Wall Sound and Lighting– Proposed Warehouse Development

210/220 Maple Creek Court, City of Ottawa

Site Servicing and Stormwater Management Report

Prepared for:

BBS Construction
1805 Woodward Drive
Ottawa, ON
K2C 0P9

Prepared by:

McIntosh Perry
115 Walgreen Road
Carp, ON
K0A 1L0

REV01: January 20th, 2016

CP-15-0429

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION 1

1.1 Purpose 1

1.2 Site Description 1

2.0 BACKGROUND STUDIES 2

3.0 PRE-CONSULTATION SUMMARY 2

4.0 EXISTING SERVICES 3

5.0 SERVICING PLAN 3

5.1 Water Servicing 3

5.2 Sanitary Servicing 3

5.3 Storm Servicing 4

6.0 STORMWATER MANAGEMENT 4

6.1 Design Methodology 4

6.2 Site Drainage 5

6.2.1 Pre-Development Drainage 5

6.2.2 Post-Development Drainage 5

6.3 Quantity Control 6

6.4 Quality Control 6

7.0 SEDIMENT AND EROSION CONTROL 8

8.0 SUMMARY 8

9.0 RECOMMENDATION 9

List of Figures

FIGURE 1: KEY MAP: 210/220 MAPLE CREEK COURT, OTTAWA 1

List of Tables

TABLE 1: PRE-DEVELOPMENT DRAINAGE SUMMARY.....5

TABLE 2: POST-DEVELOPMENT RUNOFF CALCULATIONS.....5

List of Appendices

APPENDIX A: CITY OF OTTAWA PRE-CONSULTATION NOTES

APPENDIX B: WATER DEMANDS AND FIRE CALCULATIONS

APPENDIX C: SEPTIC DESIGN BY PATERSON GROUP

APPENDIX D: PRE-DEVELOPMENT PLAN

APPENDIX E: POST-DEVELOPMENT PLAN

APPENDIX F: STORMWATER CALCULATIONS

APPENDIX G: CITY OF OTTAWA DESIGN CHECKLIST

1.0 PROJECT DESCRIPTION

1.1 Purpose

This report will address the servicing (water, sanitary, and storm) and stormwater management requirements associated with the proposed development located at 210/220 Maple Creek Court within the City of Ottawa.

1.2 Site Description

The property is located at 210/220 Maple Creek Court within the approved Reis Road Industrial Park. It is described as Parts 4 & 5, Plan 27R-17169 geographic Township of Huntley, City of Ottawa. The land in question covers approximately 3.47 ha and is located at the end of the roundabout on Maple Creek Court.

The existing site is currently undeveloped and is made up of gravel and grass areas with low lying vegetation. There are no buildings or infrastructure located on or under the existing site.

The proposed development consists of four (4) warehouse buildings approximately 1,865 m² in size. The proposed development will be completed in phases. Parking and drive aisles will be provided throughout the site with landscaping located around the perimeter of the site.

Figure 1: Key Map: 210/220 Maple Creek Court, Ottawa

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site include review of the City of Ottawa as-built drawings, Reis Road Industrial Park Design Guidelines, a topographical survey of the site, A Phase I Environmental Site Assessment, a geotechnical report, a hydrogeological assessment and an environmental impact statement.

As-built drawings of the existing services within the vicinity of the site were reviewed in order to determine proper servicing and stormwater management schemes for the site.

The original Reis Road Industrial Park Design Guidelines were reviewed for the specific design criteria.

A topographic survey of the site was completed by McIntosh Perry Survey Inc. (MPSI) dated November 2nd, 2016, and can be found under separate cover.

The following reports have previously been completed and are available under separate cover:

- Phase I Environmental Site Assessment completed by Pinchin dated October 7th, 2014.
- Geotechnical Investigation completed by Paterson Group dated December 16, 2016.
- Hydrogeological Assessment completed by Paterson Group dated January, 2017.
- Environmental Impact Statement completed by McIntosh Perry dated January 20th, 2017

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff have been pre-consulted regarding this proposed development in person on June 16th, 2016. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 20 minutes and 10 minutes, respectively.
- Control 5 through 100-year post-development as outlined in the approved Reis Road Industrial Park Guidelines.
    - Sites in this subdivision can be developed without a requirement for on-site SWM as long as the combined C-value does not exceed 0.775
    - It is important to note that the subdivision design used constant C-values, while the City of Ottawa Sewer Design Guidelines (SDG) now stipulate a 25% increase during the 100-year event. Accordingly, future designs are to use the City's 100-year runoff coefficients when determining the combined C-value for the site.
- Quality control is required to be provided to an enhanced level, 80% TSS as per discussions with the MVCA.

Correspondence with the City can be found in Appendix 'A'.

4.0 EXISTING SERVICES

No underground water, storm or sanitary mains exist within Maple Creek Court.

There is currently a roadside ditch within Maple Creek Court. The roadside ditches within the vicinity of the site direct storm flows towards the northwest away from the proposed site. There is an existing low spot along the center of the property frontage.

Hydro, cable and Bell are available to service the site from Maple Creek Court.

5.0 SERVICING PLAN

The proposed site will be serviced with a new well and septic system that will provide the proposed development with water and sanitary services. Stormwater runoff will sheet flow to the grass storage swales located along the property limits of the site.

Hydro, Bell, and Cable will be provided via an underground trench. All utilities will be provided from Maple Creek Court.

All servicing requirements shall be approved by the City of Ottawa or the relevant utilities, as applicable.

5.1 Water Servicing

A new well will be drilled on site to provide the proposed building with domestic water supply. As per the findings of the hydrogeological Assessment Report, dated January 2017, the drilled well can provide sufficient quantity and quality of water for proposed site needs. The report also finds the proposed development will not adversely affect groundwater.

The proposed well, however, will not provide the required fire protection for the site. Fire protection will be provided on site via an underground fire tank protection system which will be located in the northwest corner of the site, on the south side of the site entrance. The tank system will hold 50,000 UK Gallons and will be equipped with all of the required connections as well as a dry hydrant system on the outside of the buildings that has been approved by the Ottawa Fire Services. See Appendix 'B' for detailed calculations.

5.2 Sanitary Servicing

The proposed septic system has been designed by Paterson Group and is found under separate cover. The design flow for the proposed development was calculated as 9,900 L/day based on the Ontario Building Code (OBC) for a warehouse without showers. (See Appendix 'C' for more information). The septic design has been reviewed and approved by the Ottawa Septic System Office. For further design information pertaining to the on-site sewage disposal system, please refer to Paterson's design in Appendix 'C'.

5.3 Storm Servicing

Site runoff within the development area will sheet flow to two (2) proposed SWM swales, one located along the north corner of the site, and the other adjacent to the southern property limit of the site. The proposed grass swales will collect storm flows and restrict the runoff prior to leaving the site. The storm system will be further detailed in Section 6.0.

6.0 STORMWATER MANAGEMENT

Stormwater management for the development area will be maintained through positive drainage away from the proposed buildings and into the proposed SWM swales. Restricted runoff will then be directed to the existing roadside ditch along Maple Creek Court. This SWM plan will protect the receiving waterways from excessive erosion by implementing velocity and quantity control strategies. The storm runoff will enter the pipe system through catch basins (CB's) and catchbasin manholes (CBMH's) located throughout the site. The quantitative and qualitative properties of the storm runoff for both the pre- and post-development flows are further detailed below.

6.1 Design Methodology

Runoff calculations in this report are derived using the Rational Method, given as:

Q=2.78 CIA (L/s)
C=Runoff coefficient
I=Rainfall intensity in mm/hr.
A=Drainage area in hectares

It is recognized that the rational method tends to overestimate runoff rates. As a by-product of using extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

In conjunction with the City of Ottawa Sewer Design Guidelines the following runoff coefficients were used to develop a balanced 'C' for each drainage area:

Building roofs, Asphalt, Concrete	0.90
Grass, undeveloped areas	0.20
Gravel	0.60

As per the City of Ottawa Sewer Design Guidelines, the 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre-development and post-development flows shall be calculated using a time of concentration (Tc) of 20 minutes and 10 minutes, respectively.

6.2 Site Drainage

6.2.1 *Pre-Development Drainage*

The existing site has been demonstrated as drainage areas A1 and A2. Drawing CP-15-0429 PRE (Appendix 'D') indicates the limits of these drainage areas.

Table 1: Pre-Development Drainage Summary

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	1.76	0.21	0.26	72.0	152.3
A2	1.71	0.24	0.30	80.2	171.1
Total	**3.47**			**152.2**	**323.4**

(See Appendix 'F' for Calculations)

6.2.2 *Post-Development Drainage*

The proposed site has been demonstrated as drainage areas B1-B7. Drawing CP-15-0429 Post (Appendix 'E') indicates the limits of these drainage areas.

Table 2: Post-Development Runoff Calculations

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
B1	0.64	0.61	0.69	75.9	146.6
B2	0.64	0.75	0.84	93.9	179.6
B3	0.58	0.52	0.59	59.2	114.7
B4	0.23	0.81	0.91	36.9	70.8
B5	0.03	0.20	0.25	1.1	2.3
B6	0.17	0.72	0.81	24.6	47.2
B7	0.13	0.72	0.81	18.1	34.8
B8	0.15	0.77	0.86	23.3	44.4
B9	0.54	0.51	0.58	54.2	105.3
B10	0.35	0.20	0.25	13.6	29.0
Total	**3.47**	**0.59**	**0.67**	**400.8**	**774.8**

(See Appendix 'F' for Calculations)

6.3 Quantity Control

The allowable runoff rate from sites within the Reis Road Industrial Park is governed by the design assumptions used in the approved Engineering Report contained in Schedule 'H' of the subdivision agreement. If the resulting runoff from the proposed site will be less than the allowable rate, no on-site SWM will be required. The design of the internal drainage for the subdivision was based on site developments that would be 50% building (C=1.0), 25% parking (C=0.9) and 25% undeveloped (C=0.2).

The design assumptions have been interpreted by the City of Ottawa, that sites in this subdivision can be developed without a requirement for on-site SWM as long as the combined C-value does not exceed 0.775. As detailed within Appendix 'D' the proposed development will have a C-value of 0.54.

After discussing with City staff the stormwater management criteria for the site, no stormwater management quantity control is required for this site as the site C-value does not warrant SWM as per the excerpt provided by the City (See Appendix 'A' for City correspondence).

In the event that there is a rainfall above the 100-year storm event, or a blockage within the storm network, an emergency overland flow route has been provided such that the storm water runoff will be conveyed towards the north and south corners of the site away from the buildings. An elevation difference of 1.15 m has been provided from the lowest finished floor (115.05) of the building to the overland flow route elevation (113.90).

6.4 Quality Control

The Mississippi Valley Conservation Authority (MVCA) was contacted on September 21st, 2015 in order to identify the quality control requirements. An enhanced level of protection which involves a quality control of 80% Total Suspended Solids (TSS) removal is required for the site. Details can be found in Appendix 'A'.

The grass swales between the buildings have been designed to have shallow slopes (<5%) & to have a length greater than 40 m, however the depth of flow will not be controlled. Each swale has a tributary drainage area less than 1 ha. The grass within the swales will be kept at a length greater than 75 mm to enhance the filtration of suspended soils. The rear portion of the site will remain vegetated and will act as a large vegetated filter strip. The filter strip has an existing slope of 0.4%, has a length of 30 m and is 10 m wide in the flow direction (towards the south). Perennial rye grass shall be planted within the swales as it is a very fast germinating grass that spreads well under full sun conditions. The outlet for this area will be the south corner of the property as in pre-development conditions.

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. BMP's at this site will be implemented at the lot level. Lot level BMP's typically include minimizing ground slopes and maximizing landscaped areas which are being implemented on this development.

6.4.1 *Temperature Mitigation Measures*

The MVCA references the requirements for temperature mitigation measures for Huntley Creek as it has been designated as a "cool-water fish habitat". It is expected that stormwater measures designed to promote infiltration would aid in addressing these targets. The site is primarily impervious area underlain by glacial till, so infiltration measures will be limited as BMPs for temperature mitigation. The building rooftop has been proposed with light-coloured (high albedo) material to reduce radiant heat transfer to stormwater runoff from roof areas.

As the majority of heat transfer from paved surfaces occurs during the first flush (considered as the initial 10 mm of the design event), storage of the 2 year storm event has been given priority. The clearstone media area has been sized such that the 2 year event (greater than the 10 mm event) will not require any surface storage and will be contained within the proposed underground clear-stone media storage area. This will ensure that surface flows are directed through the clearstone before discharging to the roadside ditch within Maple Creek Court.

6.4.2 *Clear Stone Media Trench*

A Clear Stone Media Trench has been designed for the site in order to meet the required storage volumes as per the Ministry of the Environment (MOE) Stormwater Management Planning and Design Manual March 2003 Section 4.5.8 Infiltration Trenches. The Clear Stone Media Trench has been design to meet the MOE standards; however the underlying soils onsite will not provide any significant infiltration benefits. Flow within the Clear Stone Media Trench will be directed to the roadside ditch within Maple Creek Drive and storage for the restricted flow will be provided within the voids of the clear stone.

The Clear Stone Media Trench will be constructed at the west side of the site between the building and the property line. Storm runoff from the majority of the site will be collected within the new on-site storm network and will discharge into the Clear Stone Media Trench.

6.4.3 *Maintenance Design Parameters*

Operation and maintenance is required to ensure effective operation, longevity and aesthetic functioning of the SWMP and may include: sediment removal, trash removal, maintenance of vegetation and inspection of the inlet(s) and outlet(s).

Estimates of the longevity of infiltration SWMPs are based on professional opinion. Equation 7.1 and Table 7.4 from the MOE Stormwater Management Planning and Design Manual may be used as guidance for estimating longevity (based on monitoring results in literature and the native soil permeability). Recognizing the subjectiveness of Equation 7.1, there needs to be flexibility in assessing the lifespan of infiltration SWMPs based on site-specific information. As the majority of the site is made up of the proposed roof the runoff entering the SWM Area will have limited opportunity for carrying sediments to the infiltration structure.

Our recommendation for the SWM Area is to have annual inspections completed for the Clear Stone Media Trench including a CCTV of the pipe network within the SWM area. The inspection should note any sediment build-up, standing water or any trash on the within the structure. Based on the reviews maintenance will be required to ensure the SWM Area is functioning as designed.

7.0 SEDIMENT AND EROSION CONTROL

The site-grading contractor is responsible for ensuring sediment control structures are installed in accordance with the Site Grading and Drainage Plan as indicated. Silt fences shall be installed on site before construction or earth-moving operations begin, as shown on the site plan.

Geosock is to be installed under the grates of all existing structures along the frontage of the site and any new structures immediately upon its installation. The Geosock is to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

At the discretion of the project manager, municipal staff or conservation authority, additional silt control devices shall be installed at designated locations.

8.0 SUMMARY

- 4 new ±1,865 m^2 warehouse buildings will be constructed centrally on the site located at 210/220 Maple Creek Court
- A new septic system will be installed on-site and has been designed by Paterson Group. This design has been added to this report in Appendix C for reference purposes only.
- A new drilled well will be constructed on-site to service the development with domestic water supply.
- A new storm network will be installed onsite and will discharge to the clear stone media area.
- As discussed with the City of Ottawa staff, stormwater management is not required for this site as the combined C-value is below the 0.775 threshold.
- Stormwater quality treatment will be designed to remove 80% TSS per Mississippi Valley Conservation Authority requirements.

9.0 RECOMMENDATION

We respectfully recommend that:

This report, dated January 20th, 2016 and the associated site grading, drainage and servicing plans be approved for engineering details.

The sediment and erosion control plan outlined in Section 7.0 and detailed in the Grading and Drainage Plan notes are to be implemented by the contractor.

This report is respectfully being submitted for approval.

Ryan Kennedy, P. Eng.
Practice Area Lead, Land Development
(613) 836-2184 Ext.2243
R.Kennedy@mcintoshperry.com

Jonathan Jonker, C.E.T., rcsi
Site Development Designer
(613) 836-2184 Ext.2252
J.Jonker@mcintoshperry.com

APPENDIX A: CITY OF OTTAWA PRE-CONSULTATION NOTES

Jonathan Jonker

From: Hall, Kevin <Kevin.Hall@ottawa.ca>
Sent: December 1, 2016 3:06 PM
To: Jonathan Jonker
Subject: RE: 210/220 Maple Creek Court - SWM Confirmation

Follow Up Flag: Follow up
Flag Status: Flagged

Jonathan

Yes those are still the requirements.

Kevin Hall, C.E.T.
Project Manager, Infrastructure Approvals
Development Review - Rural Services
Gestionnaire de projet, Approbation des demandes d'infrastructure
Examen des demandes d'aménagement (Services ruraux)
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27824
ottawa.ca/planning / ottawa.ca/urbanisme

From: Jonathan Jonker [mailto:j.jonker@mcintoshperry.com]
Sent: Thursday, December 01, 2016 2:50 PM
To: Hall, Kevin
Subject: 210/220 Maple Creek Court - SWM Confirmation

Good Afternoon Kevin,

We are working with BBS to complete the submittal package for this site. As per the Reis Road Industrial Park Guidelines, we have determined that the site will have a combined C value of 0.66 for the 5-year and 0.74 for the 100-year. As per the engineering report for the subdivision and previous designs within the park, the site will not require on-site SWM controls.

We will provide our calculations to prove the combined runoff coefficients are below the 0.775 values. Can you please confirm that this is still the design criteria for the subdivision?

We have contacted the MVCA and they have stipulated that an enhanced level of treatment is required for the site, we will ensure this is provided through the site design.

Thank you very much,

Jonathan Jonker, C.E.T.
Designer / Inspector | Land Development
115 Walgreen Road, RR 3, Carp, ON K0A 1L0
T. 613.836.2184 (2252) | F. 613.836.3742 | C. 613.868.6484

Stormwater Management – The allowable runoff rate from sites within the Reis Industrial Park is governed by the design assumptions used in the approved Engineering Report contained in Schedule "H" of the subdivision agreement. If the resulting runoff from the proposed site will be less than the allowable rate, no on-site SWM will be required. The design parameters used in the approved subdivision Engineering Report are as follows:

- The design of the internal drainage for the subdivision was based on site developments that would be: 50% building (C=1.0), 25% parking (C=0.9) and 25% undeveloped (C=0.2). By my interpretation of design assumptions in the subdivision Engineering Report, sites in this subdivision can be developed without a requirement for on-site SWM as long as the combined C-value does not exceed 0.775.

It is important to note that the subdivision design used constant C-values, while the City of Ottawa Sewer Design Guidelines now stipulate a 25% increase during the 100-year event. Accordingly, I would ask that you use the City's 100-year runoff coefficients when determining the combined C-value for the site. If this is below 0.775, no on-site SWM will be required. If SWM is required, the allowable release will be based on the 5-year flow, with a C-value of 0.775

Jonathan Jonker

From: Myra Van Die <MVandie@mvc.on.ca>
Sent: September 30, 2015 10:56 AM
To: Curtis Melanson
Cc: Craig Cunningham
Subject: RE: 210 Maple Creek Court

Hi Curtis,

MVCA's quality control recommendations for the site are listed below:

- Huntley Creek is located to the south east of the site. An enhanced level of quality treatment is recommended for Huntley Creek based on the targets from the Carp River Watershed Subwatershed Study.
- The Carp Road Corridor CDP indicates the site is located within an area of high groundwater recharge. Given this, it is recommended stormwater techniques to infiltrate runoff be considered. Where infiltration measures receives primarily roof and pervious area runoff, the techniques can be employed without pre-treatment. Credit Valley Conservation has the following Design Guide available at: http://www.creditvalleyca.ca/low-impact-development/low-impact-development-support/stormwater-management-lid-guidance-documents/low-impact-development-stormwater-management-planning-and-design-guide/ that may be of assistance.
- The Carp River Watershed Study identifies Huntley Creek as a cold water system and includes infiltration and runoff temperature targets. It is expected that stormwater measures designed to promote infiltration would aid in addressing these targets.

Please contact me should you have any questions.

Regards,

Myra Van Die, P.Eng. | Water Resources Engineer
Mississippi Valley Conservation Authority

From: Curtis Melanson [mailto:c.melanson@mcintoshperry.com]
Sent: September-21-15 1:35 PM
To: Craig Cunningham
Cc: Myra Van Die
Subject: 210 Maple Creek Court

Hi Craig,
We have a client who is looking to develop approximately 50,000 ft2 of warehouse space at 210 Maple Creek Court in the Reis Industrial Park. Please see the attached concept plans for the site. They have not identified which concept they will be moving forward with.

Please note that we recognize there are a number of items missing including the septic/well/SWM locations.

We have not had a pre-consultation meeting with the City but are anticipating quantity control requirements. Can you please review and let us know what the quality control requirements for the site would be?

Thanks,

APPENDIX B: WATER DEMANDS AND FIRE CALCULATIONS

CP-15-0429 - 210/220 MAPLE CREEK COURT - OBC FIRE PROTECTION CALCULATIONS

Project:	210/220 MAPLE CREEK COURT
Project No.:	CP-15-0429
Designed By:	JMJ
Checked By:	CJM
Date:	January 20, 2017

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Store/Office & Warhouse Building

Building is classified as Group : F2 (from table 3.2.2.55)
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls,

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:
Q = minimum supply of water in litres
K = water supply coefficient from Table 1
V = total building volume in cubic metres
Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:
Stot = 1.0 + [Sside1+Sside2+Sside3+..etc.]

K	27	(from Table 1 pg A-31) (Worst case occupancy {E/ F2} 'K' value used)
V	17,058	(Total building volume in cu.m.)
Stot	1.0	(From figure 1 pg A-32)
Q =	460,577.71 L	

From Figure 1 (A-32)

Snorth	13.825	m	0.0
Seast	129.1	m	0.0
Ssouth	34.07	m	0.0
Swest	20.57	m	0.0

* approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9000 L/min (if Q >270,000 L)
2378 GPM

Table 1					
WATER SUPPLY COEFFICIENT - K					
TYPE OF CONSTRUCTION	Classification by Group or Division in Accordance with Table 3.1.2.1. of the Building Code				
	A-2 B-1 B-2 B-3 C D	A-4 F-3	A-1 A-3	E F-2	F-1
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2., including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

Table 3.2.2.55.
Maximum Building Area, Group D, up to 2 Storeys
Forming Part of Sentence 3.2.2.55.(1)

No. of *Storeys*	Maximum Area, m^2		
	Facing 1 *Street*	Facing 2 *Streets*	Facing 3 *Streets*
1 2	1 000 800	1 250 1 000	1 500 1 200
Column 1	2	3	4

Table 2	
OBC Part 3 Buildings	Required Minimum Water Supply Flow Rate (L/min)
One-storey building with building area not exceeding 600 m²	1800
All other buildings	2700 (if Q ≤ 108,000 L)(1) 3600 (if Q > 108,000 L and ≤ 135,000 L)(1) 4500 (if Q > 135,000 L and ≤ 162,000 L)(1) 5400 (if Q > 162,000 L and ≤ 190,000 L)(1) 6300 (if Q > 190,000 L and ≤ 270,000 L)(1) 9000 (if Q > 270,000 L)(1)

Note to Table 2:
(1) $Q = KVS_{Tot}$ as referenced in Paragraph 3(a)

Project: Wall Sound and Lighting
210/220 Maple Creek Court
Ottawa, ON

Re: Fire Fighting Storage Tank Calculations

1. Building Occupancy

From Table 3.1.2.1. Volume 1 of the National Building Code – Major Occupancy Classification:

- Group F Division 2

2. Buildings Requiring On-Site Water Supply

From Div. B A-3.2.5.7. Volume 2 of the National Building Code – 3."Buildings Requiring On-Site Water Supply"

- $Q=K* V* S_{tot}$ Where:
  K = 27 (from Table 1 pg A-30)
  V = 17,058 m^3
  (NOTE: The volume was calculated using total final volume of the Phase 1 building)
  S_{tot} = 1.00 (from Figure 1 pg A-32)
- Therefore, Q = (27) * (17,058 m^3) * (1.00) = 460,566 L (~ 121,669 gal)

3. Minimum Required Water Supply

From Div. B A-3.2.5.7., Table 2, Volume 2 of the National Building Code – Required Minimum Water Supply Flow Rate (L/min)

- 9,000 L/min (if Q > 270.000 L)
  From 3. (c) 9000 L/min for 30 min = 270,000 L (~71,326 gal)

Due to the excessive amount of water required from the equation above, the minimum supply required for 30 minutes will be used for this site. Therefore, the proposed underground fire protection tanks will be 5 – 45460.9 L (10,000 gal) tanks.

(MPCE File # CP-15-0429)

APPENDIX C: SEPTIC DESIGN BY PATERSON GROUP

CONSTRUCTION & DESIGN NOTES

1) ESTIMATE OF DAILY SEWAGE FLOW (Q)

Building No.	Unit No.	Floor Area (m²)				Estimated Daily Sewage Flow (L)		
		Office Space	Warehouse Space	Warehouse L. Docks	Total GFA	Office	Warehouse	Total
1	1	92	827	3	929	742	450	1192
	2	92	827	5	929	742	750	1492
Total	2	184	1654	8	1858	1484	1200	2684
							PHASE 1 - TDDSSF	2700
2	1	92	827	3	929	742	450	1192
	2	92	827	3	929	742	450	1192
Total	2	184	1654	6	1858	1484	900	2384
							PHASE 2 - TDDSSF	2400
3	1	92	827	3	929	742	450	1192
	2	92	827	3	929	742	450	1192
Total	2	184	1654	6	1858	1484	900	2384
							PHASE 3 - TDDSSF	2400
4	1	92	827	3	929	742	450	1192
	2	92	827	3	929	742	450	1192
Total	2	184	1654	6	1858	1484	900	2384
							PHASE 4 - TDDSSF	2400

ESTIMATED DAILY SEWAGE FLOW FOR PHASE 1 = 2684 L
DESIGN DAILY SEWAGE FLOW FOR PHASE 1 = 2,700 L

THE PROPOSED DEVELOPMENT WILL BE CONSTRUCTED IN 4 PHASES.
ESTIMATED SEWAGE FLOW FOR THE BUILT OUT DEVELOPMENT = 9,836 L
DESIGN DAILY SEWAGE FLOW FOR BUILT OUT DEVELOPMENT = 9,900 L

THE DESIGN NOTES AND GUIDELINES BELOW HAVE BEEN PROVIDED FOR THE PHASE 1 SEWAGE SYSTEM ONLY. A SEWAGE SYSTEM PERMIT WILL BE REQUIRED FOR EACH OF THE SUBSEQUENT PHASES.

2) SOIL CONDITIONS

SOILS INFORMATION GATHERED BY PATERSON GROUP INC. ON NOVEMBER 14, 2016

BH 4, ELEV. 114.93m

0-0.30	TOPSOIL
0.30-0.69	GLACIAL TILL: RED-BROWN SILTY FINE SAND, SOME GRAVEL & COBBLES
0.69-4.82	GLACIAL TILL: BROWN SILTY FINE SAND, SOME GRAVEL, COBBLES & BOULDERS, TRACE CLAY

- GWL @ 2.64 m DEPTH

BH 5, ELEV. = 114.10m

0-0.08	TOPSOIL
0.08-0.69	GLACIAL TILL: RED-BROWN SILTY FINE SAND, SOME GRAVEL & COBBLES
0.69-5.31	GLACIAL TILL: BROWN SILTY FINE SAND, SOME GRAVEL, COBBLES & BOULDERS, TRACE CLAY
5.31	PRACTICAL REFUSAL

GWL @ 1.07 m DEPTH

3) TANKAGE

GENERAL REQUIREMENTS

- ALL TANKS SHALL CONSIST OF PRECAST CONCRETE TANKS CONFORMING TO CSA-B66-10.
- THE ACTUAL TANK CONFIGURATION MAY DIFFER FROM THAT SHOWN PROVIDED THE MINIMUM SPECIFIED WORKING CAPACITY OF THE TANK MEET THE DESIGN REQUIREMENTS.
- ALL SEPTIC TANKS MUST BE CPA OR CSA CERTIFIED AND SHALL BE DESIGNED TO WITHSTAND ALL APPLICABLE LOADS.
- TANKS SHALL BE BEDDED ON A LAYER OF OPSS GRANULAR A COMPACTED TO AT LEAST 95% OF ITS SPMDD.
- TANKS SHALL BE CONNECTED USING 100 mmØ SCH 40 PVC SEWER PIPE WITH WATERTIGHT CONNECTIONS.
- BACKFILL TANKS USING OPSS GRANULAR B TYPE 1 BACKFILL OR CLEAN SAND FILL. PLACE BACKFILL IN UNIFORM LAYERS NOT EXCEEDING 300 mm THICKNESS AND COMPACT TO AT LEAST 90% OF SPMDD.
- FINAL GRADING SHALL BE SHAPED TO ENSURE THAT SURFACE WATER IS DIRECTED AWAY FROM ALL TANKS.
- WORK AREA SHALL BE COVERED WITH A LAYER OF TOPSOIL OF AT LEAST 100mm IN THICKNESS.

SEPTIC TANK

- MINIMUM WORKING CAPACITY OF TANK REQUIRED = 3Q = 8,100 L. A 9,000 L PRECAST TWO-COMPARTMENT CONCRETE SEPTIC TANK SHALL BE INSTALLED.
- A POLYLOK PL-625 EFFLUENT FILTER WITH A PIPE SUPPORT SHALL BE INSTALLED IN THE SEPTIC TANK.
- THE EFFLUENT FILTER SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S GUIDELINES AND CENTRED OVER THE ACCESS OPENING.
- THE ACCESS LIDS OVER THE TANK OPENINGS (2) SHALL EXTEND TO THE GROUND SURFACE. INSTALL POLY RISERS AND COVERS TO SUIT.
- RISER SHALL EXTEND TO AT LEAST 50mm ABOVE FINISHED GRADE.

PUMP STATION

- THE PUMP STATION SHALL CONSIST OF A 1,350 L MIN. SINGLE COMPARTMENT TANK.
- THE PUMP STATION SHALL BE LOCATED IN SERIES AND DOWNSTREAM FROM THE SEPTIC TANK.
- TANKS SHALL BE CONNECTED USING 100 mm Ø SCH 40 PVC SEWER PIPE WITH WATERTIGHT CONNECTIONS.
- THE ACCESS OPENING OVER THE PUMP SYSTEM SHALL EXTEND TO THE GROUND SURFACE. INSTALL POLY RISERS AND COVER TO SUIT.
- RISER SHALL EXTEND TO AT LEAST 50mm ABOVE FINISHED GRADE.
- THE PUMP CHAMBER SHALL BE EQUIPPED WITH A FLOAT OPERATED EFFLUENT PUMP (MYERS ME3F OR EQUIVALENT) OPERATED BY AN ON DEMAND CONTROL PANEL AND A HIGH WATER ALARM WITH AUDIBLE AND VISUAL WARNING CAPABILITIES.
- CONTROL PANEL TO BE MOUNTED ON SIDE OF BUILDING.
- THE RECOMMENDED PUMP DUTY CYCLE IS 350L.
- INSTALL REQUIRED FITTINGS AND PIPING FROM NEW PUMP AND CONNECT TO 38 mm Ø SCH40 PVC FORCEMAIN.
- PUMP DISCHARGE ASSEMBLY SHALL BE CONFIGURED SUCH THAT THE PUMP CAN BE EASILY REMOVED FROM THE GROUND SURFACE.
- FORCEMAIN TO BE PROVIDED WITH AT LEAST 1.5 m OF SOIL COVER AND OVERLAIN WITH 50mm THICK BY 600mm WIDE INSULATION BOARDS.
- THE FORCEMAIN SHALL BE BEDDED ON 150mm THICK LAYER OF OPSS GRANULAR 'A', FOLLOWED BY 300mm MIN. SAND COVER (REFER TO FORCEMAIN DETAIL).
- ALL PIPING CONNECTIONS TO BE GLUED.
- ALL ELECTRICAL WORKS MUST BE CARRIED OUT BY A QUALIFIED ELECTRICAL CONTRACTOR IN ACCORDANCE TO THE LATEST CODES, BYLAWS AND REGULATIONS.
- CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN ALL NECESSARY ELECTRICAL PERMITS AND COORDINATE ALL ELECTRICAL INSPECTIONS.

4) LEACHING BED SIZING

- LENGTH OF PIPE REQUIRED = QT/200 = 2700(8)/200 = 108m
- USE 8 RUNS OF 13.5m EACH RUN.
- TOTAL LENGTH OF DISTRIBUTION PIPES PROVIDED =108m
- TOTAL BED AND MANTLE AREA = 531m²
- HYDRAULIC LOADING RATE = 5.1 L/d/m²

5) DISPOSAL FIELD CONSTRUCTION GUIDELINES

- A FILL BASED ABSORPTION TRENCH STYLE LEACHING BED SHALL BE INSTALLED.
- THE SUBGRADE SURFACE FOR THE BED AND MANTLE AREAS SHOULD BE PREPARED BY REMOVING ALL EXISTING TOPSOIL AND SUBEXCAVATING TO AT LEAST ELEVATION 113.80m.
- WHERE REQUIRED, THE SPECIFIED CONTACT LEVEL SHALL BE ESTABLISHED WITH SELECT SAND FILL.
- THE SUBGRADE SHALL BE SCARIFIED UNDER DRY CONDITIONS.
- A MINIMUM THICKNESS OF 0.9m OF IMPORTED SAND FILL, HAVING A PERCOLATION RATE OF NOT GREATER THAN 8 min/cm, SHALL BE PROVIDED BELOW THE BASE OF THE TRENCHES.
- LEACHING BED SAND FILL SHALL BE UNIFORM SAND WITH GRADING LIMITS SIMILAR TO 100% PASSING 13.2mm SIEVE, LESS THAN 5% PASSING 0.075mm SIEVE AND HAVING A PERCOLATION RATE OF 8 min/cm. LEACHING BED FILL SHALL BE PRE-APPROVED BY THE CONSULTANT.
- THE DISTRIBUTION PIPES SHOULD CONSIST OF 100mmØ PERFORATED SEPTIC PIPE WHICH SHOULD BE EMBEDDED IN A 300mm THICK x 500mm (MIN.) WIDE LAYER OF WASHED SEPTIC STONE.
- THE DISTRIBUTION PIPES SHOULD BE INSTALLED WITH A UNIFORM DOWNWARD SLOPE FROM ELEVATION 114.90m AT THE HEADER AND ELEVATION 114.85m AT THE FOOTER.
- THE ENDS OF EACH RUN SHALL BE INTERCONNECTED WITH A SOLID FOOTER PIPE.
- THE CLEAR STONE LAYER SHOULD BE COVERED WITH A NON-WOVEN GEOTEXTILE FABRIC.
- THE CLEAR STONE LAYER SHOULD BE BACKFILLED WITH PERMEABLE SAND FOLLOWED BY APPROXIMATELY 100mm OF SANDY TOPSOIL.
- THE TOTAL THICKNESS OF THE COVER OVER THE BASE OF THE TRENCHES SHOULD BE WITHIN THE RANGE OF 0.6m TO 0.9m.
- THE SIDES OF THE BED SHOULD BE SLOPED IN THE RANGE OF 4H:1V OR SHALLOWER.
- THE SAND AREA OUTSIDE OF LIMITS OF THE DISTRIBUTION PIPES SHALL CONSIST OF A MINIMUM THICKNESS OF 300mm OF UNIFORM SAND HAVING A PERCOLATION RATE OF NOT GREATER THAN 8 min/cm.
- THE BED AREA SHOULD BE VEGETATED AS SOON AS POSSIBLE.

6) MINIMUM CLEARANCE DISTANCES FROM DISTRIBUTION PIPES

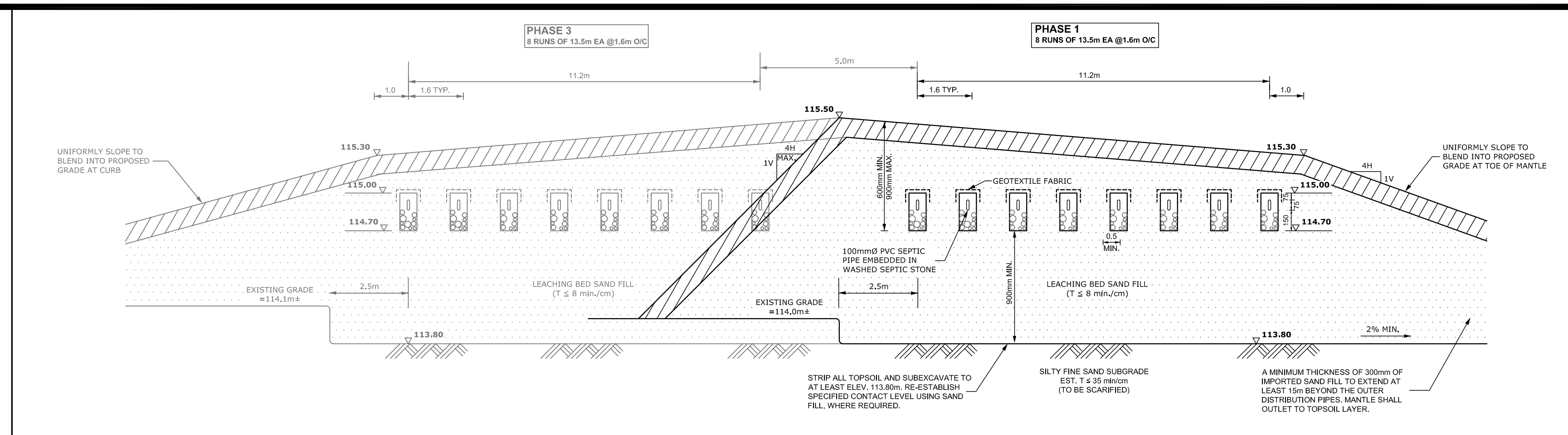
- 6.0 m FROM ANY PROPERTY LINE
- 8.0 m FROM ANY STRUCTURE
- 18.0 m FROM ANY DRILLED WELL

7) MINIMUM CLEARANCE DISTANCES FROM TANKS

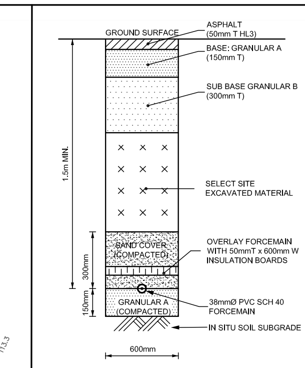
- 3.0m FROM ANY PROPERTY LINE
- 1.5m FROM ANY STRUCTURE
- 15.0m FROM ANY DRILLED WELL

GENERAL NOTES FOR SEWAGE SYSTEMS:

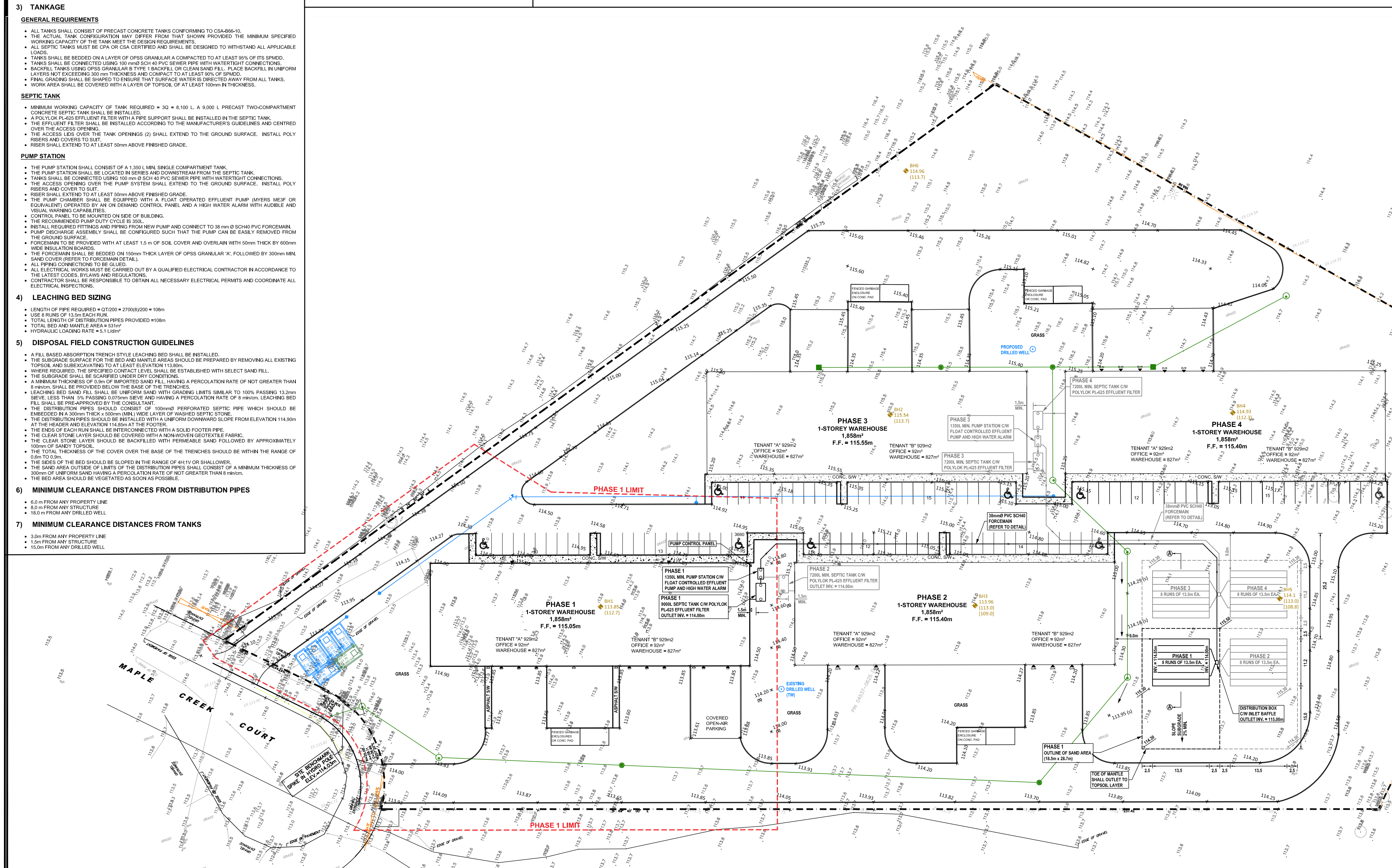
1) SEWAGE SYSTEM CONTRACTOR SHALL BE QUALIFIED AND REGISTERED UNDER PART 8 OF THE ONTARIO BUILDING CODE.
2) ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE LATEST BY-LAWS, CODES AND REGULATIONS.
3) CONTRACTOR SHALL REVIEW DRAWINGS IN DETAIL AND SHALL INFORM THE CONSULTANT OF ANY ERRORS AND/OR OMISSION ON DESIGN DRAWINGS IMMEDIATELY.
4) CONTRACTOR SHALL VISIT THE SITE AND REVIEW ALL DOCUMENTATION TO BECOME FAMILIAR WITH THE SITE AREA AND SUBSURFACE SOIL CONDITIONS TO DETERMINE SUITABLE METHODS OF CONSTRUCTION.
5) CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT AND GRADING FOR SEWAGE SYSTEMS AS DETAILED ON THE DESIGN DRAWINGS.
6) THE CONTRACTOR IS RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UNDERGROUND SERVICES.
7) THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE PROJECT MANAGER.
8) THE WORK AREAS SHALL BE PROTECTED DURING CONSTRUCTION WORK.
9) THE CONTRACTOR IS RESPONSIBLE FOR DAMAGE TO PROPERTY AND STRUCTURES AND SHALL REPAIR AT OWN EXPENSE.
10 ALL MATERIALS AND CONSTRUCTION METHODS SHALL CONFORM TO OBC, OPSS AND CITY OF OTTAWA STANDARDS AND SPECIFICATIONS.
11) THE CONTRACTOR SHALL CONTROL WATER RUN OFF FROM THE SITE IN ACCORDANCE WITH STANDARD SEDIMENT CONTROL MEASURES.
12) EXCESS AND/OR UNSUITABLE SITE EXCAVATED SOIL SHALL BE REMOVED FROM THE SEWAGE SYSTEM AREA AND DISPOSE OF, AS DIRECTED BY THE CONSULTANT, AT NO ADDITIONAL COST TO THE OWNER.
13) THE CONTRACTOR IS RESPONSIBLE TO SUPPLY ALL MATERIALS AND LABOUR NECESSARY TO MAKE THE SEWAGE SYSTEM FULLY FUNCTIONAL AS INTENDED BY DESIGN.
14) THE CONTRACTOR SHALL SUPPLY, AND HAVE INSTALLED BY A QUALIFIED PERSON ALL ELECTRICAL COMPONENTS NECESSARY TO MAKE THE PUMPING SYSTEM FUNCTIONAL AND CONFORM TO THE PERTINENT REGULATIONS.



PHASE 1&3 - LEACHING BED CROSS-SECTION A-A
SCALE - 1:100H, 1:25 V



TYPICAL FORCEMAIN TRENCH DETAIL
SCALE - N.T.S.



LEGEND:

(symbol)	BOREHOLE LOCATION, PREVIOUS INVESTIGATION PATERSON GROUP REPORT PG3905-1, DEC. 2016
114.10	GROUND SURFACE ELEVATION (m)
x 114.80	PROPOSED SITE GRADING (m) (REFER TO SITE GRADING AND SERVICING PLAN)
x 115.80	PROPOSED GROUND SURFACE ELEV. OVER SEWAGE SYSTEM COMPONENTS (m)
(113.7)	GROUNDWATER ELEV. (m) - NOV. 14, 2016
[108.9]	PRACTICAL REFUSAL TO DCPT ELEVATION (m)
(symbol)	DRILLED WELL LOCATION
F.F.	FINISHED FLOOR LEVEL
(line)	STORM SEWER LINE
(dashed line)	LIMIT OF PHASE 1 WORK AREA

paterson group
consulting engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

REFERENCES:

BASE PLAN AND EXISTING TOPOGRAPHIC INFORMATION PROVIDED BY OTHERS

THIS PLAN PROVIDES DETAILS OF THE PROPOSED SEWAGE SYSTEM. REFER TO DRAWINGS C101 AND C102 BY MCINTOSH PERRY FOR DETAILS OF THE PROPOSED SITE GRADING AND SERVICING.

NO.	DESCRIPTION	DATE
0	ISSUED FOR SITE PLAN CONTROL	01/18/17

DESIGNED BY:	AVS
DRAWN BY:	JB
CHECKED BY:	AVS
SCALE:	1:500
DATE:	01/2017

CLIENT

2434894 ONTARIO INC.
C/O BBS CONSTRUCTION (ONTARIO) INC.

PROJECT/LOCATION

PROPOSED WAREHOUSE DEVELOPMENT

210 & 220 MAPLE CREEK COURT OTTAWA, ONTARIO

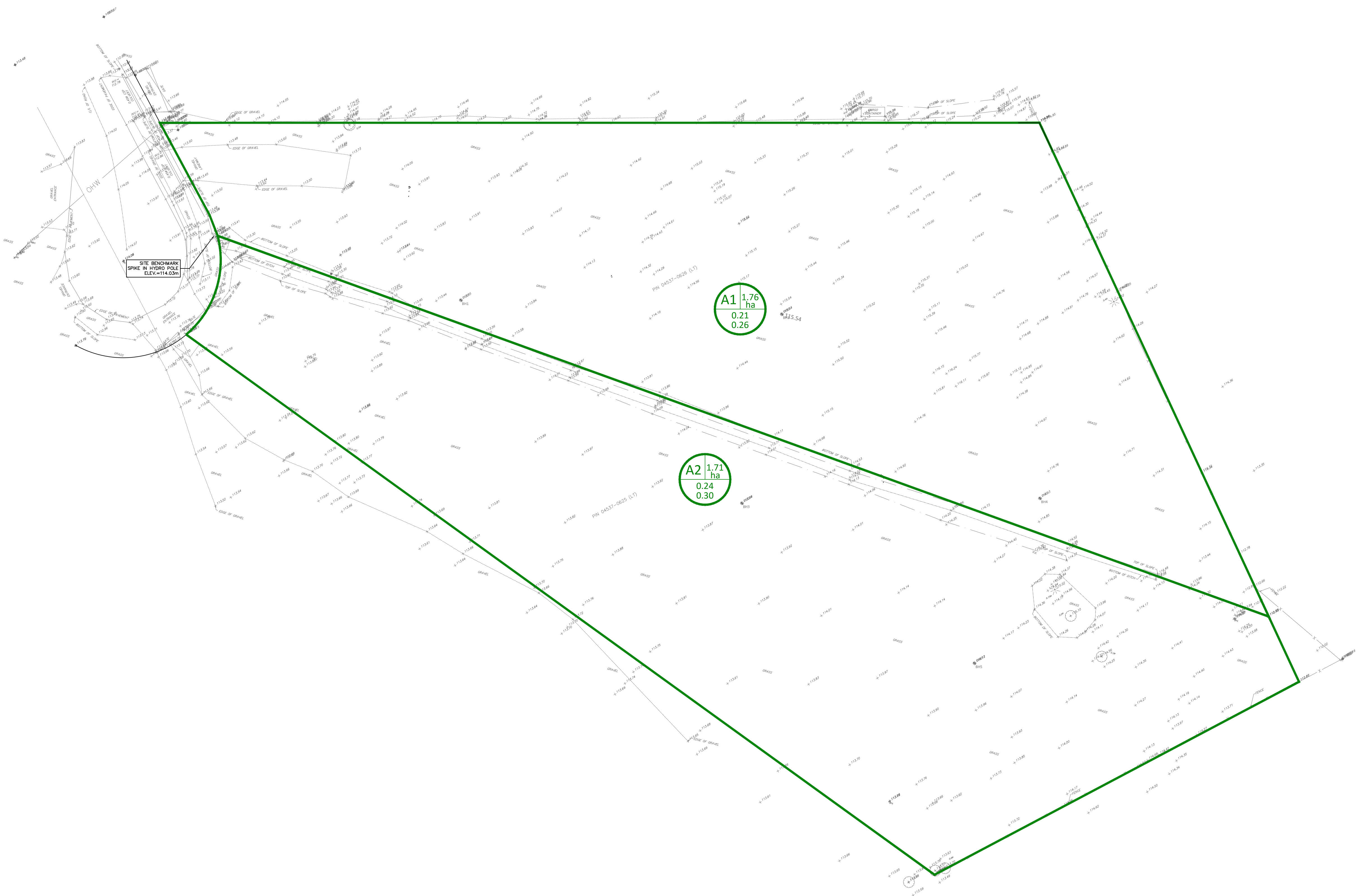
DRAWING

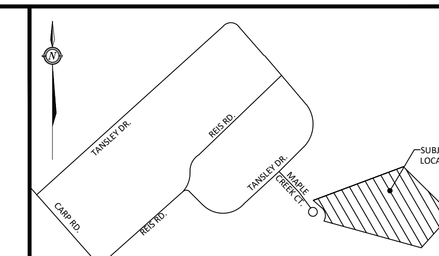
SEWAGE SYSTEM LAYOUT PLAN & DETAILS

PROJECT NO.	DRAWING NO.	REVISION NO.
PH3158	SS1	0

p:\autocad drawings\hydrogeology\ph31xx\ph3158-1.dwg

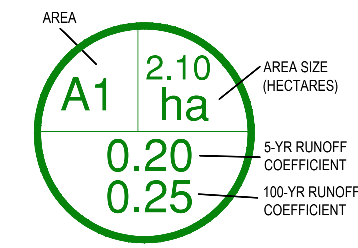
APPENDIX D: PRE-DEVELOPEMENT PLAN





LOCATION PLAN

LEGEND

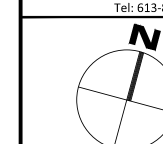


No.	Revision/Issue	Date
01	ISSUED FOR SITE PLAN CONTROL	JAN 20, 2017

Check and verify all dimensions before proceeding with the work

Do not scale drawings

McINTOSH PERRY
115 Walgreen Road R.R. #3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742



Stamp:

Client:

BBS CONSTRUCTION (ONTARIO) LTD.
1805 WOODWARD DRIVE P: 613-226-8830
OTTAWA ON, K2C 0P9 F: 613-226-7709

Project:

210/220 MAPLE CREEK COURT

WALL SOUND
PROPOSED WAREHOUSE DEVELOPMENT

OTTAWA ONTARIO

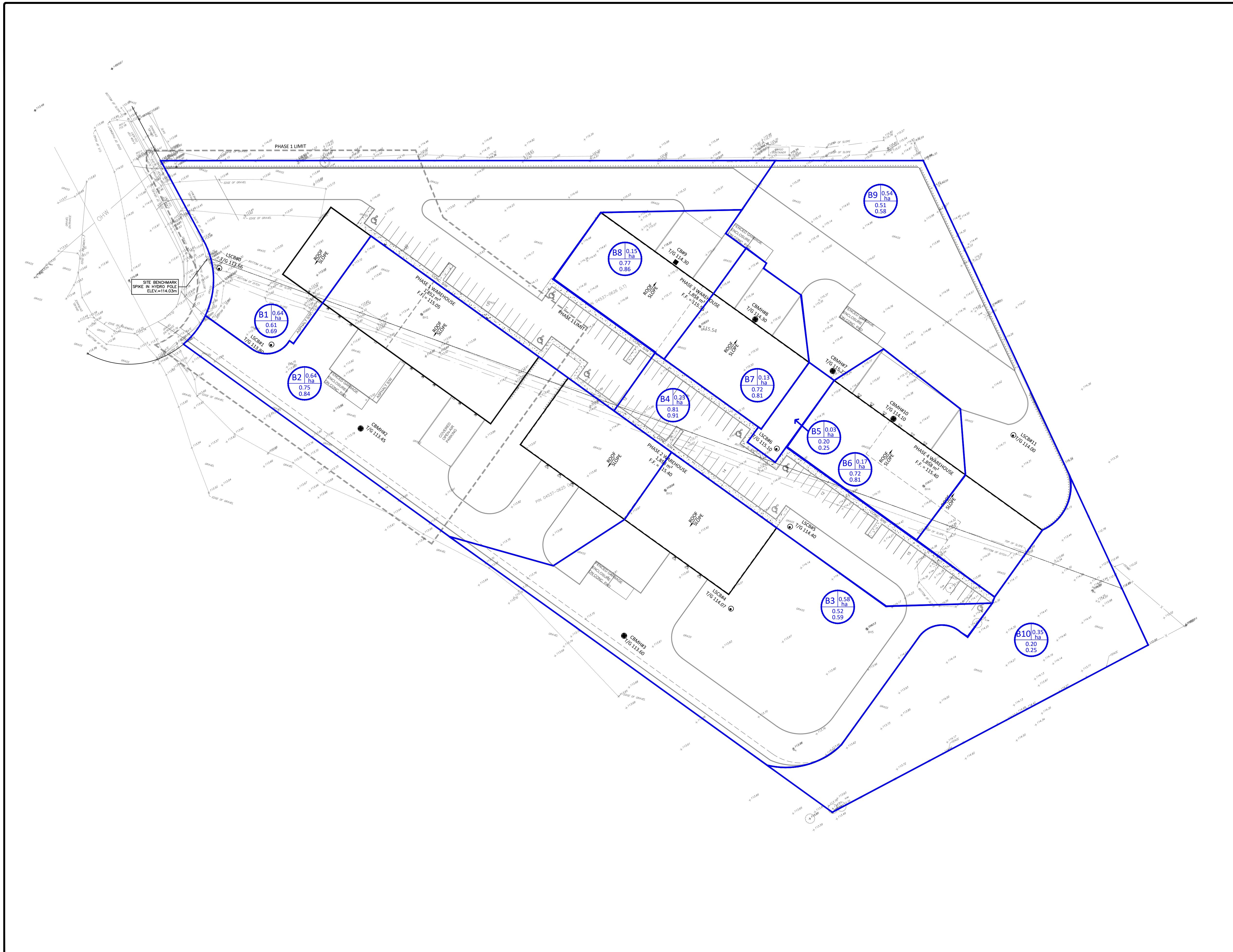
Drawing Title:

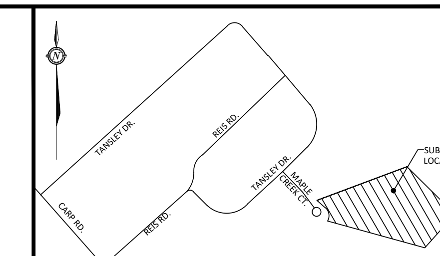
PRE-DEVELOPMENT DRAINAGE PLAN

Scale: N.T.S.	Project Number: CP-15-0429
Drawn by: CDH	
Checked By: RPK/CJM	Drawing Number:
Designed By: JMJ	SHEET 1 of 1 PRE
Date: NOV 25, 2016	

FILENAME: \\192.168.1.3\mpdocuments\01 Project - Proposals\2015 Jobs\CP\0CP-15-0429 BBS_Site Plan_210 Maple Creek Court\Civil\15 - Drawings\0CP-15-0429 - PRESENTATION.dwg
LAST SAVED: Friday, January 20, 2017 LAST SAVED BY: j.jonker
LAST PLOTTED: Friday, January 20, 2017 CTB FILE USED: ----

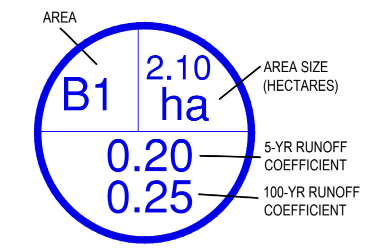
APPENDIX E: POST-DEVELOPMENT PLAN





LOCATION PLAN

LEGEND

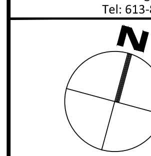


No.	Revision/Issue	Date
01	ISSUED FOR SITE PLAN CONTROL	JAN 20, 2017

Check and verify all dimensions before proceeding with the work

Do not scale drawings

McINTOSH PERRY
115 Walgreen Road R.R. #3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742



Stamp:

Client:
BBS CONSTRUCTION (ONTARIO) LTD.
1805 WOODWARD DRIVE
OTTAWA ON, K2C 0P9
P: 613-226-8830
F: 613-226-7709

Project:
210/220 MAPLE CREEK COURT
WALL SOUND
PROPOSED WAREHOUSE DEVELOPMENT
OTTAWA ONTARIO

Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

Scale:	N.T.S.	Project Number:	CP-15-0429
Drawn by:	CDH		
Checked By:	RPK/CJM	Drawing Number:	
Designed By:	JMJ	SHEET 1 of 1	POST
Date:	NOV 25, 2016		

APPENDIX F: STORMWATER CALCULATIONS

AVERAGE PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area A1	210 MAPLE CREEK - NORTH SIDE				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
GRAVEL	0.60	0.75	411.7	247.0	308.8
GRASS	0.20	0.25	17151.5	3430.3	4287.9
Avg C	0.21	0.26			

Area A2	220 MAPLE CREEK - SOUTH SIDE				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
GRAVEL	0.60	0.75	1816.3	1089.8	1362.2
GRASS	0.20	0.25	15288.8	3057.8	3822.2
Avg C	0.24	0.30			

AVERAGE POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area B1	NORTH WEST CORNER OF DEVELOPMENT AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	2770.9	2493.8	2770.9
BUILDING	0.90	1.00	346.7	312.0	346.7
CONCRETE	0.90	1.00	504.4	454.0	504.4
GRAVEL	0.60	0.75	201.1	120.7	150.8
GRASS	0.20	0.25	2549.1	509.8	637.3
Avg C	0.61	0.69			

Area B2	SOUTH WEST CORNER OF DEVELOPMENT AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	2414.4	2173.0	2414.4
BUILDING	0.90	1.00	2639.4	2375.5	2639.4
CONCRETE	0.90	1.00	25.0	22.5	25.0
GRASS	0.20	0.25	1334.4	266.9	333.6
Avg C	0.75	0.84			

Area B3	SOUTH SIDE OF PROPERTY DEVELOPMENT				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	1717.7	1546.0	1717.7
BUILDING	0.90	1.00	926.7	834.0	926.7
GRASS	0.20	0.25	3186.8	637.4	796.7
Avg C	0.52	0.59			

Area B4	CENTRAL AREA OF BUILDINGS				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	1688.5	1519.6	1688.5
CONCRETE	0.90	1.00	348.5	313.7	348.5
GRASS	0.20	0.25	295.0	59.0	73.8
Avg C	0.81	0.91			

Area B5	BETWEEN BUILDINGS				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
GRASS	0.20	0.25	279.2	55.8	69.8
Avg C	0.20	0.25			

Area B6	PHASE 4 BUILDING AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	148.4	133.5	148.4
BUILDING	0.90	1.00	1159.4	1043.4	1159.4
GRASS	0.20	0.25	440.0	88.0	110.0
Avg C	0.72	0.81			

Area B7	SOUTHEAST HALF OF PHASE 3 BUILDING				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	104.3	93.9	104.3
BUILDING	0.90	1.00	857.2	771.5	857.2
GRASS	0.20	0.25	328.3	65.7	82.1
Avg C	0.72	0.81			

Area B8	NORTHEAST HALF OF PHASE 3 BUILDING				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	261.7	235.6	261.7
BUILDING	0.90	1.00	1005.2	904.7	1005.2
GRASS	0.20	0.25	280.3	56.1	70.1
Avg C	0.77	0.86			

Area B9	NORTH EAST CORNER OF DEVELOPMENT AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	2406.6	2165.9	2406.6
GRASS	0.20	0.25	3038.4	607.7	759.6
Avg C	0.51	0.58			

Area B10	SOUTH EAST SIDE OF DEVELOPMENT AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
GRASS	0.20	0.25	3473.0	694.6	868.3
Avg C	0.20	0.25			

Time of concentration (min.)	25mm EVENT (mm/hr)	5-Year (mm/hr)	100-Year (mm/hr)	
20.00	15.6	70.3	120.0	PRE-DEVELOPMENT
10.00	31.3	104.2	178.6	POST-DEVELOPMENT

PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
A1	1.76	0.21	0.26	72.0	152.3
A2	1.71	0.24	0.30	80.2	171.1
Total	3.47	0.22	0.28	152.2	323.4

POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Basin	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (l/s)	100-Year Flow Rate (l/s)
B1	0.64	0.61	0.69	75.9	146.6
B2	0.64	0.75	0.84	93.9	179.6
B3	0.58	0.52	0.59	59.2	114.7
B4	0.23	0.81	0.91	36.9	70.8
B5	0.03	0.20	0.25	1.1	2.3
B6	0.17	0.72	0.81	24.6	47.2
B7	0.13	0.72	0.81	18.1	34.8
B8	0.15	0.77	0.86	23.3	44.4
B9	0.54	0.51	0.58	54.2	105.3
B10	0.35	0.20	0.25	13.6	29.0
Total	3.47	0.59	0.67	400.8	774.8

STORM SEWER DESIGN SHEET

PROJECT: Maple Creek Court
LOCATION: Ottawa
CLIENT: BBS Construction
PAGE: 3 OF 3

LOCATION				CONTRIBUTING AREA (ha)							RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE		AREA			INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																								DIA	W	H			(L/s)	(%)
	B9	LCSB#11	CB#10	0.51		0.54			0.28	0.28	10.00	0.75	10.75	104.19	122.14	178.56	80.44				80.44	91.46	35.92	375			0.25	0.802	11.02	12.05%
	B6	CB#10	CBMH#7	0.72		0.17			0.13	0.40	10.75	0.37	11.12	100.41	117.69	172.01	112.64				112.64	129.34	25.50	375			0.50	1.134	16.70	12.91%
	B8	CB#9	CB#8	0.77		0.15			0.11	0.11	10.00	0.56	10.56	104.19	122.14	178.56	32.27				32.27	43.87	29.05	250			0.50	0.866	11.60	26.44%
	B7	CB#8	CBMH#7	0.72		0.13			0.09	0.20	10.56	0.26	10.82	101.33	118.77	173.60	57.54				57.54	182.91	25.03	375			1.00	1.604	125.37	68.54%
		CBMH#7	LSCB#6							0.61	11.12	0.39	11.51	98.62	115.58	168.92	166.64				166.64	188.11	26.97	450			0.40	1.146	21.47	11.41%
	B5	LSCB#6	LSCB#5	0.20		0.03			0.01	0.61	11.51	0.37	11.89	96.83	113.47	165.82	165.11				165.11	188.11	25.66	450			0.40	1.146	23.00	12.23%
	B4	LSCB#5	LSCB#4	0.81		0.23			0.19	0.80	11.89	0.36	12.24	95.18	111.53	162.98	212.29				212.29	230.39	29.99	450			0.60	1.403	18.10	7.86%
	B3	LSCB#4	CBMH#3	0.52						0.80	12.24	0.39	12.63	93.67	109.75	160.36	208.92				208.92	230.39	32.72	450			0.60	1.403	21.47	9.32%
		CBMH#3	CBMH#2			0.52			0.58	1.39	12.63	1.19	13.83	92.08	107.88	157.62	354.65				354.65	405.13	99.47	600			0.40	1.388	50.48	12.46%
	B2	CBMH#2	LSCB#1	0.75		0.64			0.48	1.87	13.83	0.52	14.34	87.55	102.55	149.79	454.28				454.28	518.80	43.58	675			0.35	1.404	64.52	12.44%
	B1	LSCB#1	LSCB#0	0.61		0.04			0.02	0.02	10.00	0.32	10.32	104.19	122.14	178.56	7.07				7.07	129.34	21.95	375			0.50	1.134	122.27	94.54%
		LSCB#0	EX			0.60			0.36	0.39	10.32	0.13	10.45	102.52	120.17	175.66	110.78				110.78	71.33	7.68	300			0.50	0.978	-39.45	-55.30%

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

Notes:
1. Mannings coefficient (n) = 0.013

Designed: CH

Checked: CJM

Project No.: CP-15-0429

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2017-01-20

Date: 2017-01-20

Sheet No: 3 of 3

APPENDIX G: CITY OF OTTAWA DESIGN CHECKLIST

City of Ottawa

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix 'E'
☐ Plan showing the site and location of all existing services.	Site Servicing and Utility Plan
☐ 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
☐ Summary of Pre-consultation Meetings with City and other approval agencies.	Appendix 'A'
☐ 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.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management

☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary
☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ 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).	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
☐ 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 neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
☐ 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.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	See Geotech
☐ All preliminary and formal site plan submissions should have the following information: ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	N/A
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ 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.	Appendix 'B'
☐ 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.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the necessity of a pressure zone boundary modification.	N/A
☐ 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	N/A

☐ 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.	N/A
☐ 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.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix 'B'
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ 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).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ 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.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	5.2 Sanitary Servicing

☐ 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)	N/A
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	5.2 Sanitary Servicing
☐ 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).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	6.0 Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre- and Post-Development Plans
☐ 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.	6.0 Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	6.0 Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	6.0 Stormwater Management
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A

☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Appendix 'F'
☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Sediment and Erosion Control Plan
☐ 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.	6.0 Stormwater Management, Appendix 'F'
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	6.0 Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	6.0 Stormwater Management
☐ 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.	Appendix 'A'
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	6.0 Stormwater Management
☐ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Lot Grading, Drainage Plan & sediment Control Plan
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	7.0 Sediment and Erosion Control
☐ 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.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ 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.	N/A
☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐ Changes to Municipal Drains.	N/A
☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	8.0 Summary 9.0 Recommendations
☐ 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.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped