MH150A	MH151A	10.0					34.0	34.0	4.00	0.55							0.00	0.88	0.88	0.25	0.80	33.87	200	79.85	0.98	1.05	33.07	97.65
Grand Manan Circle	MH159A	MH156A	5.0					17.0	17.0	4.00	0.28							0.00	0.34	0.34	0.10	0.38	32.82	200	41.36	0.92	1.01	32.44	98.86
Grand Manan Circle	MH156A	MH157A	3.0					10.2	27.2	4.00	0.44							0.00	0.20	0.54	0.15	0.59	52.00	200	28.99	2.31	1.60	51.41	98.86
Grand Manan Circle	MH157A	MH158A	7.0					23.8	51.0	4.00	0.83							0.00	0.44	0.98	0.27	1.10	51.79	200	59.47	2.29	1.60	50.69	97.87
Grand Manan Circle	MH158A	MH151A						0.0	51.0	4.00	0.83							0.00	0.01	0.99	0.28	1.11	35.56	200	12.93	1.08	1.10	34.45	96.89
Grand Manan Circle	MH151A	MH152A	1.0					3.4	88.4	4.00	1.43							0.00	0.11	1.98	0.55	1.98	22.95	200	24.52	0.45	0.71	20.97	91.35
Grand Manan Circle	MH152A	MH153A	2.0					6.8	95.2	4.00	1.54							0.00	0.29	2.27	0.64	2.18	19.36	200	12.48	0.32	0.60	17.18	88.76
Grand Manan Circle	MH153A	MH154A	6.0					20.4	115.6	4.00	1.87							0.00	0.58	2.85	0.80	2.67	34.56	200	92.19	1.02	1.07	31.89	92.28
Grand Manan Circle	MH154A	MH155A	4.0					13.6	129.2	4.00	2.09							0.00	0.38	3.23	0.90	2.99	28.42	200	68.44	0.69	0.88	25.43	89.46
Grand Manan Circle	MH155A	MH163A	2.0					6.8	136.0	4.00	2.20							0.00	0.32	3.55	0.99	3.19	20.53	200	30.91	0.36	0.63	17.34	84.44
Grand Manan Circle	MH159A	MH160A	10.0					34.0	34.0	4.00	0.55							0.00	0.64	0.64	0.18	0.73	51.10	200	77.98	2.23	1.58	50.37	98.57
Grand Manan Circle	MH160A	MH161A	2.0					6.8	40.8	4.00	0.66							0.00	0.19	0.83	0.23	0.89	80.17	200	13.30	5.49	2.47	79.28	98.89
Grand Manan Circle	MH161A	MH162A	2.0					6.8	47.6	4.00	0.77							0.00	0.25	1.08	0.30	1.07	82.62	200	25.05	5.83	2.55	81.55	98.70
Grand Manan Circle	MH162A	MH163A	2.0					6.8	54.4	4.00	0.88							0.00	0.27	1.35	0.38	1.26	78.47	200	12.94	5.26	2.42	77.21	98.40
Block 478	MH163A	MH190A						0.0	190.4	4.00	3.09							0.00	0.01	4.91	1.37	4.46	34.22	200	10.94	1.00	1.06	29.76	86.95
Block 478	MH190A	MH191A						0.0	190.4	4.00	3.09							0.00	0.02	4.93	1.38	4.47	34.22	200	29.00	1.00	1.06	29.75	86.94
Block 478	MH191A	MH192A						0.0	190.4	4.00	3.09							0.00	0.02	4.95	1.39	4.48	96.78	200	40.68	8.00	2.99	92.30	95.38
Richardson Side Road	MH192A	MH193A						0.0	190.4	4.00	3.09							0.00	0.09	5.04	1.41	4.50	98.97	200	48.77	8.37	3.05	94.47	95.45
Richardson Side Road	MH193A	MH194A				28.0		50.4	240.8	4.00	3.90							0.00	0.59	5.63	1.58	5.48	96.78	200	51.00	8.00	2.99	91.30	94.34
Richardson Side Road To Terry Fox Dr.	MH194A	MH1015A						0.0	240.8	4.00	3.90							0.00	0.05	5.68	1.59	5.49	86.95	200	24.28	6.46	2.68	81.46	93.69
Terry Fox Dr. (exisiting)	MH1015A	MH1016A						0.0	2367.1	3.53	33.83							0.00	0.43	41.22	11.54	45.37	68.53	375	95.45	0.14	0.60	23.16	33.79
Terry Fox Dr. (exisiting)	MH1016A	MH1017A						0.0	2367.1	3.53	33.83							0.00	0.43	41.65	11.66	45.49	68.28	375	95.45	0.14	0.60	22.79	33.37
Terry Fox Dr. (exisiting)	MH1017A	MH1018A						0.0	2367.1	3.53	33.83							0.00	0.47	42.12	11.79	45.62	68.44	375	106.00	0.14	0.60	22.82	33.34
Terry Fox Dr. (exisiting)	MH1018A	MH1019A						0.0	2367.1	3.53	33.83							0.00	0.13	42.25	11.83	45.66	117.87	350	42.61	0.60	1.19	72.21	61.26
Terry Fox Dr. (exisiting)	MH1019A	Stub						0.0	2367.1	3.53	33.83							0.00	0.00	42.25	11.83	45.66	68.44	375	24.00	0.14	0.60	22.78	33.28

REVISION	DATE
Updated as-built data	18-Jun-13
Updated as-built data	4-Mar-13
Updated as-built data	14-Feb-13
Added as-built data	7-Dec-12
Revision #2	Jun-12
Revision #1	30-Jun-11

Designed:

Checked:

Dwg Reference:	File Ref:	Date:	Sheet No.
11585	11585 - 5.7	8/24/2010	2

Population Per Unit: 3.4 For Singles; 2.7 Townhouses/Semis; 1.8 Apt; 90.0 Low/Medium Density (90 ppHa)

Avg. Per Capita Flow Rate: 350 l/day

Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = pop'n in thousands

Note: Commercial flow was calculated using as an equivalent population.
(area * commercial flow) / avg per capita flow rate

ICI Rates		Peak Factor
Institution	50000 l/ha/day	1.5
Commercial	50000 l/ha/day	1.5
Industrial	35000 l/ha/day	MOE Guidelines

Infiltration Allowance: 0.28 l/sec/Ha

Assumed pipe roughness coefficient = 0.013

SANITARY DESIGN SHEET
BROUGHTON SUBDIVISION
PHASE 1
JOB #102118

NOVATECH ENGINEERING CONSULTANTS LTD.

Broughton Lands Residential Development (Phases 1 and 2), July 18, 2008, by Novatech Engineering

LOCATION				INDIVIDUAL AREA AND POPULATION				CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area (ha)	Dwellings SFH	Dwellings TH	Pop.	Area (ha)	Pop.	Peak Factor	Pop. Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Length (m)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (L/s)	Ratio Q/Qfull (%)
Huntsville Drive	14	113	111	0.26	4	0	13.6	0.26	13.6	4.00	0.22	0.07	0.29	39.9	201.2	200	1.50	1.28	40.8	1%
Viva Kanata			411	1.38				1.55	16.2	1.50	1.20	0.43	1.63							
Battersea Crescent	Fut 5	Fut 5	Cap	0.81	0	22	59.4	0.81	59.4	4.00	2.16	0.61	2.77		201.2	200	5.37	2.43	77.1	4%
Battersea Crescent	Fut 5	Cap	111	0.00	0	0	0.0	0.81	59.4	4.00	2.16	0.61	2.77	13.0	201.2	200	5.37	2.43	77.1	4%
Huntsville Drive	13	111	109	0.34	6	0	20.4	1.41	79.0	4.00	2.48	0.83	3.31	41.9	201.2	200	0.32	0.59	18.8	18%
	12	109	107	0.29	6	0	20.4	1.70	99.4	4.00	2.81	0.91	3.72	37.9	201.2	200	0.32	0.59	18.8	20%
	11	107	105	0.34	5	0	17.0	2.04	116.4	4.00	3.08	1.01	4.09	56.4	201.2	200	0.32	0.59	18.8	22%
	10	105	103	0.02	0	0	0.0	2.06	116.4	4.00	3.08	1.01	4.09	18.8	201.2	200	0.32	0.59	18.8	22%
Huntsville Drive	Fut 4	Fut 4	Cap	2.62	19	15	105.1	2.62	105.1	4.00	1.70	0.73	2.44		201.2	200	4.00	2.09	66.5	4%
Huntsville Drive	34	Cap	103	0.11	2	0	6.8	2.73	111.9	4.00	1.81	0.76	2.58	19.9	201.2	200	4.00	2.09	66.5	4%
Ingersoll Crescent	28	525	527	0.26	2	0	6.8	0.26	6.8	4.00	0.11	0.07	0.18	11.5	201.2	200	0.72	0.89	28.2	1%
	29	527	529	0.18	2	0	6.8	0.44	13.6	4.00	0.22	0.12	0.34	19.1	201.2	200	0.72	0.89	28.2	1%
	30	529	531	0.20	3	0	10.2	0.64	23.8	4.00	0.39	0.18	0.56	22.2	201.2	200	0.72	0.89	28.2	2%
	31	531	533	0.14	2	0	6.8	0.78	30.6	4.00	0.50	0.22	0.71	16.6	201.2	200	0.72	0.89	28.2	3%
	32	533	503	0.18	2	0	6.8	0.96	37.4	4.00	0.61	0.27	0.87	44.1	201.2	200	0.72	0.89	28.2	3%
Ingersoll Crescent	27	525	523	0.35	4	0	13.6	0.35	13.6	4.00	0.22	0.10	0.32	50.9	201.2	200	1.20	1.15	36.5	1%
	26	523	521	0.44	6	0	20.4	0.79	34.0	4.00	0.55	0.22	0.77	60.9	201.2	200	1.20	1.15	36.5	2%
	25	521	519	0.09	1	0	3.4	0.88	37.4	4.00	0.61	0.25	0.85	17.7	201.2	200	1.20	1.15	36.5	2%
	24	519	517	0.08	1	0	3.4	0.96	40.8	4.00	0.66	0.27	0.93	11.3	201.2	200	1.20	1.15	36.5	3%
	23	517	515	0.11	1	0	3.4	1.07	44.2	4.00	0.72	0.30	1.02	10.7	201.2	200	0.32	0.59	18.8	5%
	22	515	513	0.18	2	0	6.8	1.25	51.0	4.00	0.83	0.35	1.18	11.8	201.2	200	0.32	0.59	18.8	6%
	21	513	511	0.22	3	0	10.2	1.47	61.2	4.00	0.99	0.41	1.40	22.9	201.2	200	0.32	0.59	18.8	7%
	20	511	509	0.28	4	0	13.6	1.75	74.8	4.00	1.21	0.49	1.70	31.3	201.2	200	0.32	0.59	18.8	9%
	19	509	507	0.22	3	0	10.2	1.97	85.0	4.00	1.38	0.55	1.93	22.9	201.2	200	0.32	0.59	18.8	10%
	18	507	505	0.26	3	0	10.2	2.23	95.2	4.00	1.54	0.62	2.17	31.3	201.2	200	0.32	0.59	18.8	12%
	17	505	503	0.16	2	0	6.8	2.39	102.0	4.00	1.65	0.67	2.32	35.8	201.2	200	0.32	0.59	18.8	12%
Ingersoll Crescent	16	503	501	0.29	4	0	13.6	3.64	153.00	4.00	2.48	1.02	3.50	39.6	201.2	200	0.32	0.59	18.8	19%
	15	501	103	0.36	5	0	17.0	4.00	170.0	4.00	2.75	1.12	3.87	50.6	201.2	200	0.32	0.59	18.8	21%
Huntsville Drive	9	103	213	0.07	0	0	0.0	8.86	398.30	4.00	7.65	2.91	10.57	84.1	201.2	200	2.65	1.70	54.2	20%

SANITARY DESIGN SHEET
BROUGHTON SUBDIVISION
PHASE 1
JOB #102118

NOVATECH ENGINEERING CONSULTANTS LTD.

Broughton Lands Residential Development (Phases 1 and 2), July 18, 2008, by Novatech Engineering

LOCATION				INDIVIDUAL AREA AND POPULATION				CUMULATIVE AREA & POPULATION		POPULATION FLOW			TOTAL FLOW	PROPOSED SEWER						
Street	Area Number	From MH	To MH	Area (ha)	Dwellings SFH	Dwellings TH	Pop.	Area (ha)	Pop.	Peak Factor	Pop. Flow (L/s)	Infiltration Flow (L/s)	Total Flow (L/s)	Length (m)	Dia Act (mm)	Dia Nom (mm)	Slope (%)	Velocity (Full) (m/s)	Capacity (Full) (L/s)	Ratio Q/Qfull (%)
Tillsonburg Street	Fut 3	Fut 3	Cap	2.24	24		81.6	2.24	81.6	4.00	1.32	0.63	1.95		201.2	200	6.15	2.60	82.5	2%
Tillsonburg Street	8	Cap	213	0.29	5	0	17.0	2.53	98.6	4.00	1.60	0.71	2.31	23.5	201.2	200	6.15	2.60	82.5	3%
Tillsonburg Street	7	213	211	0.21	4	0	13.6	11.60	500.90	3.97	9.26	3.68	12.94	31.4	201.2	200	5.50	2.46	78.0	17%
	6	211	209	0.32	6	0	20.4	11.92	521.3	3.96	9.57	3.77	13.34	32.2	201.2	200	5.50	2.46	78.0	17%
	5	209	207	0.29	5	0	17.0	12.21	538.3	3.96	9.83	3.85	13.68	33.1	201.2	200	3.20	1.87	59.5	23%
Tillsonburg Street	4	207	205	0.14	2	0	6.8	12.35	545.1	3.95	8.73	3.46	12.19	30.8	201.2	200	3.20	1.87	59.5	20%
Commercial	1		205	1.45				1.45	0.00	1.50	1.26	0.41	1.66							
	3	205	203	0.08	0	0	0.0	12.43	545.1	3.95	11.19	4.32	15.51	40.2	366.4	200	0.32	0.88	93.2	17%
		203	201	0.00	0	0	0.0	12.43	545.1	3.95	11.19	4.32	15.51	42.1	366.4	200	0.32	0.88	93.2	17%
Future Development	Fut 2	Fut 2	T. Fox	1.91	0	61	164.7	1.91	164.7	4.00	2.67	0.53	3.20		201.2	200	5.50	2.46	78.0	4%
Baylis Lands			201	2.26			146.9	2.26	146.9	4.00	2.38	0.63	3.01	100.0	366.4	375	0.15	0.60	63.8	5%
Richardson Farm			201	23.47			1525.6	25.73	1672.5	3.64	24.69	7.20	31.90	100.0	366.4	375	0.15	0.60	63.8	50%
Terry Fox (along Baylis and Richardson)			201	2.70			0.0	30.34	1837.15	3.61	26.90	8.50	35.39	120.0	366.4	375	0.15	0.60	63.8	55%
Terry Fox		201	917	0.17	0	0	0.0	42.94	2382.3	3.53	36.48	12.86	49.34	120.0	366.4	375	0.15	0.60	63.8	77%
		917	915	0.17	0	0	0.0	43.10	2547.0	3.50	38.59	12.91	51.49	120.0	366.4	375	0.15	0.60	63.8	81%
		915	913	0.17	0	0	0.0	43.27	2547.0	3.50	38.59	12.95	51.54	120.0	366.4	375	0.15	0.60	63.8	81%
		913	911	0.17	0	0	0.0	43.43	2547.0	3.50	38.59	13.00	51.59	120.0	366.4	375	0.15	0.60	63.8	81%
		911	909	0.17	0	0	0.0	43.60	2547.0	3.50	38.59	13.05	51.63	120.0	366.4	375	0.15	0.60	63.8	81%
		909	907	0.17	0	0	0.0	43.76	2547.0	3.50	38.59	13.09	51.68	106.5	366.4	375	0.15	0.60	63.8	81%
		907	905	0.17	0	0	0.0	43.93	2547.0	3.50	38.59	13.14	51.73	106.5	366.4	375	0.15	0.60	63.8	81%
		905	903	0.17	0	0	0.0	44.09	2547.0	3.50	38.59	13.19	51.77	120.0	366.4	375	0.15	0.60	63.8	81%
		903	901	0.17	0	0	0.0	44.26	2547.0	3.50	38.59	13.23	51.82	118.0	366.4	375	0.15	0.60	63.8	81%
		901	EX MH	0.17	0	0	0.0	44.42	2547.0	3.50	38.59	13.28	51.86	34.0	366.4	375	0.15	0.60	63.8	81%

DESIGN PARAMETERS

Average Daily Flow = 350
Commercial/Instutional Flow = 50000
Industrial Flow = 35000
Max Res Peak Factor = 4.00
Comm/Inst Peak Factor = 1.50
Peak factor based on Harmon Equation = 1+(14/4+Pop/1000)^1/2)*1 - (Maximum of 4.0)

Infiltration Flow= 0.28 L/s/ha
Minimum Velocity= 0.6 m/s
Manning's n= 0.013

Richardson and Baylis Lands areas are preliminary and populations are based on 65 persons/ha
* Viva Kanata population flow determined by 50000 L x 1.38 ha x 1.5 Peak Factor / 86400 s = 1.20 L/s

Project: Broughton Subdivision
Client: Kanata Road Inc. c/o Regional Group DCR Phoenix
Date: May 28, 2006
Revised August 24, 2007
May 2, 2008
June 13, 2008
July 18, 2008

Designed: ATR/JA/DDB
Checked: MSP
Dwg. Reference: 102118-SAN

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IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

TERRY FOX DRIVE SANITARY SEWER DESIGN SHEET

PROJECT: Richardson Ridge
LOCATION: CITY OF OTTAWA
CLIENT: Richardson Ridge

LOCATION			RESIDENTIAL									INSTITUTIONAL COMMERCIAL INDUSTRIAL							INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
			UNIT TYPES					POPULATION		CUMULATIVE FLOW		AREA (ha)																	
Street	From MH	To MH	Singles	Semis	Towns	Stacked	Area (Ha.)	INDIV.	CUM.	Peaking Factor	Peak Flow (l/s)	INSTITUTION Indiv	INSTITUTION Cumm.	COMMERCIAL Indiv	COMMERCIAL Cumm.	INDUSTRIAL Indiv	INDUSTRIAL Cumm.	Pk. Flow (l/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (l/s)	(l/s)	Capacity (l/s)	Pipe Size (mm)	Length (M)	Slope (%)	Velocity(f) M/sec	Avail. Cap. L/s	Avail. Cap. (%)
External Lands (Richcraft)								198.7	198.7										2.26										
Future Development								692.0	692.0										9.01										
Terry Fox	MH1000A	MH1001A						0.0	890.7	3.83	13.83							0.00	0.35	11.62	3.25	17.08	43.97	300	74.82	0.19	0.60	26.89	61.15
Terry Fox	MH1001A	MH1002A						0.0	890.7	3.83	13.83							0.00	0.33	11.95	3.35	17.18	43.97	300	70.46	0.19	0.60	26.80	60.94
Terry Fox	MH1002A	MH1003A						0.0	890.7	3.83	13.83							0.00	0.42	12.37	3.46	17.29	43.97	300	92.77	0.19	0.60	26.68	60.67
Terry Fox	MH1003A	MH1004A						0.0	890.7	3.83	13.83							0.00	0.56	12.93	3.62	17.45	43.97	300	120.00	0.19	0.60	26.52	60.32
Terry Fox	MH1004A	MH1005A						0.0	890.7	3.83	13.83							0.00	0.27	13.20	3.70	17.53	43.97	300	59.80	0.19	0.60	26.45	60.14
Terry Fox	MH1005A	MH1006A						0.0	890.7	3.83	13.83							0.00	0.47	13.67	3.83	17.66	43.97	300	103.52	0.19	0.60	26.32	59.84
Terry Fox	MH1006A	MH1007A						0.0	890.7	3.83	13.83							0.00	0.33	14.00	3.92	17.75	43.97	300	71.15	0.19	0.60	26.22	59.63
Terry Fox	MH1007A	MH1008A						0.0	890.7	3.83	13.83							0.00	0.19	14.19	3.97	17.80	79.73	375	42.96	0.19	0.70	61.93	77.67
Phase 1C								125.8	125.8										2.98	2.98									
Phase 3A								173.2	173.2										3.28	3.28									
Phase 3C								446.2	446.2										2.16	2.16									
Phase 1C, 3A, 3C	stub	MH1008A						0.0	745.2	3.88	11.71							0.00	0.00	8.42	2.36	14.07	50.44	300	6.00	0.25	0.69	36.37	72.11
Terry Fox	MH1008A	MH1009A						0.0	1635.9	3.65	24.20							0.00	0.32	22.93	6.42	30.62	73.16	375	71.00	0.16	0.64	42.54	58.15
Terry Fox	MH1009A	MH1010A						0.0	1635.9	3.65	24.20							0.00	0.46	23.39	6.55	30.75	68.44	375	100.74	0.14	0.60	37.69	55.07
Phase 2A	stub	MH1010A						258.0	258.0	4.00	4.18							0.00	0.00	5.00	1.40	5.58	44.30	250	5.60	0.51	0.87	38.72	87.41
Terry Fox	MH1010A	MH1011A						0.0	1893.9	3.60	27.65							0.00	0.35	28.74	8.05	35.70	68.44	375	78.75	0.14	0.60	32.74	47.84
Phase 2B	stub	MH1011A						370.6	370.6	4.00	6.01							0.00	5.32	5.32	1.49	7.50	44.30	250	6.00	0.51	0.87	36.80	83.07
Terry Fox	MH1011A	MH1012A						0.0	2264.5	3.54	32.50							0.00	0.54	34.60	9.69	42.19	68.44	375	119.98	0.14	0.60	26.25	38.36
Terry Fox	MH1012A	MH1013A						0.0	2264.5	3.54	32.50							0.00	0.35	34.95	9.79	42.29	68.44	375	77.74	0.14	0.60	26.15	38.21
Terry Fox	MH1013A	MH1014A						0.0	2264.5	3.54	32.50							0.00	0.34	35.29	9.88	42.38	68.44	375	74.96	0.14	0.60	26.06	38.07
Terry Fox	MH1014A	MH1015A						0.0	2264.5	3.54	32.50							0.00	0.35	35.64	9.98	42.48	68.44	375	74.78	0.14	0.60	25.96	37.93
Phase 1B	stub	MH1015A						190.4	190.4	4.00	3.09							0.00	5.02	5.02	1.41	4.50	86.97	200	4.80	6.46	2.68	82.47	94.83
Terry Fox	MH1015A	MH1016A						0.0	2454.9	3.51	34.95							0.00	0.43	41.09	11.51	46.46	68.44	375	95.45	0.14	0.60	21.98	32.12
Terry Fox	MH1016A	MH1017A						0.0	2454.9	3.51	34.95							0.00	0.43	41.52	11.63	46.58	68.44	375	95.45	0.14	0.60	21.86	31.95
Terry Fox	MH1017A	MH1018A						0.0	2454.9	3.51	34.95							0.00	0.47	41.99	11.76	46.71	68.44	375	106.00	0.14	0.60	21.73	31.75
Terry Fox	MH1018A	MH1019A						0.0	2454.9	3.51	34.95							0.00	0.13	42.12	11.79	46.74	117.87	350	42.61	0.60	1.19	71.13	60.34
Terry Fox	MH1019A	*Ex CAP*						0.0	2454.9	3.51	34.95							0.00	0.00	42.12	11.79	46.74	68.44	375	24.00	0.14	0.60	21.70	31.70
Richardson Ph. 1D		*EX MH201*						27.2	27.2	4.00	0.44							0.00	0.58	0.58	0.16	0.60							
Broughton Residential $_2$		*EX MH201*						1106.3	1106.3	3.77	16.90							0.00	13.81	13.81	3.87	20.77							
Broughton Commercial $_2$		*EX MH201*						0.0	0.0	4.00	0.00			1.20	1.20			1.04	1.20	1.20	0.34	1.38							
Broughton Total		*EX MH201*							1133.5	3.76	17.28				1.20			1.04		15.59	4.37	22.69							
Terry Fox	*EX MH201*	*EX MH919*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*57.88*	*16.21*	*66.31*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.53*	*6.40*
Terry Fox	*EX MH919*	*EX MH917*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.05*	*16.25*	*66.36*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.49*	*6.33*
Terry Fox	*EX MH917*	*EX MH915*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.22*	*16.30*	*66.40*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.44*	*6.26*
Terry Fox	*EX MH915*	*EX MH913*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.39*	*16.35*	*66.45*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.39*	*6.20*
Terry Fox	*EX MH913*	*EX MH911*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.56*	*16.40*	*66.50*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.34*	*6.13*
Terry Fox	*EX MH911*	*EX MH909*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.73*	*16.44*	*66.55*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.30*	*6.06*
Terry Fox	*EX MH909*	*EX MH907*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*58.90*	*16.49*	*66.59*	*70.84*	*375*	*63.50*	*0.15*	*0.62*	*4.25*	*6.00*
Terry Fox	*EX MH907*	*EX MH905*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*59.07*	*16.54*	*66.64*	*70.84*	*375*	*35.00*	*0.15*	*0.62*	*4.20*	*5.93*
Terry Fox	*EX MH905*	*EX MH903*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*59.24*	*16.59*	*66.69*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.15*	*5.86*
Terry Fox	*EX MH903*	*EX MH901*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*59.41*	*16.63*	*66.74*	*70.84*	*375*	*120.00*	*0.15*	*0.62*	*4.10*	*5.79*
Terry Fox	*EX MH901*	*EX 901A*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*59.58*	*16.68*	*66.78*	*70.84*	*375*	*23.60*	*0.15*	*0.62*	*4.06*	*5.73*
Terry Fox	*EX MH901A*	*EX MH*						*0.0*	*3588.4*	*3.38*	*49.06*							*1.04*	*0.17*	*59.75*	*16.73*	*66.83*	*70.84*	*375*	*11.40*	*0.15*	*0.62*	*4.01*	*5.66*

Designed:

Checked:

REVISION	DATE
2. Revised as Per City Comments	18/02/2011
1. Revised as Per City Comments	16/11/2010
Issued for MOE approval	10/20/2010

Dwg Reference:	File Ref:	Date:	Sheet No.
11585	11585 - 5.7	8/26/2010	1

Population Per Unit:	3.4	For Singles
	2.7	Townhouses/Semis
	1.9	Mixed Use
	90.0	Low/Medium Density (90 ppHa)
Avg. Per Capita Flow Rate:	350	l/day
Residential Peaking Factor:	Harmon Formula = 1+(14/(4+P^0.5)) where P = pop'n in thousands	

Note 1: As per Dec. 13, 2007 Master Sanitary Servicing Plan prepared by Stantec.
Note 2: As per June 16, 2010 Detail Design Drawings prepared by Novatech

ICI Rates		Peak Factor
Institution	50000 l/ha/day	1.5
Commercial	50000 l/ha/day	1.5
Industrial	35000 l/ha/day	MOE Guidelines

Infiltration Allowance: 0.28 l/sec/Ha

Assumed pipe roughness coefficient = 0.013

APPENDIX B

Storm Sewer Design

STORM SEWER DESIGN SHEET
124 BATTERSEA CRESCENT
KANATA LAKES (Block 3)
JOB# 110105-1

NOVATECH
Engineers, Planners & Landscape Architects

Location	From MH	To MH	AREA (ha) R= 0.20	AREA (ha) R= 0.60	AREA (ha) R= 0.90	FLOW Indiv. 2.78 AC	FLOW Accum. 2.78 AC	FLOW Time of Conc.	FLOW 5yr Rainfall Intensity (mm)	FLOW 5yr Peak Flow Q (L/s)	FLOW Controlled 5yr Peak Flow (L/s)	SEWER DATA Dia. (m) Actual	SEWER DATA Dia. (mm) Nominal	SEWER DATA Type	SEWER DATA Slope (%)	SEWER DATA Length (m)	SEWER DATA Capacity (L/s)	SEWER DATA Velocity (m/s)	SEWER DATA Time of Flow (min)	SEWER DATA Ratio Q/Q full	SEWER DATA Controlled Ratio Q/Q full
Area 2			0.03		0.18	0.47	0.47														
Area 3	STMMH 108	EX-STMMH 106			0.003	0.01	0.47	10.00	104.19	83.3	35.0	0.254	250	PVC	1.78	33.0	82.7	1.63	0.34	101%	42%
Area 11					0.130	0.33	0.80														
	EX-STMMH 106	EX-STMMH 104				0.00	0.80	10.34	102.45	81.9	35.0	0.254	250	PVC	1.44	19.4	74.4	1.47	0.22	110%	47%
	EX-STMMH 104	EX-STMMH 102				0.00	0.80	10.56	101.34	81.1	35.0	0.254	250	PVC	2.20	9.1	91.9	1.81	0.08	88%	38%
Area 1	EX-STMMH 102	EX-STMMH 100	0.04		0.13	0.35	1.15	10.64	100.93	115.8	74.0	0.254	250	PVC	4.48	18.3	131.2	2.59	0.12	88%	56%
	EX-STMMH 100	EX-STM 404-406				0.00	1.15	10.76	100.35	115.1	74.0	0.254	250	PVC	9.74	7.8	193.4	3.82	0.03	60%	38%
								10.79													
Area 4	EX-STMMH 206	EX-STMMH 204	0.004		0.06	0.16	0.16	10.00	104.19	32.1	7.0	1.067	1050	PVC	0.20	45.6	1,273.5	1.42	0.53	3%	1%
Area 5					0.06	0.15	0.31														
Area 6	EX-STMMH 204	EX-STMMH 202			0.08	0.20	0.51	10.53	101.46	51.8	7.0	1.067	1050	PVC	0.20	12.8	1,273.5	1.42	0.15	4%	1%
Area 9	EX-STMMH 202	EX-STMMH 200			0.01	0.03	0.54	10.68	100.72	86.7	22.0	0.381	375	PVC	0.70	27.8	152.9	1.34	0.35	57%	14%
Area 10					0.13	0.33	0.86														
	STMMH 200	EX-STMMH 110				0.00	0.86	11.03	99.06	85.3	22.0	0.381	375	PVC	0.58	10.7	139.2	1.22	0.15	61%	16%
	EX-STMMH 110	EX-STM 406-408				0.00	0.86	11.17	98.37	84.7	22.0	0.381	375	PVC	6.20	6.9	455.1	3.99	0.03	19%	5%
								11.20													

DESIGN PARAMETERS

Definitions:

Q = 2.78 AIR, where
Q = Peak Flow in Liters per Second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Total flow outletting to Battersea Crescent storm sewer

PROJECT INFORMATION

Storm Design: Novatech Engineering Consultants Ltd.

Project:	Kanata Lakes Condominium Development - Block 3	Designed:	DDB/SAZ
Client:	Brigil Homes	Checked:	MJP
Date:	March 28, 2011	Dwg. Reference:	110105-1-STM
Revised:	August 31, 2011		
Revised:	December 14, 2011		
Revised:	August 31, 2015		
Revised:	January 18, 2016		
Revised:	December 20, 2016		

LICENSED PROFESSIONAL ENGINEER
D. D. BLAIR
100122737
Dec. 20/16
PROVINCE OF ONTARIO

STORM SEWER DESIGN SHEET
BROUGHTON SUBDIVISION
PHASE 2
JOB# 102118

LICENSED PROFESSIONAL ENGINEER
M.J. PETEPIECE
100079354
July 21, 2008
PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.

Return Frequency = 5 years

Location	LOCATION From Node	LOCATION To Node	Area (ha) R= 0.20	Area (ha) R= 0.45	Area (ha) R= 0.60	Area (ha) R= 0.75	Area (ha) R= 0.90	FLOW Indiv. 2.78 AC	FLOW Accum. 2.78 AC	FLOW Time of Conc.	FLOW Rainfall Intensity	FLOW Peak Flow Q (L/s)	SEWER DATA Dia. (m) Actual	SEWER DATA Dia. (mm) Nominal	SEWER DATA Type	SEWER DATA Slope (%)	SEWER DATA Length (m)	SEWER DATA Capacity (L/s)	SEWER DATA Velocity (m/s)	SEWER DATA Time of Flow (min)	SEWER DATA Ratio Q/Q full
Battersea Crescent	402	404						0.00	0.00	10.00	104.19	0.0	0.254	250	PVC	1.17	19.7	67.0	1.32	0.25	0%
	404	406			0.17			0.28	0.28	10.25	102.90	29.2	0.254	250	PVC	4.00	47.3	124.0	2.45	0.32	24%
										10.57											
Viva *	406	408						0.00	0.00	10.00	104.19	188.0	0.457	450	PVC	4.00	11.7	594.4	3.62	0.05	32%
										10.05											
Battersea Crescent	406	408			0.09			0.15	0.43	10.57	101.27	231.9	0.457	450	PVC	4.00	11.7	594.4	3.62	0.05	39%
	408	410			0.08			0.13	0.57	10.62	101.01	245.3	0.457	450	PVC	4.00	34.1	594.4	3.62	0.16	41%
	410	Cap			0.09			0.15	0.72	10.78	100.24	259.9	0.457	450	PVC	4.00	35.2	594.4	3.62	0.16	44%
										10.94											
Battersea Crescent	402	400			0.12			0.20	0.20	10.00	104.19	20.9	0.305	300	PVC	2.50	65.7	159.4	2.18	0.50	13%
	400	304	0.93	0.17	0.17			1.01	1.21	10.50	101.82	123.3	0.381	375	PVC	2.50	45.9	289.0	2.53	0.30	43%
										10.80											
Huntsville Drive	300	302		0.31				0.39	0.39	10.00	104.19	40.4	0.254	250	PVC	3.10	55.6	109.1	2.15	0.43	37%
	302	304						0.00	0.39	10.43	101.97	39.5	0.254	250	PVC	3.10	25.5	109.1	2.15	0.20	36%
										10.63											
Huntsville Drive	304	306		0.06				0.08	1.68	10.80	100.13	167.9	0.381	375	PVC	4.50	42.8	387.7	3.40	0.21	43%
	306	308		0.16				0.20	1.88	11.01	99.13	186.0	0.381	375	PVC	3.60	21.3	346.8	3.04	0.12	54%
	308	Cap		0.12				0.15	2.03	11.13	98.58	199.8	0.381	375	PVC	4.00	6.2	365.5	3.21	0.03	55%
										11.16											
Wallaceburg Court	600	602		0.29				0.36	0.36	10.00	104.19	37.8	0.254	250	PVC	4.70	67.3	134.4	2.65	0.42	28%
										10.42											
Wallaceburg Court	608	606		0.40				0.50	0.50	15.00	83.56	41.8	0.305	300	PVC	0.31	42.4	56.1	0.77	0.92	75%
	606	604		0.18				0.23	0.73	15.92	80.70	58.6	0.381	375	PVC	0.31	9.3	101.8	0.89	0.17	58%
	604	602						0.00	0.73	16.09	80.19	58.2	0.381	375	PVC	0.31	33.5	101.8	0.89	0.63	57%
										16.72											
Tillsonburg Street	602	214		0.43				0.54	1.63	16.72	78.39	127.5	0.381	375	PVC	4.50	59.4	387.7	3.40	0.29	33%
	214	212		0.13				0.16	1.79	17.01	77.58	138.8	0.381	375	PVC	4.50	34.5	387.7	3.40	0.17	36%
	212	Cap		0.39				0.49	2.28	17.18	77.12	175.6	0.381	375	PVC	5.38	19.0	423.9	3.72	0.09	41%
										17.26											

DESIGN PARAMETERS

Definitions:

Q = 2.78 AIR, where
Q = Peak Flow in Litres per Second (L/s)
A = Area in hectares (ha)
I = Rainfall Intensity (mm/hr)
R = Runoff Coefficient

Notes:

1) Ottawa Rainfall-Intensity Curve
2) Min. Pipe Velocity = 0.80 m/s
3) Tc = 15 min (subdivision)
4) Flow controlled from Viva site to 188 L/s *

PROJECT INFORMATION

Storm Design: Novatech Engineering Consultants Ltd.

Project: Broughton Subdivision — Designed: DDB
Client: Kanata Road Inc. c/o Regional Group, DCR Phoenix — Checked: MSP
Date: January 15, 2008 — Dwg. Reference: 102118-STM2
Revised: June 13, 2008
Revised: July 18, 2008

APPENDIX C

Hydraulic Analysis

WATERMAIN DESIGN SHEET
Block 3

Population and Consumption Rate Calculations

Node	Number of Units	Persons per Unit	Population	Consumption Rates (L/s) Average Daily	Maximum Daily	Maximum Hourly
R1	0	1.8	0	0.00	0.00	0.00
R2	0	1.8	0	0.00	0.00	0.00
N3	0	1.8	0	0.00	0.00	0.00
N4	16	2.1	34	0.14	0.34	0.75
N5	79	1.8	142	0.68	1.70	3.73
	12	2.1	25			
N6	0	1.8	0	0.00	0.00	0.00
N7	0	1.8	0	0.00	0.00	0.00
N8	79	1.8	142	0.58	1.44	3.17
N9	0	1.8	0	0.00	0.00	0.00
Total	**186**	**1.86**	**343**	**1.39**	**3.48**	**7.65**

Water Demand Parameters

Two Bedroom Apartment Unit (Existing Blocks)	2.1	persons/unit
Average Apartment Unit (Blocks 3-4)	1.8	persons/unit
Residential Demand	350	L/c/day
Residential Max Day	2.5	x Avg Day
Residential Peak Hour	2.2	x Max Day
Apartment Building Fire Flow	195.69	L/s

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK
Block 3

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi	Age hours
Resvr R1	162.80	-0.62	162.80	0.00	0.00	0.00	0.0
Resvr R2	162.80	-0.78	162.80	0.00	0.00	0.00	0.0
Junc N3	113.93	0.00	162.80	48.87	479.41	69.53	0.6
Junc N4	114.40	0.14	162.80	48.40	474.80	68.86	0.9
Junc N5	114.56	0.68	162.80	48.24	473.23	68.64	2.2
Junc N6	111.88	0.00	162.80	50.92	499.53	72.45	2.6
Junc N7	111.99	0.00	162.80	50.81	498.45	72.29	1.0
Junc N8	111.90	0.58	162.80	50.90	499.33	72.42	0.5
Junc N9	111.00	0.00	162.80	51.80	508.16	73.70	0.3

Maximum Pressure in Heritage Hills
Maximum Age

AVERAGE DAY DEMAND / HIGH PRESSURE CHECK
Block 3

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	43.00	200	110	0.62	0.02	0.01	0.053
Pipe P2	23.00	200	110	0.62	0.02	0.00	0.049
Pipe P3	25.00	200	110	0.48	0.02	0.00	0.050
Pipe P4	34.00	200	110	-0.20	0.01	0.00	0.052
Pipe P5	39.00	200	110	-0.20	0.01	0.00	0.045
Pipe P6	10.00	200	110	-0.20	0.01	0.00	0.000
Pipe P7	23.00	200	110	-0.78	0.02	0.01	0.051
Pipe P8	23.00	200	110	-0.78	0.02	0.01	0.051

MAXIMUM HOUR DEMAND
Block 3

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	154.20	-3.38	154.20	0.00	0.00	0.00
Resvr R2	154.20	-4.27	154.20	0.00	0.00	0.00
Junc N3	113.93	0.00	154.19	40.26	394.95	57.28
Junc N4	114.40	0.75	154.19	39.79	390.34	56.61
Junc N5	114.56	3.73	154.19	39.63	388.77	56.39
Junc N6	111.88	0.00	154.19	42.31	415.06	60.20
Junc N7	111.99	0.00	154.19	42.20	413.98	60.04
Junc N8	111.90	3.17	154.19	42.29	414.86	60.17
Junc N9	111.00	0.00	154.20	43.20	423.79	61.47

Minimum Pressure

MAXIMUM HOUR DEMAND
Block 3

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	43.00	200	110	3.38	0.11	0.12	0.040
Pipe P2	23.00	200	110	3.38	0.11	0.12	0.040
Pipe P3	25.00	200	110	2.63	0.08	0.07	0.042
Pipe P4	34.00	200	110	-1.10	0.04	0.02	0.048
Pipe P5	39.00	200	110	-1.10	0.04	0.02	0.048
Pipe P6	10.00	200	110	-1.10	0.04	0.01	0.047
Pipe P7	23.00	200	110	-4.27	0.14	0.18	0.039
Pipe P8	23.00	200	110	-4.27	0.14	0.18	0.039

MAXIMUM DAY + FIRE FLOW DEMAND AT N5
Block 3

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	135.70	-103.33	135.70	0.00	0.00	0.00
Resvr R2	137.00	-95.84	137.00	0.00	0.00	0.00
Junc N3	113.93	0.00	132.82	18.89	185.31	26.88
Junc N4	114.40	0.34	131.27	16.87	165.49	24.00
Junc N5	114.56	197.39	129.61	15.05	147.64	21.41
Junc N6	111.88	0.00	131.54	19.66	192.86	27.97
Junc N7	111.99	0.00	133.75	21.76	213.47	30.96
Junc N8	111.90	1.44	134.32	22.42	219.94	31.90
Junc N9	111.00	0.00	135.66	24.66	241.91	35.09

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N5
Block 3

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	43.00	200	110	103.33	3.29	67.05	0.024
Pipe P2	23.00	200	110	103.33	3.29	67.05	0.024
Pipe P3	25.00	200	110	102.99	3.28	66.64	0.024
Pipe P4	34.00	200	110	-94.40	3.00	56.72	0.025
Pipe P5	39.00	200	110	-94.40	3.00	56.72	0.025
Pipe P6	10.00	200	110	-94.40	3.00	56.72	0.025
Pipe P7	23.00	200	110	-95.84	3.05	58.33	0.025
Pipe P8	23.00	200	110	-95.84	3.05	58.33	0.025

MAXIMUM DAY + FIRE FLOW DEMAND AT N6
Block 3

Junction Report

Node ID	Elevation m	Demand LPS	Total Head m	Pressure m	Pressure kPa	Pressure psi
Resvr R1	135.70	-87.04	135.70	0.00	0.00	0.00
Resvr R2	137.00	-112.13	137.00	0.00	0.00	0.00
Junc N3	113.93	0.00	133.60	19.67	192.96	27.99
Junc N4	114.40	0.34	132.48	18.08	177.36	25.72
Junc N5	114.56	1.70	131.27	16.71	163.93	23.78
Junc N6	111.88	195.69	129.68	17.80	174.62	25.33
Junc N7	111.99	0.00	132.65	20.66	202.67	29.40
Junc N8	111.90	1.44	133.41	21.51	211.01	30.60
Junc N9	111.00	0.00	135.21	24.21	237.50	34.45

Minimum Pressure

MAXIMUM DAY + FIRE FLOW DEMAND AT N6
Block 3

Pipe Report

Link ID	Length m	Diameter mm	Roughness	Flow LPS	Velocity m/s	Headloss m/km	Friction Factor
Pipe P1	43.00	200	110	87.04	2.77	48.80	0.025
Pipe P2	23.00	200	110	87.04	2.77	48.80	0.025
Pipe P3	25.00	200	110	86.70	2.76	48.45	0.025
Pipe P4	34.00	200	110	85.00	2.71	46.70	0.025
Pipe P5	39.00	200	110	-110.69	3.52	76.16	0.024
Pipe P6	10.00	200	110	-110.69	3.52	76.16	0.024
Pipe P7	23.00	200	110	-112.13	3.57	78.01	0.024
Pipe P8	23.00	200	110	-112.13	3.57	78.01	0.024

MAXIMUM DAY + FIRE FLOW DEMAND SUMMARY
Block 3

Maximum day plus fire flow demand was modeled for each node.
The following is a summary of the minimum pressures that occurred for each operating condition.

Fire at Junction	Demand (L/s)			Minimum Pressure			
	Maximum Daily	Fire Flow	Max Day + Fire	(m)	kPa	psi	Node
N5	1.66	195.69	197.35	15.05	147.64	21.41	N5
N6	0.00	195.69	195.69	16.71	163.93	23.78	N5

Fire Flow Calculations - Kanata Lakes Revised Site Plan

As per Fire Underwriter's Survey Guidelines

PROJECT: Kanata Lakes
JOB#: 110105-1
Block 4

DATE: May 4, 2015
REVISED: June 9, 2015
REVISED: December 20, 2016

C	**Coefficient related to type of construction**	[yes/no]			
	• Wood frame		1.5		
	• Ordinary construction	yes	1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***6,080***	<==>	65,445 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***17,154 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible		-25%		
	• Limited combustible	yes	-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				14,581 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3)	yes	50%	***7,291 L/min***	(2)
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m		5%		
			Cumulative Total		**25%**
				3,645 L/min	
	Fire Wall Separation				
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***3,645 L/min***	(3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***10,936 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***182.27 L/s***
	or	***2,408 IGPM***

BY: *Drew Blair*

Fire Flow Calculations - Kanata Lakes Revised Site Plan

As per Fire Underwriter's Survey Guidelines

PROJECT: Kanata Lakes
JOB#: 110105-1
Block 3

DATE: May 4, 2015
REVISED: June 9, 2015
REVISED: December 20, 2016

C	**Coefficient related to type of construction**	[yes/no]			
	• Wood frame		1.5		
	• Ordinary construction	yes	1		
	• Non-combustible construction		0.8		
	• Fire resistive construction (< 2 hrs)		0.7		
	• Fire resistive construction (> 2 hrs)		0.6		
	• Interpolation (Using FUS Tables)				
A	**Area of structure considered (m^2)**	***6,160***	<==>	66,306 ft^2	
	(All floors excluding Basement, under 2-Storeys)				
F	**Required fire flow (L/min)**				
	$F = 220\ C\ (A)^{0.5}$			***17,267 L/min***	
	Occupancy hazard reduction of surcharge	[yes/no]			
	• Non-combustible		-25%		
	• Limited combustible	yes	-15%		
	• Combustible		0%		
	• Free burning		15%		
	• Rapid burning		25%		
				14,677 L/min	(1)
	Sprinkler Reduction				
	• Non-combustible - Fire Resistive (3)	yes	50%	***7,338 L/min***	(2)
	Exposure surcharge (cumulative (%))	[yes/no]			
	0 - 3 m		25%		
	3.1 - 10 m		20%		
	10.1 - 20 m	yes	15%	1 side	15%
	20.1 - 30 m	yes	10%	1 side	10%
	30.1- 45 m	yes	5%	1 side	5%
			Cumulative Total		**30%**
				4,403 L/min	
	Fire Wall Separation				
	• Number of Party Walls * 1000 L/min				
	(As per City of Ottawa Standard)			***4,403 L/min***	(3)

REQUIRED FIRE FLOW [(1) - (2) + (3)]		***11,741 L/min***
(2,000 L/min < Fire Flow < 45,000 L/min)	***or***	***195.69 L/s***
	or	***2,585 IGPM***

BY: *Drew Blair*

APPENDIX D

Correspondence

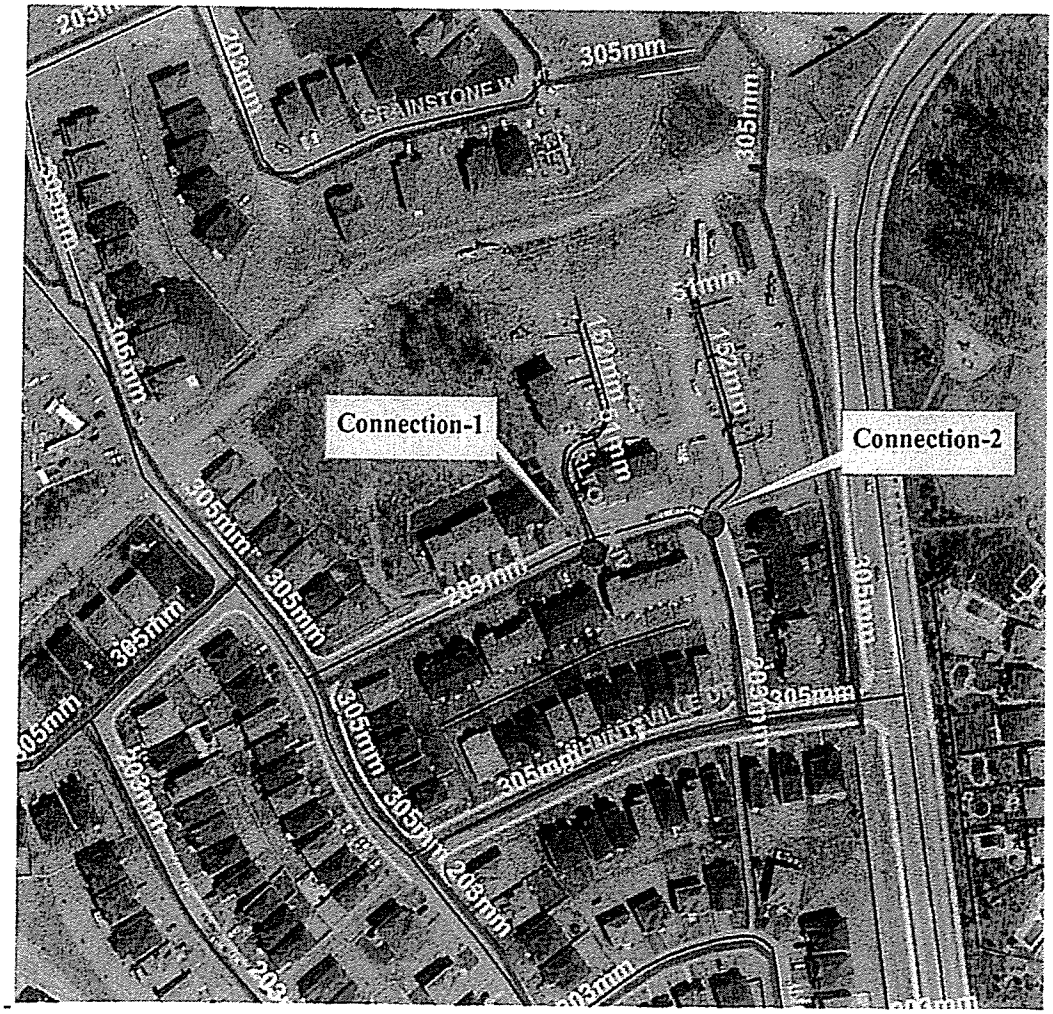
Boundary Conditions at Heritage Hills

Information Provided:

Date provided: 01 June 2015

	Scenario-1	Scenario-2
Criteria	Demand (L/s)	Demand (L/s)
Average Demand	0.75	1.30
Maximum Daily Demand	1.88	3.245
Peak Hourly Demand	4.13	7.14
Fire Flow Demand	243.02	243.02
Maximum Daily + Fire Flow Demand	244.9	246.27

Location:



Results

Connection-1:

	Connection-1	Connection-2
Criteria	Head (m)	Head (m)
Max HGL	162.8	162.8
PKHR	154.2	154.2
MXDY + Fire Flow (244.9 L/s)	135.7	137.0

Connection-2:

	Connection-1	Connection-2
Criteria	Head (m)	Head (m)
Max HGL	162.7	162.7
PKHR	155.1	155.1
MXDY + Fire Flow (244.9 L/s)	135.1	136.5

Note:
The boundary conditions are regenerated assuming a link pipe created looping in between the Earlton Pvt. and Kirkland Pvt pipes. Both sites of the development created dead ends with more than 49 units. According to the Section 4.3.1 of the City's Water Design Guideline, the watermains must require a second feed of looping to ensure adequate circulation of flows. In addition to that, the development also requires an installation of a Gate Valve between Junction R1 and R2 (as per drawing sheet). The development must not proceed without looping watermains and the installation of a valve.

Disclaimer

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

APPENDIX E

Excerpts from the Building Code

607.0 Gravity Supply Tanks

Gravity tanks for potable water shall be tightly covered, and have not less than a sixteen (16) square inch (10,323 mm^2) overflow screened with copper screen having not less than fourteen (14) nor more than eighteen (18) openings per linear inch (25.4 mm).

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves

608.1 Inadequate Water Pressure. Whenever the water pressure in the main or other source of supply will not provide a residual water pressure of at least fifteen (15) pounds per square inch (103.4 kPa), after allowing for friction and other pressure losses, a tank and a pump or other means which will provide said fifteen (15) pound (103.4 kPa) pressure shall be installed. Whenever fixtures and/or fixture fittings are installed, which require residual pressure higher than fifteen (15) pounds per square inch (103.4 kPa), that minimum residual pressure shall be provided.

608.2 Excessive Water Pressure. Where local static water pressure is in excess of eighty (80) pounds per square inch (552 kPa), an approved type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to eighty (80) pounds per square inch (552 kPa) or less. For potable water services up to and including one and one-half (1-1/2) inch (38 mm) regulators, provision shall be made to prevent pressure on the building side of the regulator from exceeding main supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping. All pipe size determinations shall be based on eighty (80) percent of the reduced pressure when using Table 6-5.

608.3 Any water system provided with a check valve or a pressure regulating device which does not have a bypass feature at its source shall be provided with an approved, listed, adequately sized pressure relief valve.

Any water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination pressure and temperature relief valve, except for listed non-storage instantaneous heaters having an inside diameter of not more than three (3) inches (76 mm). Each such approved combination temperature and pressure relief valve shall be installed on the water heating device in an approved location based on its listing requirements and the manufacturer's instructions. Each such combination temperature and pressure relief valve shall be provided with a drain as required in Section 608.5.

In addition to the required pressure or combination pressure and temperature relief valve, an approved, listed expansion tank or other device designed for intermittent operation for thermal expansion control shall be installed whenever the building supply pressure is greater than the required relief valve pressure setting or when any device is installed that prevents pressure relief through the building supply. The tank or device shall be sized in accordance with the manufacturer's recommendation.

608.4 Each pressure relief valve shall be an approved automatic type with drain, and each such relief valve shall be set at a pressure of not more than one hundred fifty (150) pounds per square inch (1035 kPa). No shutoff valve shall be installed between the relief valve and the system or in the drain line.

608.5 Relief valves located inside a building shall be provided with a drain, not smaller than the relief valve outlet, of galvanized steel, hard drawn copper piping and fittings, CPVC, or listed relief valve drain tube with fittings which will not reduce the internal bore of the pipe or tubing (straight lengths as opposed to coils) and shall extend from the valve to the outside of the building with the end of the pipe not more than two (2) feet (610 mm) nor less than six (6) inches (152 mm) above the ground or the flood level of the area receiving the discharge and pointing downward. Such drains may terminate at other approved locations. No part of such drain pipe shall be trapped and the terminal end of the drain pipe shall not be threaded.

608.6 Any water heating device connected to a separate storage tank and having valves between said heater and tank shall be provided with an approved water pressure relief valve.

608.7 Vacuum Relief Valves. Where a hot water storage tank or an indirect water heater is located at an elevation above the fixture outlets in the hot water system, a vacuum relief valve shall be installed on the storage tank or heater.

609.0 Installation, Testing, Unions, and Location

609.1 Installation. All water piping shall be adequately supported to the satisfaction of the Administrative Authority. Burred ends shall be reamed to the full bore of the pipe or tube. Changes in direction shall be made by the appropriate use of fittings, except that changes in direction in copper tubing may be made with bends, provided that such bends are made with bending equipment which does not deform or create a loss in the cross-sectional area of the tubing. Provisions shall be made for expansion

APPENDIX F

Erosion and Sediment Control

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

Scope of Work

The work under the applicable items includes the preparation, implementation and monitoring of an Erosion and Sediment Control Plan to prevent sediment-laden runoff resulting from the Contractor's construction operations from entering all sewers and watercourses both within and downstream from the Working Area. The plan shall include management and monitoring of water discharged from dewatering operations. The specification is limited to the management of sediment laden water and the management of contaminants such as hydrocarbons and volatile organic compounds present within groundwater at the site shall be managed as described elsewhere in the contract documents.

General

The Contractor acknowledges that surface erosion and sediment runoff resulting from construction operations has potential to cause a detrimental impact to any downstream watercourse, and that all construction operations that may impact upon water quality shall be carried out in a manner that strictly meets the requirements of all applicable legislation and regulations.

Accordingly, the Contractor shall be responsible for determining and conforming to the requirements of the Ontario Ministry of the Environment (MOE), the Ontario Ministry of Natural Resources, the City of Ottawa, applicable Conservation Authorities and any other Governmental Regulatory Agencies (collectively "Regulatory Agencies") having jurisdiction in the Working Area or over any potentially affected watercourses.

Erosion and Sediment Control Plan

Before commencing the Work, the Contractor shall submit to the Contract Administrator six copies of a detailed Erosion and Sediment Control Plan. The ESC Plan will consist of a written description and detailed drawings indicating the on-site activities and measures to be used to control erosion and sediment movement for each step of the Work. The written description shall be signed by, and the drawings shall bear the stamp and signature of a qualified Professional Engineer licensed in Ontario, herein designated as the Engineer of Record (EOR).

The Contractor acknowledges that the scheduling of the implementation of erosion and sediment controls is the key component for successful sediment control. Accordingly, the ESC Plan will contain a detailed schedule which identifies the following:

- Phasing of the steps for the installation of all control measures.
- Inspection, monitoring and maintenance of all control measures during construction.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

- Phasing of the removal and disposal of the control measures.

The Contractor acknowledges that no one measure is likely to be 100% effective for erosion protection and controlling sediment runoff and water discharges from the site. Therefore, where necessary the ESC Plan will implement sequential measures arranged in such a manner so as to mitigate sediment release from construction operations and achieve specific maximum permitted criteria where applicable. Suggested on-site measures may include, but shall not be limited to, the following methods: sediment ponds, filter bags, pump filters, settling tanks, silt fences, straw bales, filter cloths, check dams and/or berms, or other recognized technologies and methods available at the time of construction. Specific measures shall be installed in accordance with the requirements of OPSS 805 where appropriate, or in accordance with manufacturer's recommendations.

Inspection and Monitoring of Mitigation Measures

The Contractor shall be solely responsible for inspecting, monitoring and maintaining the effectiveness of the ESC Plan upon implementation. The Contractor shall submit to the Contract Administrator weekly inspection reports demonstrating the performance of the installed measures, identifying deficiencies and indentifying required maintenance issues. These reports shall be prepared, signed by the EOR and provided to the Contract Administrator within 48 hours of the inspection.

- Maintenance issues are defined as any measure which is not functioning to the satisfaction of the EOR and in the opinion of the EOR may be repaired by the contractor with subsequent re-inspection at the next scheduled EOR site inspection.
- Deficiencies are defined as any measure or lack of measure which has potential to cause an adverse environmental impact at the site given the current/forecasted conditions and schedule of the work.

Maintenance issues which have previously been identified but not adequately corrected shall be considered deficiencies.

Deficiencies shall be immediately corrected. Corrective actions shall be re-inspected and documented by the EOR. Re-inspection reports shall be specific to the deficiency observed and may be written field reports.

EOR monitoring reports submitted shall include:

- The date and time of the inspection and monitoring.
- General description of the mitigating measures being utilized at the site.
- Confirmation as to the effectiveness of the measures inspected.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

- Description of any maintenance issue which requires minor repair, improvement or maintenance.
- Description of any deficiency observed including timeline for correction and re-inspection.
- Deficiency re-inspection reports outstanding for the site.

The Contractor shall notify the Contract Administrator in all situations where a regulatory agency has identified deficiencies in erosion/sediment control measures, quality of runoff or quality of water quality discharged from dewatering operation.

Where in the opinion of the Contract Administrator either the proof of performance submitted is or the measures implemented are considered inadequate, the Contractor shall have the EOR review measures in the presence of the Contract Administrator within 24 hours of being notified in writing.

The Contractor shall monitor all weather forecasts and schedule the Work in order to minimize the risk of sediment-laden water from entering any watercourse or sewer system. The ESC Plan shall contain a Contingency Plan to include the provision of additional labour, equipment or materials to install additional control measures, and detail an emergency response plan in case of an accidental event. As such, the Contractor shall have additional control materials on site at all times which are easily accessible and may be implemented at a moment's notice.

Contractor's Responsibilities

The Contractor shall ensure that all workers, including sub-contractors, in the Working Area are aware of the importance of the erosion and sediment control measures and informed of the consequences of the failure to comply with the requirements of all Regulatory Agencies and the specifications detailed herein.

The Contractor shall periodically, and when requested by the Contract Administrator or EOR, clean out accumulated sediment deposits as required at the sediment control devices, including those deposits that may originate from outside the construction area. Accumulated sediment shall be removed in such a manner that prevents the deposition of this material into any sewer or watercourse and avoids damage to the control measure. The sediment shall be removed from the site at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract.

The Contractor shall immediately report to applicable regulatory agencies and the Contract Administrator any accidental discharges of sediment material into either the watercourse or the storm sewer system. Failure to report will be constitute a breach of this specification and the Contractor may also be subject to the penalties imposed by any

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

applicable Regulatory Agency. Appropriate response measures, including any repairs to existing control measures or the implementation of additional control measures, shall be carried out by the Contractor without delay.

The sediment control measures shall be removed when, in the opinion of the EOR, the measure(s) is no longer required. No control measure may be permanently removed without prior written authorization from the EOR. All sediment and erosion control measures shall be removed in a manner that avoids the entry of sediment or debris into any sewer or watercourse within or downstream of the Working Area. All accumulated sediment shall be removed from the Working Area at the Contractor's expense and managed in compliance with the requirements for excess earth material, as specified elsewhere in the Contract. Any seeding and mulching, temporary cover, sodding or original turf cover that is disturbed by the removal of the control measures and accumulated sediment, shall be brought to final grade and restored. Payment for the supply and placing of ground cover at these locations shall be made under the applicable items listed elsewhere in the Contract.

Where, in the opinion of either the Contract Administrator or a Regulatory Agency, any of the terms specified herein have either not been complied with or not performed in a suitable manner, the Contract Administrator or Regulatory Agency has the right to immediately withdraw its permission to continue the work but may renew its permission upon being satisfied that the defaults and/or deficiencies in the performance of this specification by the Contractor have been remedied. No compensation will be made to the Contractor for the withdrawal of permission to do the work resulting from non-compliance with the requirements of this specification and the Regulatory Agencies.

In addition to any other remedy and/or penalty provided by law, where there has been default or non-compliance with any of the terms specified herein and the Contractor refuses to perform or rectify same within forty-eight (48) hours of the receipt of the written demand of the Contract Administrator to do so, the Owner is hereby entitled to enter upon the Working Area and either complete the work in conformity with the Contract or have the work done that it considers necessary to complete the Work to its intended condition, whichever, in the Owner's sole opinion, is the most reasonable course of action. The Contractor and the Owner further agree that the costs incurred for any such work shall be retained by the Owner from monies otherwise due to the Contractor.

Monitoring of Water Quality Impacts and Point Source Discharges

The Contractor shall monitor runoff quality and quantity of water discharged from dewatering operations. The work shall include turbidity monitoring of impacts to watercourses (upstream vs downstream conditions), total suspended solids (TSS) monitoring of point sources such as those from dewatering operations. Discharge shall be in accordance with site specific constraints, regulatory requirements and sewer use bylaw

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

requirements. Where no specific criteria has otherwise been identified, the contractor shall meet the following discharge objective.

Source	Objective	Monitoring Frequency (min)
Watercourse Impacts	Downstream turbidity not to exceed upstream levels by greater than 25%	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis Daily for situations where the work is being conducted within 20 metres of a watercourse.
Discharge from Dewatering Operations	TSS maximum level of 25 mg/L	Minimum of daily for first three days of operation Minimum of twice weekly on an ongoing basis

Monitoring frequency to increase where scheduled construction operations have potential to impair water quality.

Mitigation and Action by Contractor Where Monitoring Indicates Water Impacts or Discharges Over Criteria or Objectives

Where site specific criteria or objectives are not attained, the Contractor and/or EOR shall immediately notify applicable regulatory agency of the monitoring results and possible impacts to sewers and watercourses. The Contractor shall implement an Action/Mitigation Plan acceptable to the EOR and applicable regulatory agency prior to continuing or resuming construction activities.

Measurement and Basis of Payment

Item – Erosion and Sediment Control Plan and Monitoring

Payment at the Contract price for the item "Erosion and Sediment Control Plan and Monitoring" shall be full compensation for the preparation and monitoring of the Erosion and Sediment Control Plan.

Payment shall be based upon the following schedule:

a) 25% upon satisfactory submission and implementation of the ESC Plan; and,
b) 75% pro-rated into equal payments over the term of the contract.

EROSION AND SEDIMENT CONTROL PLAN, MONITORING, AND MEASURES

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Item – Erosion and Sediment Control Measures

Payment at the Contract price for the item "Erosion and Sediment Control Measures" shall be full compensation for the implementation and maintenance of erosion and sediment control measures required for the site, and shall include all labour, equipment and materials to supply, construct, monitor and maintain all erosion and sediment control measures detailed therein.

Payment shall be based upon the following schedule:

a) 20% upon satisfactory installation of the control measures;
b) 70% pro-rated into equal payments over the term of the contract; and,
c) 10% upon successful completion and removal of the ESC Plan protection measures.

This payment schedule may only be modified as agreed upon in writing between the Contractor and the Contract Administrator.

Warrant: For work which is conducted in close proximity to watercourses or environmentally sensitive areas.

APPENDIX G

Development Servicing Study Checklist

NOVATECH
Engineers, Planners & Landscape Architects

Project Name: Kanata Lakes
Project Number: 110105-1
Date: December 20, 2016

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Fig 1	
Plan showing the site and location of all existing services.	Y	Fig 2	
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Y	1.0, 2.0	
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	1.3	
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	1.4	
Statement of objectives and servicing criteria.	Y	3.0, 4.0, 5.0	
Identification of existing and proposed infrastructure available in the immediate area.	Y		General Plan of Services 110105-GP
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Y	3.0	
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	3.0	

Development Servicing Study Checklist

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	Y	10.0	
Reference to geotechnical studies and recommendations concerning servicing.	Y	2.3	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	Y		Grading Plan 110105-GR
North arrow (including construction North)	Y		Grading Plan 110105-GR
Key plan	Y		Grading Plan 110105-GR
Name and contact information of applicant and property owner	Y		Grading Plan 110105-GR
Property limits including bearings and dimensions	Y		Grading Plan 110105-GR
Existing and proposed structures and parking areas	Y		Grading Plan 110105-GR
Easements, road widening and rights-of-way	Y		Grading Plan 110105-GR
Adjacent street names	Y		Grading Plan 110105-GR

Development Servicing Study Checklist

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	6.0	
Availability of public infrastructure to service proposed development.	Y	6.2	
Identification of system constraints.	Y	6.0	
Identify boundary conditions.	Y	6.3	
Confirmation of adequate domestic supply and pressure.	Y	6.5	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	6.5	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	6.5	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	Y	6.0	
Address reliability requirements such as appropriate location of shut-off valves.	Y	6.0	
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	6.5	
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	6.4	
Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	6.1	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y		Figure 6

Development Servicing Study Checklist

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	5.0	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	5.2, 11.0	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	5.1	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	5.1	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Y		Appendix B
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	5.1	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	Y		Appendix B
Special considerations such as contamination, corrosive environment etc.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	3.0	
Analysis of the available capacity in existing public infrastructure.	Y		Appendix A
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y		Fig 1, Fig 3, Grading Plan 110105-GR
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	3.0	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	3.0	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	3.0	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	Y		Appendix A
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Y		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	1.3	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	3.0	Appendix A
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	3.0	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	3.0	Appendix A
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	3.0	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	NA		

Development Servicing Study Checklist

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	Y	3.0	
Description of how the conveyance and storage capacity will be achieved for the development.	Y	3.0	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y		Appendix A
Inclusion of hydraulic analysis including HGL elevations.	Y		Appendix A
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	8.0	
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	Y	3.0	
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

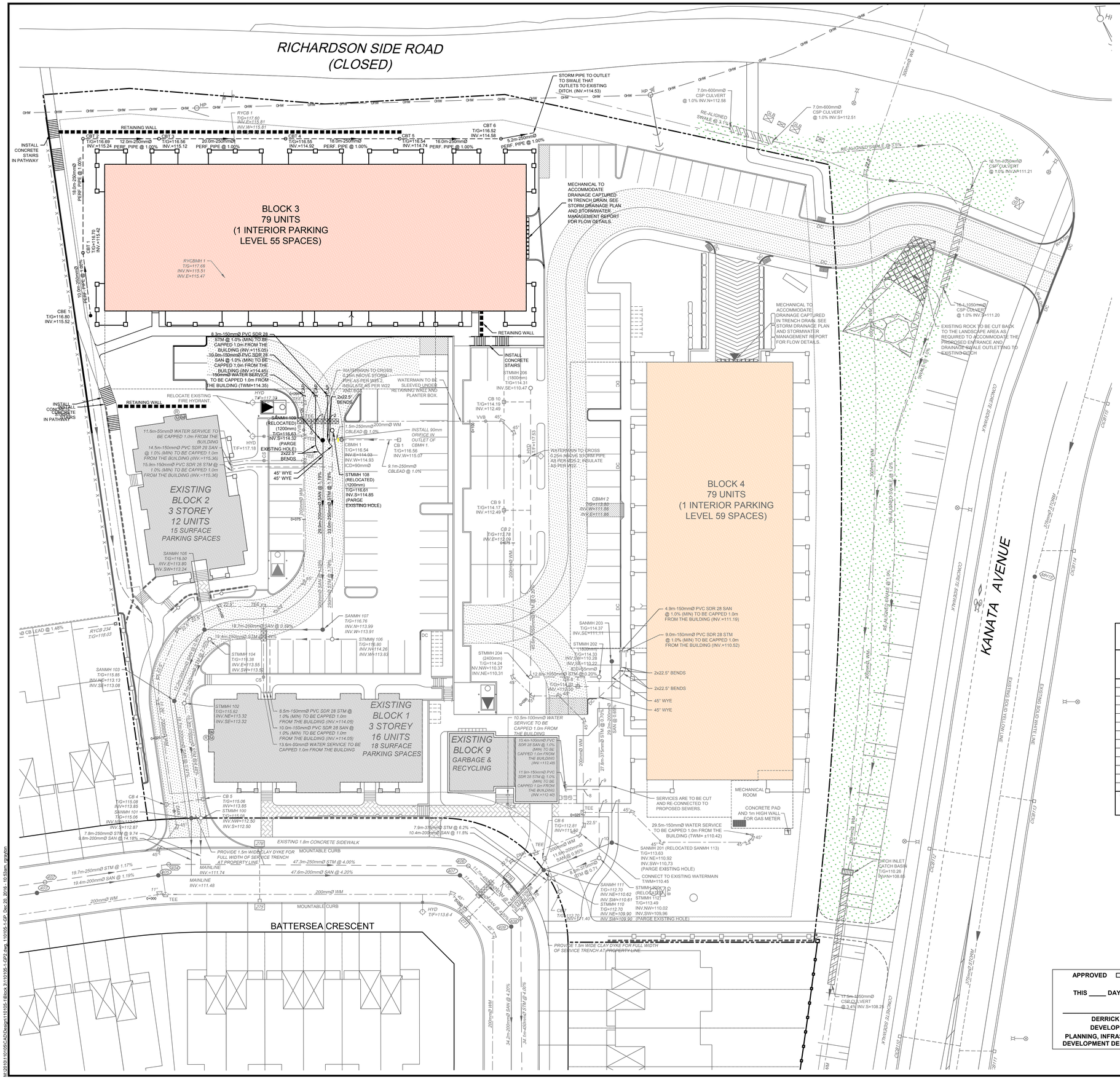
Development Servicing Study Checklist

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	1.3	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	NA		
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	NA		

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	12.0	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y		

APPENDIX H

Drawings



WATERMAIN TABLE - BLOCKS 1 TO 4

STATION	SURFACE ELEVATION	T/W ELEVATION	COMMENTS
0+000	115.16±	112.63	200 x 200 TEE
0+003.00	115.16±	112.78±	WM CROSSING OVER 200 SANITARY SEWER
0+003.18	115.16±	112.78±	45° VERTICAL BEND
0+003.63	115.16±	113.20	45° VERTICAL BEND
0+004.74	115.16±	113.20	WM CROSSING OVER 250 STORM SEWER
0+005.88	115.16±	113.20±	45° VERTICAL BEND
0+006.33	115.16±	112.69	45° VERTICAL BEND
0+007.05	115.00	112.62	45° BEND C/W THRUSTBLOCK
0+010.73	114.93	112.62	45° BEND C/W THRUSTBLOCK
0+013.17	115.03	112.66	DISTRICT METERING AREA CHAMBER
0+025.00	115.44	113.14	
0+030.55	115.85	113.45	11.25° BEND C/W THRUSTBLOCK
0+034.48	116.07	113.67	22.5° BEND C/W THRUSTBLOCK
0+042.47	116.40	113.95	22.5° BEND C/W THRUSTBLOCK
0+045.19	116.50	114.03	22.5° BEND C/W THRUSTBLOCK
0+050.12	116.55	114.18	22.5° BEND C/W THRUSTBLOCK
0+057.12	116.60	114.22	50 x 200 TEE
0+059.66	116.83	114.35	45° BEND C/W THRUSTBLOCK
0+065.04	116.92	114.48	45° BEND C/W THRUSTBLOCK
0+075.00	116.76	114.36	
0+084.26	116.65	114.26	50 x 200 TEE
0+088.09	116.71	114.45	HYDRANT AND VALVE
0+089.08	116.71	114.50	VALVE AND VALVE BOX
0+090.47	116.70	114.56	200 x 200 TEE
0+093.42	116.93	114.56	HYDRANT AND VALVE
0+094.57	116.76	114.43	CAP

NOTE: BARREL TO BARREL SEPARATION SHALL BE 500mm MINIMUM AS PER CITY OF OTTAWA DETAILS W25, AND W25.2.

WATERMAIN TABLE - BLOCK 4

STATION	SURFACE ELEVATION	T/W ELEVATION	COMMENTS
0+000	112.99±	110.66	200 x 200 TEE
0+003.00	113.08±	110.80±	WM CROSSING OVER 200 SANITARY
0+003.22	112.97±	110.80±	45° VERTICAL BEND
0+003.72	112.97±	111.17±	45° VERTICAL BEND
0+005.00	112.99±	111.17±	WM CROSSING OVER 450 STORM
0+006.44	112.97±	111.17±	45° VERTICAL BEND
0+006.94	112.97±	110.62±	45° VERTICAL BEND
0+010.33	113.02	110.62	22.5° BEND C/W THRUSTBLOCK
0+013.44	113.10	110.66	DISTRICT METERING AREA CHAMBER
0+014.34	113.10	111.01	25 x 200 TEE
0+021.77	112.85	110.45	45° BEND C/W THRUSTBLOCK
0+023.41	113.02	110.62	22.5° BEND C/W THRUSTBLOCK
0+025.00	113.60	111.20	
0+025.41	113.60	111.20	200 x 200 x 150 TEE
0+039.94	114.33	111.93	45° BEND C/W THRUSTBLOCK
0+045.41	114.31	111.91	45° BEND C/W THRUSTBLOCK
0+049.59	114.36	111.96	45° BEND C/W THRUSTBLOCK
0+053.86	114.39	111.99	45° BEND C/W THRUSTBLOCK
0+075.00	114.34	111.98	
0+088.70	114.37	111.97	HYDRANT AND VALVE
0+092.42	114.29	111.89	45° BEND C/W THRUSTBLOCK
0+094.94	114.25	111.85	45° BEND C/W THRUSTBLOCK
0+097.50	114.27	111.87	VALVE AND VALVE BOX
0+100.00	115.19	111.67	
0+101.77	116.88	111.67	45° VERTICAL BEND
0+104.57	116.99	114.59	45° VERTICAL BEND
0+118.58	116.72	114.32	45° VERTICAL BEND
0+119.83	116.72	115.57	45° VERTICAL BEND
0+121.73	116.72	115.57	CROSSING OVER 250 STORM
0+123.23	116.71	115.57	CROSSING OVER 200 SANITARY
0+123.55	116.70	115.57	45° VERTICAL BEND
0+124.81	116.70	114.56	45° VERTICAL BEND
0+126.23	116.70	114.56	200 x 200 TEE

NOTE: BARREL TO BARREL SEPARATION SHALL BE 500mm MINIMUM AS PER CITY OF OTTAWA DETAILS W25, AND W25.2.

ROOF DRAIN TABLE - NUMBER OF NOTCHES AND MAXIMUM RELEASE RATES FOR EACH ROOF DRAIN (AREA 10 & AREA 11 - IDENTICAL ROOFS FOR BLOCK 3 AND BLOCK 4)

ROOF DRAIN ID	CATCHMENT AREA (ha)	NUMBER OF NOTCHES[1]	MODIFIED RATIONAL METHOD (100yr EVENT)		MAXIMUM RELEASE RATE[2] (L/s)	MAXIMUM STORAGE (m^3)
			RELEASE RATE (L/s)	STORAGE USED (m^3)		
R1	0.007	1	0.52	2.50	0.56	3.08
R2	0.009	2	0.94	2.33	1.12	3.88
R3	0.010	2	0.96	2.78	1.12	4.41
R4	0.009	2	0.94	2.27	1.12	3.81
R5	0.008	2	0.95	1.98	1.12	3.23
R6	0.019	4	1.88	5.50	2.24	9.20
R7	0.015	3	1.44	4.28	1.68	6.75
R8	0.020	4	1.89	5.72	2.24	9.45
R9	0.008	1	0.53	2.93	0.56	3.54
R10	0.007	1	0.50	2.10	0.56	2.86
R11	0.006	1	0.50	2.09	0.56	2.85
R12	0.007	1	0.50	2.13	0.56	2.90
R13	0.008	1	0.53	2.91	0.56	3.51

NOTE:
1) ZURN FLOW CONTROL TYPE ROOF DRAIN X4 MAX REDUCED; PROVIDES 0.56L/s / NOTCH @ 0.15m OF HEAD.
2) ASSUMES 0.15m OF HEAD.

PROPOSED PIPE CROSSING TABLE

CROSSING #	WATERMAIN	STORM	SANITARY
1	115.37 BWM 115.57 TWM		114.41 INV 114.55 OBV
2	115.37 BWM 115.57 TWM	115.01 INV 115.11 OBV	
3	111.88 BWM 112.08 TWM	110.32 INV 111.63 OBV	
4		110.45 INV 110.60 OBV	111.08 INV 111.28 OBV
5	111.18 BWM 111.33 TWM	110.07 INV 110.45 OBV	
6	111.28 BWM 111.43 TWM		110.95 INV 111.15 OBV
7	111.04 BWM 111.24 TWM		112.45 INV 112.55 OBV
8	111.04 BWM 111.24 TWM	112.37 INV 112.52 OBV	
9		110.10 INV 110.48 OBV	112.43 INV 112.53 OBV
10		110.03 INV 110.41 OBV	110.71 INV 110.91 OBV

* OBVERT AND INVERT INCLUDE THICKNESS OF CONCRETE PIPE

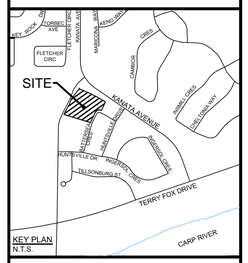
APPROVED ☐ REFUSED ☐

THIS _____ DAY OF _____, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

REFER TO 110105-LEG2 FOR ADDITIONAL NOTES

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.



KEY PLAN
N.T.S.

GEODETIC BENCHMARK
HUNTLEY
IRON PIPE WITH BRASS CAP, IN EASTERN SECTION OF A CROSSROAD INTERSECTION ALONG HUNTLEY-MARCH TOWNSHIP ROAD, 8.1km SOUTHEAST FROM JUNCTION WITH HIGHWAY NO.17, 40.8m NORTHEAST FROM CENTRE OF INTERSECTION, 13.7m FROM MIDDLE OF ROAD, 60cm BELOW ROAD LEVEL.
UTM ZONE 18
N: 5017820
E: 452840
ELEV: 98.710

No.	DESCRIPTION	DATE
23	REVISED SITE PLAN APPLICATION	DEC 20/16
22	ISSUED FOR CONSTRUCTION	NOV 25/16
21	GRADING AND SERVICING REVISED PER CLIENT COMMENTS	NOV 18/16
20	REISSUED FOR SITE PLAN APPROVAL	JUNE 24/16
19	ISSUED FOR SITE PLAN APPROVAL	JUNE 3/16
18	REISSUED FOR SITE PLAN APPLICATION	MAR 04/16
17	REISSUED FOR SITE PLAN APPLICATION	JAN 21/16
16	REVISED SITE PLAN APPLICATION	SEPT 4/15
15	REVISED PHASING	AUG 14/14
14	REVISED CURB LAYOUT AND CB5 LOCATION	JULY 18/14
13	REVISED WATER SERVICE CONNECTION TO BLOCK 9	JAN 27/14
12	ISSUED FOR CONSTRUCTION	JULY 08/13
11	REVISED SERVICING AND USF ELEVATIONS	FEB 12/13
10	REVISED BLOCK 9 FOR APPROVAL	FEB 8/13
9	REVISED BUILDING SERVICES	FEB 4/13
8	ISSUED FOR CONTACT EXECUTION/ CONSTRUCTION-BLASTING ONLY	JAN 09/13
7	CONSTRUCTION PHASING	DEC 14/12
6	FINAL ISSUE FOR SITE PLAN APPROVAL	FEB 01/12
5	ISSUED FOR TENDER	JAN 30/12
4	REVISED PER TRANSFORMER LOCATIONS	JAN 05/12
3	REVISED PER CITY COMMENTS	NOV 3/11
2	REVISED PER CITY COMMENTS	SEPT 07/11
1	ISSUED FOR SITE PLAN CONTROL APPLICATION	MAR 28/11

REVISIONS:

ENGINEER'S STAMP:
LICENSED PROFESSIONAL ENGINEER
D.D. BLAIR
100122737
Dec 20/16
PROVINCE OF ONTARIO

FOR REVIEW ONLY

NORTH ARROW:

CLIENT:
BRIGIL

ARCHITECT:

ENGINEER:
NOVATECH
Engineers, Planners & Landscape Architects

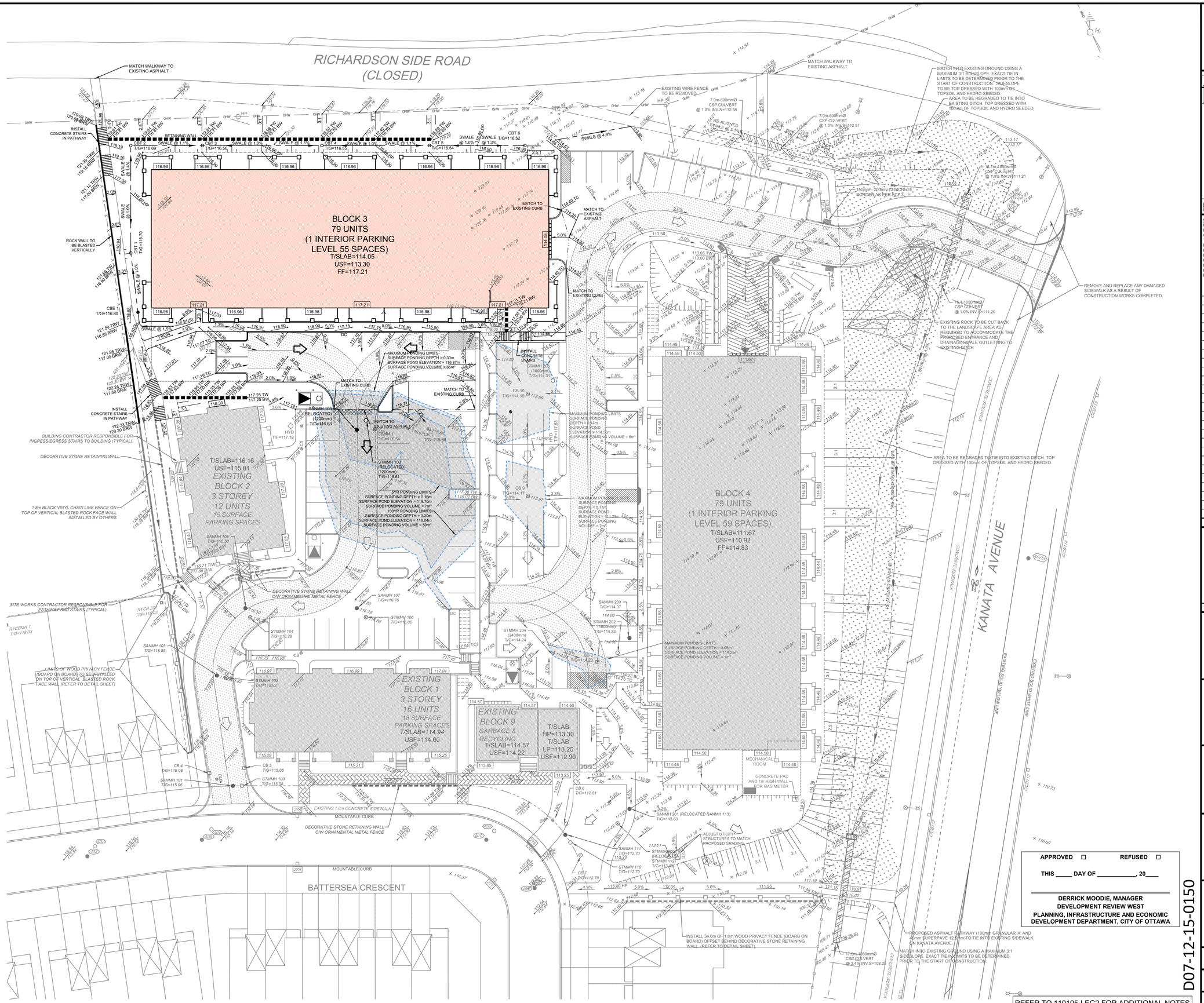
PROJECT TITLE:
KANATA LAKES
124 BATTERSEA CRESCENT
OTTAWA ONTARIO

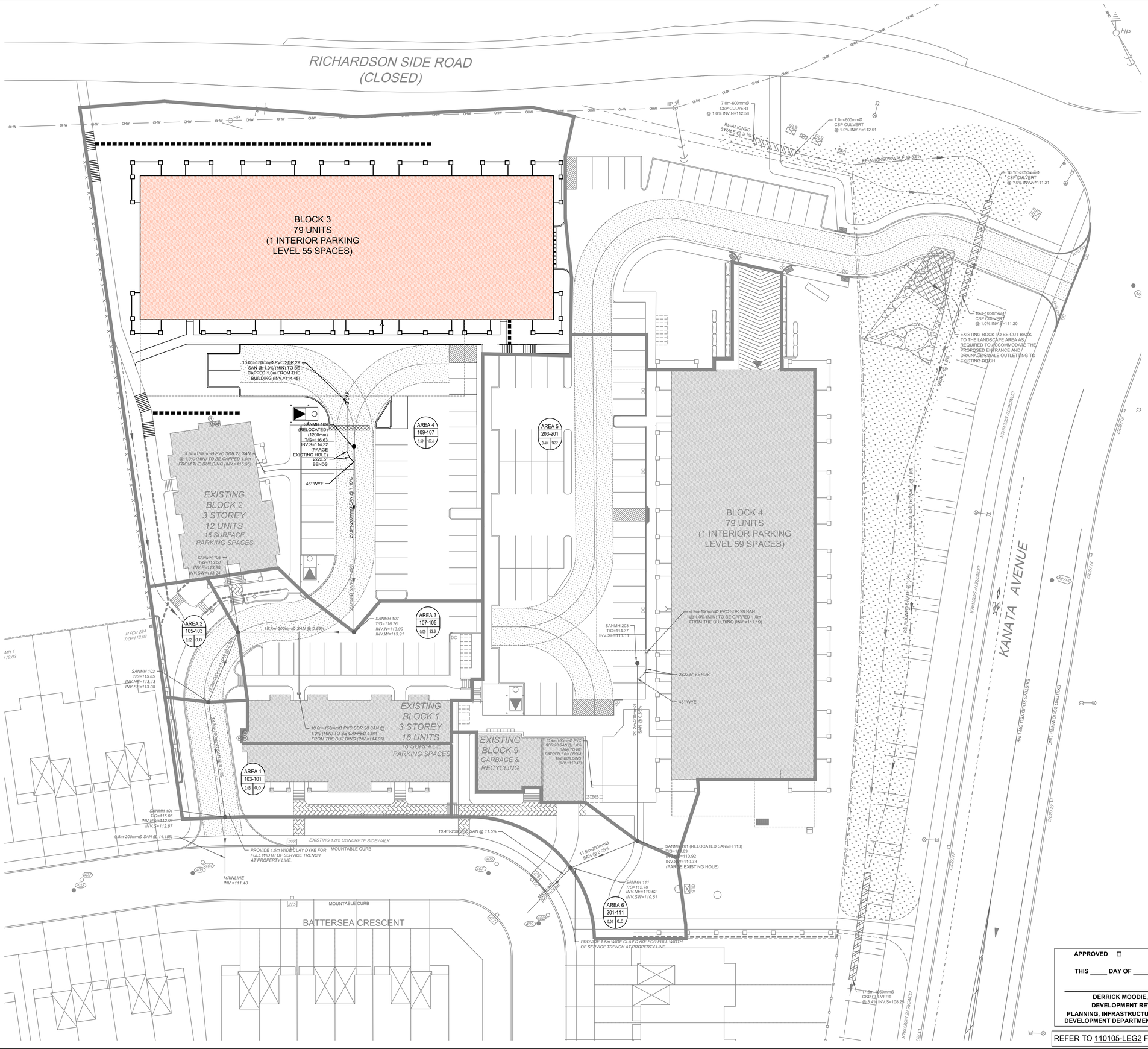
SHEET TITLE:
GENERAL PLAN OF SERVICES

D07-12-15-0150

DRAWN:	CHECKED:
RBG	MSP
SCALE: 1:250	SHEET No. 110105-GP2
PROJECT No. 110105	

M:\2010\10105\CAD\Design\110105-1\Block 3\110105-1-GP2.dwg, 110105-1-GP, Dec 20, 2016 - 10:53am, rgraydon


RICHARDSON SIDE ROAD
(CLOSED)
BLOCK 3
79 UNITS
(1 INTERIOR PARKING
LEVEL 55 SPACES)
T/SLAB=114.05
USF=113.30
FF=117.21
BLOCK 4
79 UNITS
(1 INTERIOR PARKING
LEVEL 59 SPACES)
T/SLAB=111.67
USF=110.92
FF=114.83
EXISTING
BLOCK 2
3 STOREY
12 UNITS
15 SURFACE
PARKING SPACES
T/SLAB=116.16
USF=115.81
EXISTING
BLOCK 1
3 STOREY
16 UNITS
18 SURFACE
PARKING SPACES
T/SLAB=114.94
USF=114.60
EXISTING
BLOCK 9
GARBAGE &
RECYCLING
T/SLAB=114.57
USF=114.22
T/SLAB
HP=113.30
T/SLAB
LP=113.25
USF=112.90
MECHANICAL
ROOM
CONCRETE PAD
AND 1m HIGH WALL
FOR GAS METER
KANATA AVENUE
BATTERSEA CRESCENT
MATCH WALKWAY TO
EXISTING ASPHALT
RETAINING WALL
ROCK WALL TO
BE BLASTED
VERTICALLY
INSTALL
CONCRETE STAIRS
IN PATHWAY
BUILDING CONTRACTOR RESPONSIBLE FOR
INGRESS/EGRESS STAIRS TO BUILDING (TYPICAL)
DECORATIVE STONE RETAINING WALL
1.8m BLACK VINYL CHAIN LINK FENCE ON
TOP OF VERTICAL BLASTED ROCK FACE WALL
INSTALLED BY OTHERS
SITE WORKS CONTRACTOR RESPONSIBLE FOR
PATHWAY AND STAIRS (TYPICAL)
LIMITS OF WOOD PRIVACY FENCE
(BOARD ON BOARD) TO BE INSTALLED
ON TOP OF VERTICAL BLASTED ROCK
FACE WALL (REFER TO DETAIL SHEET)
DECORATIVE STONE RETAINING WALL
C/W ORNAMENTAL METAL FENCE
EXISTING 1.8m CONCRETE SIDEWALK
MOUNTABLE CURB
MATCH TO
EXISTING CURB
MATCH TO
EXISTING ASPHALT
EXISTING WIRE FENCE
TO BE REMOVED
7.0m-600mmØ
CSP CULVERT
@ 1.0% INV.IN=112.58
RE-ALIGNED
SWALE @ 3.1%
7.0m-600mmØ
CSP CULVERT
@ 1.0% INV.IN=112.51
MATCH INTO EXISTING GROUND USING A
MAXIMUM 3:1 SIDESLOPE. EXACT TIE IN
LIMITS TO BE DETERMINED PRIOR TO THE
START OF CONSTRUCTION. SIDESLOPE
TO BE TOP DRESSED WITH 100mm OF
TOPSOIL AND HYDRO SEEDED.
AREA TO BE REGRADED TO TIE INTO
EXISTING DITCH. TOP DRESSED WITH
100mm OF TOPSOIL AND HYDRO SEEDED.
150mm - 200mm CONCRETE
BORDER AS PER SCP 3
16.1m-450mmØ
CSP CULVERT
@ 1.0% INV.IN=111.21
16-L-1050mmØ
CSP CULVERT
@ 1.0% INV.IN=111.20
EXISTING ROCK TO BE CUT BACK
TO THE LANDSCAPE AREA AS
REQUIRED TO ACCOMMODATE THE
PROPOSED ENTRANCE AND
DRAINAGE SWALE OUTLETTING TO
EXISTING DITCH
REMOVE AND REPLACE ANY DAMAGED
SIDEWALK AS A RESULT OF
CONSTRUCTION WORKS COMPLETED.
AREA TO BE REGRADED TO TIE INTO EXISTING DITCH. TOP
DRESSED WITH 100mm OF TOPSOIL AND HYDRO SEEDED.
ADJUST UTILITY
STRUCTURES TO MATCH
PROPOSED GRADING
INSTALL 34.0m OF 1.8m WOOD PRIVACY FENCE (BOARD ON
BOARD) OFFSET BEHIND DECORATIVE STONE RETAINING
WALL (REFER TO DETAIL SHEET)
PROPOSED ASPHALT PATHWAY (100mm GRANULAR 'A' AND
40mm SUPERPAVE 12.5mm)TO TIE INTO EXISTING SIDEWALK
ON KANATA AVENUE
MATCH IN TO EXISTING GROUND USING A MAXIMUM 3:1
SIDESLOPE. EXACT TIE IN LIMITS TO BE DETERMINED
PRIOR TO THE START OF CONSTRUCTION.
17.5m-1050mmØ
CSP CULVERT
@ 3.4% INV.S=108.25
MAXIMUM PONDING LIMITS
SURFACE PONDING DEPTH = 0.33m
SURFACE POND ELEVATION = 116.87m
SURFACE PONDING VOLUME = 65m³
MAXIMUM PONDING LIMITS
SURFACE PONDING
DEPTH = 0.14m
SURFACE POND
ELEVATION = 114.00m
SURFACE PONDING VOLUME = 6m³
MAXIMUM PONDING LIMITS
SURFACE PONDING
DEPTH = 0.01m
SURFACE POND
ELEVATION = 114.26m
SURFACE PONDING
VOLUME = 2m³
MAXIMUM PONDING LIMITS
SURFACE PONDING DEPTH = 0.05m
SURFACE POND ELEVATION = 114.25m
SURFACE PONDING VOLUME = 1m³
5YR PONDING LIMITS
SURFACE PONDING DEPTH = 0.16m
SURFACE POND ELEVATION = 116.70m
SURFACE PONDING VOLUME = 7m³
100YR PONDING LIMITS
SURFACE PONDING DEPTH = 0.35m
SURFACE POND ELEVATION = 116.84m
SURFACE PONDING VOLUME = 50m³
STMMH 108
(RELOCATED)
(1200mm)
T/G=116.63
STMMH 109
(RELOCATED)
(1200mm)
T/G=116.61
STMMH 204
(2400mm)
T/G=114.24
STMMH 202
(1800mm)
T/G=114.33
STMMH 203
T/G=114.37
SANMH 201 (RELOCATED SANMH 113)
T/G=113.63
SANMH 111
T/G=112.70
STMMH 110
T/G=112.70
STMMH 112
T/G=112.48
SANMH 101
T/G=115.06
STMMH 100
T/G=115.08
CB 4
T/G=115.08
CB 5
T/G=115.06
CB 6
T/G=112.81
CB 7
T/G=112.70
CB 9
T/G=114.17
CB 10
T/G=114.19
CBE 1
T/G=116.80
SANMH 103
T/G=115.85
STMMH 104
T/G=116.38
STMMH 102
T/G=115.62
SANMH 105
T/G=115.90
SANMH 107
T/G=116.76
STMMH 106
T/G=116.80
RYCB 2
T/G=118.00
RYCBMH 1
T/G=118.03
SANMH 108
(RELOCATED)
(1200mm)
T/G=116.63
CB 1
T/G=116.54
CB 2
T/G=116.58
CB 3
T/G=116.55
CBT 1
T/G=116.70
CBT 4
T/G=116.55
CBT 5
T/G=116.54
CBT 6
T/G=116.52
SWALE @ 1.5%
SWALE @ 4.9%
SWALE @ 1.1%
SWALE @ 1.0%
SWALE @ 1.3%
SWALE @ 3.1%
SWALE @ 2.5%
SWALE @ 3.4%
SWALE @ 1.0%
SWALE @ 1.5%
SWALE @ 1.0%
SWALE @ 1.0%
SWALE @ 1.0



NOTE:
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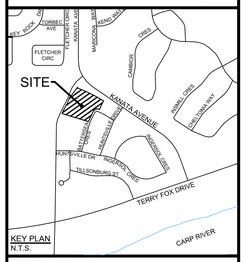

KEY PLAN
N.T.S.

GEODETIC BENCHMARK
HUNTLEY
IRON PIPE WITH BRASS CAP, IN EASTERN SECTION OF A CROSSROAD INTERSECTION ALONG HUNTLEY-MARCH TOWNSHIP ROAD, 8.1km SOUTHEAST FROM JUNCTION WITH HIGHWAY NO.17, 40.8m NORTHEAST FROM CENTRE OF INTERSECTION, 13.7m FROM MIDDLE OF ROAD, 60cm BELOW ROAD LEVEL.
UTM ZONE 18
N: 5017820
E: 452840
ELEV: 98.710

No.	DESCRIPTION	DATE
13	REVISED SITE PLAN APPLICATION	DEC 20/16
12	REISSUED FOR SITE PLAN APPROVAL	JUNE 24/16
11	ISSUED FOR SITE PLAN APPROVAL	JUNE 3/16
10	REISSUED FOR SITE PLAN APPLICATION	MAR 4/16
9	REISSUED FOR SITE PLAN APPLICATION	JAN 21/16
8	REVISED SITE PLAN APPLICATION	SEPT 4/15
7	REVISED PHASING	AUG 14/14
6	ISSUED FOR CONTACT EXECUTION/ CONSTRUCTION-BLASTING ONLY	JAN 09/13
5	FINAL ISSUE FOR SITE PLAN APPROVAL	FEB 01/12
4	REVISED PER TRANSFORMER LOCATIONS	JAN 05/12
3	REVISED PER CITY COMMENTS	NOV 3/11
2	REVISED PER CITY COMMENTS	SEPT 07/11
1	ISSUED FOR SITE PLAN CONTROL APPLICATION	MAR 28/11

REVISIONS:

ENGINEER'S STAMP:
LICENSED PROFESSIONAL ENGINEER
D.D. BLAIR
100122737
Dec. 20/16
PROVINCE OF ONTARIO

NORTH ARROW:

FOR REVIEW ONLY

CLIENT:
BRIGIL

ARCHITECT:

ENGINEER:
NOVATECH
Engineers, Planners & Landscape Architects

PROJECT TITLE:
KANATA LAKES
124 BATTERSEA CRESCENT
OTTAWA ONTARIO

SHEET TITLE:
SANITARY DRAINAGE AREAS PLAN

DRAWN:	CHECKED:
SAZ	MSP
SCALE: 1:250	SHEET No. 110105-SAN2
PROJECT No. 110105	

D07-12-15-0150

APPROVED ☐ REFUSED ☐

THIS _____ DAY OF _____, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

REFER TO 110105-LEG2 FOR ADDITIONAL NOTES

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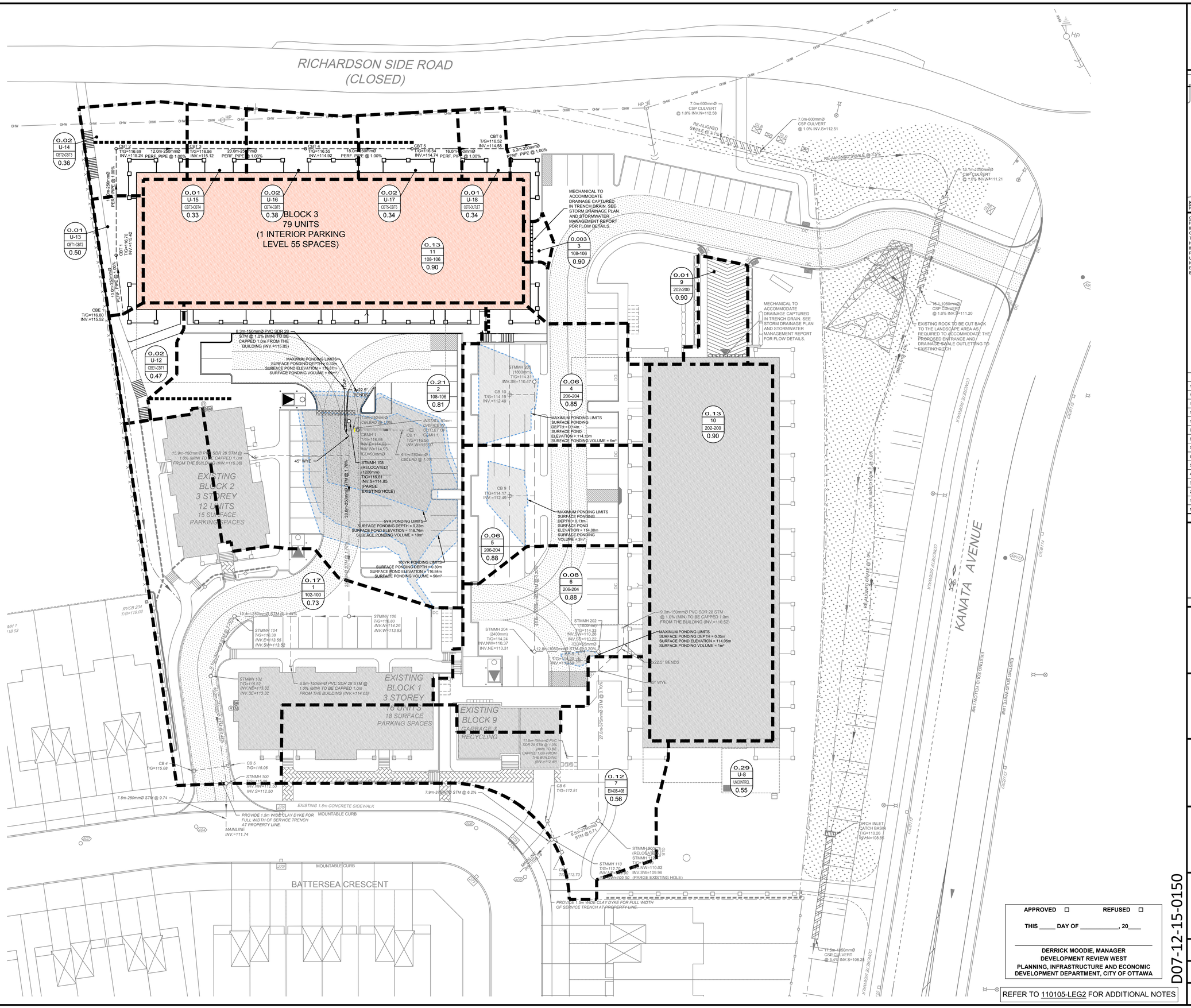

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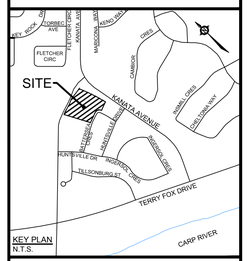

GEODETIC BENCHMARK
HUNTLEY
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ENGINEER'S STAMP:
LICENSED PROFESSIONAL ENGINEER
D.D. BLAIR
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Dec. 20/16
PROVINCE OF ONTARIO

NORTH ARROW:

FOR REVIEW ONLY

CLIENT:
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ENGINEER:
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Engineers, Planners & Landscape Architects

PROJECT TITLE:
KANATA LAKES
124 BATTERSEA CRESCENT
OTTAWA ONTARIO

SHEET TITLE:
STORM DRAINAGE
AREAS PLAN

DRAWN:	CHECKED:
RBG	MSP
SCALE: 1:250	SHEET No. 110105-STM2
PROJECT No. 110105	

D07-12-15-0150

APPROVED ☐ REFUSED ☐

THIS _____ DAY OF _____, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

REFER TO 110105-LEG2 FOR ADDITIONAL NOTES

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GENERAL NOTES:

1. COORDINATE AND SCHEDULE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
2. DETERMINE THE EXACT LOCATION, SIZE, MATERIAL AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO COMMENCING CONSTRUCTION. PROTECT AND ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES WHETHER OR NOT SHOWN ON THIS DRAWING.
3. OBTAIN ALL NECESSARY PERMITS AND APPROVALS FROM THE CITY OF OTTAWA BEFORE COMMENCING CONSTRUCTION.
4. BEFORE COMMENCING CONSTRUCTION OBTAIN AND PROVIDE PROOF OF COMPREHENSIVE, ALL RISK AND OPERATIONAL LIABILITY INSURANCE FOR $5,000,000.00. INSURANCE POLICY TO NAME OWNERS, ENGINEERS AND ARCHITECTS AS CO-INSURED.
5. RESTORE ALL DISTURBED AREAS ON-SITE AND OFF-SITE, INCLUDING TRENCHES AND SURFACES ON PUBLIC ROAD ALLOWANCES TO EXISTING CONDITIONS OR BETTER TO THE SATISFACTION OF THE CITY OF OTTAWA AND ENGINEER.
6. REMOVE FROM SITE ALL EXCESS EXCAVATED MATERIAL, ORGANIC MATERIAL AND DEBRIS UNLESS OTHERWISE INSTRUCTED BY ENGINEER. EXCAVATE AND REMOVE FROM SITE ANY CONTAMINATED MATERIAL. ALL CONTAMINATED MATERIAL SHALL BE DISPOSED OF AT A LICENSED LANDFILL FACILITY.
7. ALL ELEVATIONS ARE GEODETIC.
8. REFER TO GEOTECHNICAL REPORT (No. 62970.01, DATED DECEMBER 20, 2016), PREPARED BY HOULE CHEVRIER FOR SUBSURFACE CONDITIONS, CONSTRUCTION RECOMMENDATIONS, AND GEOTECHNICAL INSPECTION REQUIREMENTS. THE GEOTECHNICAL CONSULTANT IS TO REVIEW ON-SITE CONDITIONS AFTER EXCAVATION PRIOR TO PLACEMENT OF THE GRANULAR MATERIAL.
9. REFER TO ARCHITECT'S AND LANDSCAPE ARCHITECT'S DRAWINGS FOR BUILDING AND HARDSURFACE AREAS AND DIMENSIONS.
10. ALL SIDEWALK ARE TO BE CONCRETE UNLESS OTHERWISE NOTED.
11. REFER TO STORMWATER MANAGEMENT REPORT(R-2016-182) PREPARED BY NOVATECH.
12. SAW CUT AND KEY GRIND ASPHALT AT ALL ROAD CUTS AND ASPHALT TIE IN POINTS AS PER CITY OF OTTAWA STANDARDS (R10).
13. PROVIDE LINE/PARKING PAINTING.
14. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GENERAL PLAN OF SERVICES INDICATING ALL SERVICING AS-BUILT INFORMATION SHOWN ON THIS PLAN. AS-BUILT INFORMATION MUST INCLUDE: PIPE MATERIAL, SIZES, LENGTHS, SLOPES, INVERT AND T/G ELEVATIONS, STRUCTURE LOCATIONS, VALVE AND HYDRANT LOCATIONS, T/WM ELEVATIONS AND ANY ALIGNMENT CHANGES, ETC.
15. ALL MATERIALS AND CONSTRUCTION METHODS SHALL BE IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS. ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
16. ALL PRIVATE APPROACHES MUST BE CONSTRUCTED AS PER CITY SPECIFICATION SC7.1.

SEWER NOTES:

1. SPECIFICATIONS:

ITEM	SPEC No.	REFERENCE
CATCHBASIN (600x600mm)	705.010	OPSD
STORM / SANITARY MANHOLE (1200Ø)	701.010	OPSD
CB, FRAME & COVER	S19.1, S22, S23, 400.020	CITY OF OTTAWA/OPSD
STORM / SANITARY MH FRAME & COVER	401.010	OPSD
SEWER TRENCH - BEDDING (GRANULAR A)	S6, S7	CITY OF OTTAWA/OPSD
COVER (GRANULAR A OR GRANULAR B TYPE I, WITH MAXIMUM PARTICLE SIZE = 25mm)	S6, S7	CITY OF OTTAWA/OPSD
CATCHBASIN LEAD PVC DR 35		
PERFORATED PIPE	S29	CITY OF OTTAWA
LANDSCAPE CB "T"	S30	CITY OF OTTAWA
LANDSCAPE CB "E"	S31	CITY OF OTTAWA
SEWER SERVICE CONNECTION - RIGID PIPE	S11	CITY OF OTTAWA
SEWER SERVICE ABANDONMENT	S11.4	CITY OF OTTAWA
STORM SEWER PVC DR 35		
SANITARY SEWER PVC DR 28		

2. INSULATE ALL SANITARY PIPES THAT HAVE LESS THAN 2.5m COVER AND ALL STORM PIPES WITH LESS THAN 2.0m COVER WITH 50mmX1200mm HI-40 INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
3. SERVICES ARE TO BE CONSTRUCTED TO 1.0m FROM FACE OF BUILDING AT A MINIMUM SLOPE OF 1.0%.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY. THE USE OF CLEAR CRUSHED STONE AS A BEDDING LAYER SHALL NOT BE PERMITTED.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTING PIPES TO MANHOLES USING APPROVED MATERIALS AS SPECIFIED IN CITY OF OTTAWA SPECIFICATION MS22.15.
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS UNLESS OTHERWISE INDICATED.
8. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES.
9. REINSTATE ALL EXISTING PAVEMENT, CURB AND BOULEVARDS AS PER CITY OF OTTAWA R10.

WATERMAIN NOTES:

ITEM	SPEC. No.	REFERENCE
1. SPECIFICATIONS:		
WATERMAIN TRENCHING	W17	CITY OF OTTAWA
HYDRANT INSTALLATION	W18&W19	CITY OF OTTAWA
THERMAL INSULATION IN SHALLOW TRENCHES	W22	CITY OF OTTAWA
WATERMAIN INSULATION	W23	CITY OF OTTAWA
VALVE BOX ASSEMBLY	W24	CITY OF OTTAWA
WATERMAIN CROSSING BELOW SEWER	W25	CITY OF OTTAWA
TYPICAL CONNECTION DETAIL	W25.1	CITY OF OTTAWA
WATERMAIN CROSSING ABOVE SEWER	W25.2	CITY OF OTTAWA
CONCRETE THRUST BLOCKS FOR PVC AND DI PIPE 400mm AND UNDER	W25.3	CITY OF OTTAWA
THRUST BLOCK DIMENSION TABLES FOR PVC AND DI PIPE 400mm AND UNDER	W25.4	CITY OF OTTAWA
RESTRAINING AND RETAINING RINGS FOR PVC AND DI PIPE 400mmØ AND UNDER	W25.5	CITY OF OTTAWA
TABLES OF RESTRAINED LENGTHS FOR PVC AND DI PIPE 400mm AND UNDER	W25.6	CITY OF OTTAWA
TYPICAL SERVICE LINE	W26	CITY OF OTTAWA
TRACER WIRE INSTALLATION	W36	CITY OF OTTAWA
SERVICE INSTALLATION AT SEWER CROSSING	W38	CITY OF OTTAWA
CATHODIC PROTECTION FOR PVC WATERMAIN SYSTEMS	W40	CITY OF OTTAWA
TYPICAL ANODE INSTALLATION PVC WATERMAIN	W42	CITY OF OTTAWA
WATERMAIN	PVC DR 18	CITY OF OTTAWA

2. SUPPLY AND CONSTRUCT ALL WATERMAINS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS. EXCAVATION, INSTALLATION, BACKFILL AND RESTORATION OF ALL WATERMAINS BY THE CONTRACTOR. CONNECTIONS AND SHUT-OFFS AT THE MAIN AND CHLORINATION OF THE WATER SYSTEM SHALL BE PERFORMED BY CITY OFFICIALS.
3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED.
4. PROVIDE MINIMUM 0.50m CLEARANCE BETWEEN OUTSIDE OF PIPES AT ALL CROSSINGS WHEN WATERMAIN IS BELOW SEWER AND MINIMUM 0.25m CLEARANCE WHEN WATERMAIN IS ABOVE SEWERS.
5. WATER SERVICE IS TO BE CONSTRUCTED TO WITHIN 1.0m OF FOUNDATION WALL AND CAPPED, UNLESS OTHERWISE INDICATED.

GRADING NOTES:

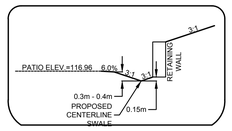
1. ALL TOPSOIL, ORGANIC OR DELETERIOUS MATERIAL MUST BE ENTIRELY REMOVED FROM BENEATH THE PROPOSED PAVED AREAS AS DIRECTED BY THE SITE ENGINEER OR GEOTECHNICAL ENGINEER.
2. EXPOSED SUBGRADES IN PROPOSED PAVED AREAS SHOULD BE PROOF ROLLED WITH A LARGE STEEL DRUM ROLLER AND INSPECTED BY THE GEOTECHNICAL ENGINEER PRIOR TO THE PLACEMENT OF GRANULARS.
3. ANY SOFT AREAS EVIDENT FROM THE PROOF ROLLING SHOULD BE SUB-EXCAVATED AND REPLACED WITH SUITABLE MATERIAL THAT IS FROST COMPATIBLE WITH THE EXISTING SOILS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. THE GRANULAR BASE SHOULD BE COMPACTED TO AT LEAST 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE. ANY ADDITIONAL GRANULAR FILL USED BELOW THE PROPOSED PAVEMENT SHOULD BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY VALUE.
5. MINIMUM OF 2% GRADE FOR ALL GRASS AREAS UNLESS OTHERWISE NOTED.
6. MAXIMUM TERRACING GRADE TO BE 3:1 UNLESS OTHERWISE NOTED.
7. ALL GRADES BY CURBS ARE EDGE OF PAVEMENT GRADES UNLESS OTHERWISE INDICATED.
8. ALL CURBS SHALL BE MONOLITHIC CONCRETE CURB AND SIDEWALK (150mm) UNLESS OTHERWISE NOTED AND CONSTRUCTED AS PER CITY OF OTTAWA STANDARDS (SC2).
9. REFER TO LANDSCAPE PLAN FOR PLANTING AND OTHER LANDSCAPE FEATURE DETAILS.
10. CONTRACTOR TO PROVIDE THE CONSULTANT WITH A GRADING PLAN INDICATING AS-BUILT ELEVATIONS OF ALL DESIGN GRADES SHOWN ON THIS PLAN.
11. ALL RETAINING WALLS MUST HAVE A MINIMUM CLEARANCE OF 0.3m FROM ALL PROPERTY LINES.

EROSION AND SEDIMENT CONTROL NOTES :

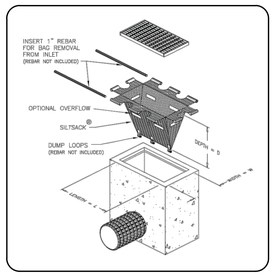
1. ALL EROSION AND SEDIMENT CONTROLS ARE TO BE INSTALLED TO THE SATISFACTION OF THE ENGINEER, THE MUNICIPALITY AND THE MISSISSIPPI VALLEY CONSERVATION AUTHORITY. THEY ARE TO BE APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION. THESE PRACTICES ARE TO BE IMPLEMENTED IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL AND SHOULD INCLUDE AS A MINIMUM THOSE MEASURES INDICATED ON THE PLAN.
2. TO PREVENT SURFACE EROSION FROM ENTERING THE DITCH OR STORM SYSTEM DURING CONSTRUCTION, CATCHBASIN INSERTS WILL BE PLACED UNDER GRATES OF ALL PROPOSED AND EXISTING CATCHBASINS AND STRUCTURES. (REFER TO CATCHBASIN INSERT DETAIL.) A LIGHT DUTY SILT FENCE BARRIER WILL ALSO BE INSTALLED ALONG THE PROPERTY LINES AND STRAW BALE BARRIERS WILL BE INSTALLED WITHIN THE OUTLET DITCHES. THESE CONTROL MEASURES WILL REMAIN IN PLACE UNTIL VEGETATION HAS BEEN ESTABLISHED AND CONSTRUCTION COMPLETE.
3. THE SEDIMENT CONTROL MEASURES SHALL ONLY BE REMOVED WHEN, IN THE OPINION OF THE ENGINEER, THE MEASURES ARE NO LONGER REQUIRED. NO CONTROL MEASURES MAY BE PERMANENTLY REMOVED WITHOUT PRIOR AUTHORIZATION FROM THE ENGINEER.
4. THE CONTRACTOR SHALL IMMEDIATELY REPORT TO THE ENGINEER ANY ACCIDENTAL DISCHARGES OF SEDIMENT MATERIAL INTO ANY DITCH OR STORM SEWER SYSTEM. APPROPRIATE RESPONSE MEASURES, INCLUDING ANY REPAIRS TO EXISTING CONTROL MEASURES OR THE IMPLEMENTATION OF ADDITIONAL CONTROL MEASURES, SHALL BE CARRIED OUT BY THE CONTRACTOR WITHOUT DELAY.
5. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
6. BATTERSEA CRESCENT, RICHARDSON SIDE ROAD AND KANATA AVENUE IS TO BE SWEPT AS REQUIRED OR AS DIRECTED BY THE ENGINEER AND/OR CITY OF OTTAWA.
7. THE CONTRACTOR SHALL ENSURE PROPER DUST CONTROL IS PROVIDED WITH THE APPLICATION OF WATER (AND IF REQUIRED, CALCIUM CHLORIDE) DURING DRY PERIODS.

ROCK EXCAVATION NOTES :

1. THE CONTRACTOR WILL NOT BE PERMITTED TO START ANY FORM OF BLASTING WORK UNTIL HE HAS HAD A PRE-CONSTRUCTION SURVEY AS PER OPSS 120 (VOL. 7) OF ALL THE BUILDINGS THAT ARE WITHIN THE PROXIMITY OF THE WORK AND IN CONFORMANCE WITH AGENCY REQUIREMENTS. OPSS 120 SPECIFIES A PRE-BLAST SURVEY SHALL BE PREPARED FOR ALL BUILDINGS, UTILITIES, STRUCTURES, WATER WELLS AND FACILITIES LIKELY TO BE AFFECTED BY THE BLAST AND THOSE WITHIN 75m OF THE LOCATION WHERE EXPLOSIVES ARE TO BE USED. A COPY OF THE REPORT ON THE PRE-CONSTRUCTION SURVEY SHALL BE PROVIDED TO THE OWNER PRIOR TO COMMENCEMENT OF BLASTING.
2. THE CONTRACTOR SHALL ESTABLISH A MONITORING PROGRAM DURING PRODUCTION BLASTING. OPSS 120 SPECIFIES DURING EACH BLAST, GROUND VIBRATION PPV AND THE PEAK SOUND PRESSURE LEVEL SHALL BE MONITORED 250m FROM THE BLAST OR AT THE CLOSEST PORTION OF ANY RESIDENCE. IT IS THEREFORE A CONDITION OF THIS CONTRACT THAT THE CONTRACTOR ENGAGES A REPUTABLE FIRM EXPERIENCED IN THIS TYPE OF WORK PRIOR TO ANY BLASTING BEING CARRIED OUT. THE OWNER SHALL APPROVE THE FIRM. COPIES OF DAILY RECORDS OUTLINING BLAST TIMES, AMOUNT OF CHARGE AND MONITORING REPORTS SHALL BE PROVIDED TO THE OWNER UPON REQUEST.
3. THE CONTRACTOR SHALL UNDERTAKE BLASTING OF THE BEDROCK FOR THE BUILDING TRENCHING, WHICH INCLUDES BUT IS NOT LIMITED TO, THE SANITARY, STORM, WATERMAIN AND UTILITY SERVICES. THE CONTRACTOR IS TO BLAST THE SERVICE TRENCHES TO 2.0m INSIDE THE BUILDING FOOTPRINT. THE CONTRACTOR SHALL COORDINATE THE EXACT LOCATION OF THE SERVICE TRENCHES WITH THE SITE ENGINEER, THE DEVELOPER, BUILDING CONTRACTOR AND THE APPROPRIATE UTILITY COMPANIES PRIOR TO THE START OF THE BLASTING OR HOE-RAM OPERATIONS.
4. THE CONTRACTOR MAY USE BLASTED ROCK IN THE LAST 0.50M IMMEDIATELY BELOW ROADWAY SUBGRADE ELEVATION TO PROVIDE A FIRM SUBGRADE CAP, IF AVAILABLE, AS DIRECTED BY THE GEOTECHNICAL ENGINEER.



SWALE TYPICAL CROSS SECTION
N.T.S.



CATCHBASIN INSERT DETAIL
N.T.S.

APPROVED ☐ REFUSED ☐

THIS _____ DAY OF _____, 20____

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

LEGEND

- SILT FENCE AS PER OPSD 219.110
- LIMIT OF CONSTRUCTION BOUNDARY
- STRAW BALE BARRIER AS PER OPSD 219.100
- 116.25 / 116.25 — PROPOSED ELEVATION / *EXISTING ELEVATION*
- 116.80 TW / 114.35 BW — PROPOSED TOP OF WALL ELEVATION / PROPOSED BOTTOM OF WALL ELEVATION
- 116.80 TRW / 114.35 BRW — PROPOSED TOP OF BLASTED ROCK WALL ELEVATION / PROPOSED BOTTOM OF BLASTED ROCK WALL ELEVATION
- 114.30(S) — PROPOSED SWALE ELEVATION
- 114.30(T/C) — PROPOSED TOP OF CURB ELEVATION
- 113.05 — PROPOSED TERRACE ELEVATION
- 2.0% — PROPOSED SLOPE DIRECTION AND GRADE
- SWALE WITH DIRECTION OF FLOW
- MAXIMUM 3:1 SIDESLOPING
- MAJOR OVERLAND FLOW ROUTE
- V&VB — PROPOSED VALVE & VALVE BOX LOCATION
- DMA — DISTRICT METERING AREA CHAMBER
- HYD T/F=103.15 — PROPOSED HYDRANT C/W VALVE, LEAD, AND TOP OF BOTTOM FLANGE ELEVATION
- SIAMESE CONNECTION
- PIPE INSULATION
- SANMH 101 — PROPOSED SANITARY MH & SEWER WITH DIRECTION OF FLOW
- STMMH 100 — PROPOSED STORM MH & SEWER WITH DIRECTION OF FLOW
- CB 2 T/G=113.20 — PROPOSED CATCH BASIN (C/W SUBDRAIN) WITH TOP OF GRATE ELEVATION
- CICB 1 — PROPOSED CURB INLET CATCH BASIN
- PROPOSED DITCH INLET CATCH BASIN
- RYCB 1 T/G=117.15 — PROPOSED REAR YARD CATCH BASIN WITH TOP OF GRATE ELEVATION
- CBMH 1 T/G=115.90 — PROPOSED CATCHBASIN MANHOLE WITH TOP OF GRATE ELEVATION
- PROPOSED TRENCH DRAIN
- PROPOSED CATCH BASIN LEAD WITH DIRECTION OF FLOW
- DC — PROPOSED DEPRESSED CURB
- PROPOSED TACTILE WALKING SURFACE INDICATOR (TWSI)
- PROPERTY BOUNDARY
- VERTICAL BLASTED ROCK RETAINING WALL C/W 1.8m CHAIN LINK FENCE
- VERTICAL BLASTED ROCK RETAINING WALL C/W 1.8m WOOD PRIVACY FENCE
- DECORATIVE STONE RETAINING WALL C/W 1.8m WOOD PRIVACY FENCE
- ARMOR STONE RETAINING WALL C/W ORNAMENTAL METAL FENCE
- DECORATIVE STONE RETAINING WALL C/W ORNAMENTAL METAL FENCE
- PROPOSED RETAINING WALL
- PROPOSED HANDRAIL
- PROPOSED HEAVY DUTY ASPHALT (FIRE ROUTE)
- PROPOSED UNIT PAVING (REFER TO LANDSCAPE PLAN L1.01)
- PROPOSED TOPSOIL AND HYDRO SEED
- PROPOSED ASPHALT SIDEWALK
- ROCK CUT AREA
- 12 — PIPE CROSSING (SEE PIPE CROSSING TABLE)
- PROPOSED HYDRO TRANSFORMER
- TP 7 EG=109.06m BR=105.36m — APPROXIMATE TEST PIT LOCATION
- BH 3 EG=109.29m BR=106.97m — APPROXIMATE BOREHOLE LOCATION
- V&VB — EXISTING VALVE & VALVE BOX LOCATION
- HYD — EXISTING HYDRANT C/W VALVE & LEAD
- 101 — EXISTING SANITARY MH & SEWER
- 100 — EXISTING STORM MH & SEWER
- 95 — EXISTING ROADSIDE CATCH BASIN
- *CICB114* — EXISTING CURB INLET CATCH BASIN
- RYCB 2 — EXISTING REAR YARD CATCH BASIN
- CBMH 3 — EXISTING CATCHBASIN MANHOLE
- EXISTING LIGHT STANDARD
- OHW — EXISTING OVERHEAD WIRE
- X — EXISTING FENCE
- EXISTING DITCH
- X — REMOVAL

PAVEMENT STRUCTURE:

LIGHT DUTY
50mm SuperPave 12.5 (PG 58-34)
150mm GRAN "O"
300mm GRAN "B" TYPE II

HEAVY DUTY (FIRE ROUTE)
40mm Superpave 12.5 (PG 58-34)
50mm Superpave 19.0 (PG 58-34)
150mm GRAN "O"
450mm GRAN "B" TYPE II

SANITARY DRAINAGE AREA

AREA 1 — AREA ID
815-813 — MANHOLE TO MANHOLE
3.81 — 89.1 — POPULATION EQUIVALENT / AREA IN HECTARES

SANITARY DRAINAGE AREA BOUNDARY

STORM DRAINAGE AREA

1.00 — DRAINAGE AREA (hectares)
1 — AREA IDENTIFICATION
105-103 — MANHOLE TO MANHOLE
0.50 — RUN-OFF COEFFICIENT

STORM DRAINAGE AREA BOUNDARY

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	DESCRIPTION	DATE
7	REVISED SITE PLAN APPLICATION	DEC 20/16
6	ISSUED FOR CONSTRUCTION	NOV 25/16
5	REISSUED FOR SITE PLAN APPROVAL	JUNE 24/16
4	ISSUED FOR SITE PLAN APPROVAL	JUNE 3/16
3	REISSUED FOR SITE PLAN APPLICATION	MAR 4/16
2	REISSUED FOR SITE PLAN APPLICATION	JAN 21/16
1	REVISED SITE PLAN APPLICATION	SEPT 4/15

REVISIONS:

ENGINEER'S STAMP: LICENSED PROFESSIONAL ENGINEER — D.D. BLAIR — 100122737 — Dec. 20/16 — PROVINCE OF ONTARIO

FOR REVIEW ONLY

NORTH ARROW:

CLIENT: LE GROUPE BRIGIL CONSTRUCTION

ARCHITECT:

ENGINEER: NOVATECH — Engineers, Planners & Landscape Architects

PROJECT TITLE:
KANATA LAKES
124 BATTERSEA CRESCENT
OTTAWA ONTARIO

SHEET TITLE:
NOTES, LEGENDS & DETAILS

DRAWN:	CHECKED:
RBG	MSP
SCALE: 1:250	SHEET No. 110105-LEG2
PROJECT No. 110105	

D07-12-15-0150

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