HOK ARCHITECTS CORPORATION

ATHLETICS AND RECREATION CENTRE (ARC) ALGONQUIN COLLEGE, OTTAWA, ON

SERVICING REPORT

DECEMBER 19, 2019
REVISION 1
REVISION 2
REVISION 3



ATHLETICS AND RECREATION CENTRE (ARC) ALGONQUIN COLLEGE, OTTAWA, ON

SERVICING REPORT

HOK ARCHITECTS CORPORATION

SITE PLAN APPLICATION
REVISION 3

PROJECT NO.: 191-01517-00
DATE: NOVEMBER 2019

WSP
2611 QUEESVIEW DRIVE, SUITE 300
OTTAWA, ON, CANADA, K2B 8K2

TEL.: +1 613-829-2800

WSP.COM

WSP Canada Group Ltd.

2611 Queensview Drive, Suite 300
Ottawa, ON, Canada K2B 8K2

Tel.: +1 613-829-2800

wsp.com

December 19, 2019

Algonquin Students' Association,

Via:

HOK Architects Corporation
205 Catherine Street, Suite 101
Ottawa, ON, K2P 1C3

Attention: Angelo Montenegrino, Principal

Dear Sir:

Subject: Athletics and Recreation Centre, Algonquin College - Servicing Report

Please find attached our revised servicing report, including civil engineering design drawings, prepared for your review prior to resubmission.

Yours sincerely,

Ding Bang (Winston) Yang, P.Eng.
Project Engineer

WSP ref.: 191-01517-00

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Issued for Site Plan Application	Response to SPA comments	Response to SPA comments	Response to SPA comments
Date	June 24, 2019	September 24, 2019	November 21, 2019	December 19, 2019
Prepared by	Ding Bang (Winston) Yang	Ding Bang (Winston) Yang	Ding Bang (Winston) Yang	Ding Bang (Winston) Yang
Signature				
Checked by	James (Jim) Johnston	James (Jim) Johnston	James (Jim) Johnston	James (Jim) Johnston
Signature				
Project number	191-01517-00	191-01517-00	191-01517-00	191-01517-00

SIGNATURES

PREPARED BY



Ding Bang (Winston) Yang, P.Eng
Project Engineer



REVIEWED BY

James (Jim) Johnston, P.Eng., MBA, M.Sc., LEED AP BD+C
Senior Project Manager

This report was prepared by WSP Canada Group Ltd. for the account of HOK Architects Corporation, in accordance with the professional services agreement. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP Canada Group Ltd.'s best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP Canada Group Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP's control and its integrity can no longer be ensured, no guarantee may be given with regards to any modifications made to this document.

TABLE OF CONTENTS

1 GENERAL 1

1.1 ExEcutive summary 1

1.2 Date and Revision Number 2

1.3 Location Map and Plan 3

1.4 Adherence to zoning and related requirements 3

1.5 Pre-Consultation meetings 3

1.6 Higher level studies 3

1.7 Statement of objectives and servicing criteria 4

1.8 Available existing and proposed infrastructure 4

1.9 Environmentally significant areas, watercourses and municIpal drains 4

1.10 Concept level master grading plan 5

1.11 Impacts on private services 5

1.12 Development phasing 5

1.13 Geotechnical sutdy 5

1.14 Drawing requirement 6

2 WATER DISTRIBUTION 7

2.1 Consistency with master servicing study and availability of publIc infrastructure 7

2.2 System constraints and boundary conditions 7

2.3 Confirmation of adequate domestic supply and pressure 7

2.4 Confirmation of adequate fire flow protection 8

2.5 Check of high pressure 9

2.6 Phasing constraints 9

2.7 Reliability requirements 9

2.8 Need for pressure zone bounday modification 9

2.9 Capability of major infrastructure to supply sufficient water 9
2.10 Description of proposed water distribution network 9
2.11 Off-site requirements 10
2.12 Calculation of water demands 10
2.13 Model Schematic 10

3 WASTEWATER DISPOSAL 11
3.1 Design Criteria 11
3.2 Consistency with master servicing study 11
3.3 Review of Soil conditions 11
3.4 Description of existing sanitary sewer 11
3.5 Verification of available capacity in downstream sewer 12
3.6 Calculations for New sanitary sewEr 12
3.7 Description of proposed sewer network 12
3.8 Environmental constraints 12
3.9 Pumping requirements 12
3.10 Force-mains 12
3.11 Emergency overflows from sanitary pumping stations. 12
3.12 Special considerations 13

4 SITE STORM SERVICING 14
4.1 Existing condition 14
4.2 Analysis of availabLe capacity in public infrastructure . 14
4.3 Drainage drawing 14
4.4 Water quantity control objective 14
4.5 Water quality control objective 14
4.6 Design criteria 15

4.7 Proposed minor system....15
4.8 Stormwater management....15
4.9 Inlet Controls....15
4.10 On-site detention....16
4.11 Watercourses....16
4.12 Pre and Post development peak flow rates....16
4.13 Diversion of drainage catchment areas....16
4.14 Downstream capacity where quanTity control is not proposed....16
4.15 Impacts to receiving watercourses....16
4.16 Municipal drains and related approvals....16
4.17 Means of conveyance and storage capacity....16
4.18 Hydraulic analysis....16
4.19 Identification of floodplains....17
4.20 Fill constraints....17

5 SEDIMENT AND EROSION CONTROL....18
5.1 General....18

6 APPROVAL AND PERMIT REQUIREMENTS....19
6.1 General....19

7 CONCLUSION CHECKLIST....20
7.1 Conclusions and recommendations....20
7.2 Comments received from review agencies....20

TABLES

TABLE 2-1: BOUNDARY CONDITIONS 7

FIGURES

FIGURE 1-1 SITE LOCATION 3

APPENDICES

A

- PRE-CONSULTATION MEETING NOTES
- TOPOGRAPHIC SURVEY PLAN
- GEOTECHNICAL REPORT BY PATERSON GROUP (REFER TO PREVIOUS SUBMISSION)
- GEOTECHNICAL REVIEW COMMENTS BY PATERSON GROUP (REFER TO PREVIOUS SUBMISSION)
- ALGONQUIN COLLEGE OTTAWA CAMPUS OVERALL SITE UTILITY FIGURE 3
- RESPONSE TO CITY ENGINEERING COMMENTS

B

- WATERMAIN BOUNDARY CONDITIONS FROM CITY OF OTTAWA
- EMAILS FROM CITY OF OTTAWA
- FIRE UNDERWRITERS SURVEY – FIRE FLOW CALCULATION
- WATER DEMAND CALCULATION

C

- STORMWATER MANAGEMENT MEMO BY WSP
- STORM SEWER DESIGN SHEET
- POST-DEVELOPMENT STORM DRAINAGE AREA PLAN C05

- PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN FIGURE 2
- GRADING PLAN C03
- SERVICING PLAN C04
- STORMTECH CHAMBERS MC-3500
- STORMCEPTOR STC-750
- DECLARATION LETTER BY CERTIFIED MECHANICAL ENGINEER

D

- EROSION AND SEDIMENTATION CONTROL PLAN C06

E

- SUBMISSION CHECK LIST

1 GENERAL

1.1 EXECUTIVE SUMMARY

WSP was retained by HOK Architects Corporation to provide servicing, grading and stormwater management design services for the proposed new athletics and recreation building, including food service, gymnasium and leisure facilities, located at Algonquin College, east of Student Commons Building and south of North Access Road. This report outlines findings and calculations pertaining to the servicing of the proposed building with a gross building area of 11,658 square metres.

Currently the land proposed for the building has been used for paved parking. The total study area was considered to be 1.549 ha in size. The site is bounded by institutional development to the north and west, and paved parking area to the east and south. It is part of lot 34 & 35 concession (Rideau Front), Geographic Township of City of Ottawa (refer to Appendix A for the Topographical Survey Plan by Stantec Geomatics Ltd, May 2019). Based on the topographic survey, the overall topography of the site is draining from east to west with a slope towards the existing catchbasins located along the current parking area and the access road east of the Student Commons Building. On-site detention facilities have not been constructed in the existing asphalt parking areas. The existing piped stormwater system conveys drainage to Pinecrest Creek.

As per the Algonquin College Ottawa Campus Stormwater Management Brief by Morrison Hershfield for the campus east of Woodroffe Avenue, the stormwater management approach has been fairly conventional. Stormwater flows mainly uncontrolled from hardened surfaces or is controlled to pre-development conditions with roof drains and inlet control catch basins as per City of Ottawa guidelines. An exception is the Student Commons Building (IBI Group, 2011), which is controlled to the 2012 Pinecrest Creek Stormwater Management Criteria using roof drains, roof storage, landscaping, and on-site sand infiltration basins.

The City of Ottawa required that the design of a drainage and stormwater management system in this development must be prepared in accordance with the following documents:

- Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area, J.F. Sabourin and Associates Inc., June 2012;
- Sewer Design Guidelines, City of Ottawa, October 2012;
- Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003; and
- Stormwater Management Facility Design Guidelines, City of Ottawa, April 2012

The City of Ottawa requires any new development or redevelopment projects within the Pinecrest Creek watershed must implement stormwater management measures that meet the criteria outlined in the "Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area" (J.F. Sabourin and Associates Inc., June 2012). Since the new development is within the Pinecrest Creek watershed, these stormwater management guidelines apply to the development.
A copy of the Stormwater Management Report by WSP Canada Inc. is attached in Appendix C of this report.

The proposed development will not increase the overall runoff coefficient of the site since the existing developed land consists primarily of asphalt parking. The required stormwater quantity control will result in a reduction in both runoff rate and quantity. The controlled areas do not receive any drainage contribution from adjacent lands.

This report was prepared utilizing servicing design criteria obtained from available sources, and outlines the design for water, sanitary wastewater, and stormwater facilities.

The format of this report matches that of the servicing study checklist found in Section 4 of the City of Ottawa's Servicing Study Guidelines for Development Applications, November 2009.

The following municipal services are available within North Access Road and access road adjacent to the development as recorded from the following as-built drawings received from Stantec:

North Access Road:

- 600 mm storm sewer, 250mm sanitary sewer and 203mm watermain.

Access Road (East of Student Commons Building):

- 375mm and 450mm storm sewers.

It is proposed that:

- On-site stormwater management systems, employing surface storage and an underground storm chamber will be provided to attenuate flow rates leaving the new parking lot and new building roof. Existing drainage patterns, previously established controlled flow rates and storm sewers will be maintained. Refer to the stormwater management report for details.

1.2 DATE AND REVISION NUMBER

This version of the report is the third revision, dated November 21, 2019.

1.3 LOCATION MAP AND PLAN

The proposed institutional development is located at Algonquin College, in the City of Ottawa at the location shown in Figure 1-1 below.

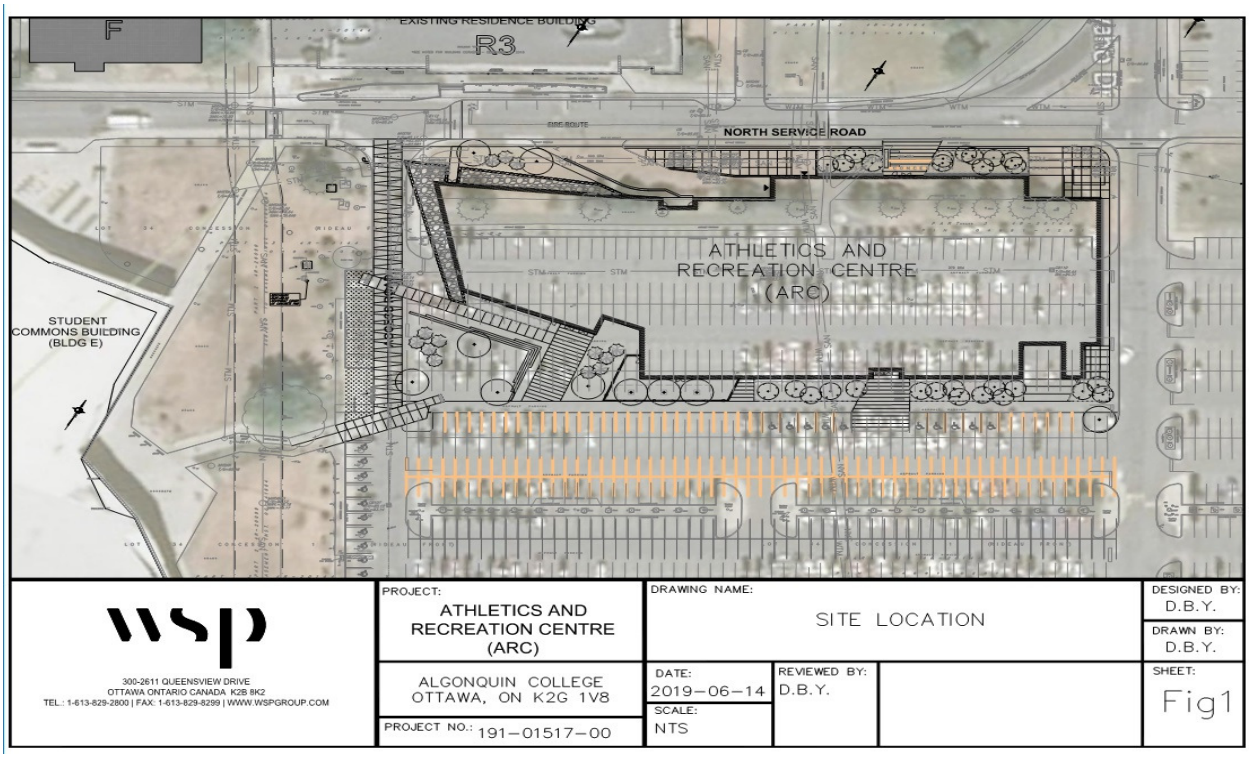


Figure 1-1 Site Location

1.4 ADHERENCE TO ZONING AND RELATED REQUIREMENTS

The proposed property use will be in conformance with zoning and related requirements prior to approval and construction, and is understood to be in conformance with current zoning.

1.5 PRE-CONSULTATION MEETINGS

A pre-consultation meeting was held with the City of Ottawa on March 6, 2019. Notes from this meeting are provided in Appendix A.

1.6 HIGHER LEVEL STUDIES

The review for servicing has been undertaken in conformance with, and utilizing information from, the following documents:

- Ottawa Sewer Design Guidelines, Second Edition, Document SDG002, October 2012, City of Ottawa including:
    - Technical Bulletin ISDTB-2012-4 (20 June 2012)

- Technical Bulletin ISDTB-2014-01 (05 February 2014)
- Technical Bulletin PIEDTB-2016-01 (September 6, 2018)
- Technical Bulletin ISDTB-2018-01 (21 March 2018)
- Technical Bulletin ISDTB-2018-04 (27 June 2018)

- Ottawa Design Guidelines – Water Distribution, July 2010 (WDG001), including:
  - Technical Bulletin ISDTB-2014-02 (May 27, 2014)
  - Technical Bulletin ISTB-2018-02 (21 March 2018)

- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).

- "Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area" (J.F. Sabourin and Associates Inc., June 2012)

- Design Guidelines for Drinking-Water Systems, Ontario Ministry of the Environment and Climate Change, 2008 (GDWS).

- Fire Underwriters Survey, Water Supply for Public Fire Protection (FUS), 1999.

1.7 STATEMENT OF OBJECTIVES AND SERVICING CRITERIA

The objective of the site servicing is to meet the requirements for the proposed modification of the site while adhering to the stipulations of the applicable higher-level studies and City of Ottawa servicing design guidelines.

1.8 AVAILABLE EXISTING AND PROPOSED INFRASTRUCTURE

A municipal sanitary sewer and a watermain are located within the North Access Road right of way. A new sanitary service and a new water service will extend from North Access Road to the proposed building. The existing on-site storm sewer network running from west to east and discharging to the existing sewer along the Access Road east of Student Commons Building will be modified in one segment, as it is presently undersized. Quantity control is required to restrict the discharge leaving the development area, as noted in the Stormwater Management Report provided in Appendix C. The existing boundary roads at the site will remain open.

1.9 ENVIRONMENTALLY SIGNIFICANT AREAS, WATERCOURSES AND MUNICIPAL DRAINS

The proposed development site is bordered by institutional land uses to the north and west, and by paved parking areas to the east and south. The College is within the Pinecrest Creek Watershed. Runoff from the development site is directed to a 2100mm diameter trunk storm sewer which runs south to north and ultimately outlets to Pinecrest Creek, north of Baseline Road. The total allowable flow to the existing storm sewer from the ARC site will be limited to 36 l/s/ha in accordance with the Pinecrest Creek design criteria.

1.10 CONCEPT LEVEL MASTER GRADING PLAN

A detailed grading plan for the site has been developed, matching the existing overland flow pattern of directing overflow drainage to the Access Road to the west and then directed to the North Access Road at the north-west corner. The site topographic survey, included in Appendix A, provides evidence of direction of overland flow of the site from east to west.
Due to the existing grade difference west of the building, it will be necessary to construct a retaining wall along the west building footprint. The height of the wall will be in the range of 1.40 to 1.50 meter.
Grading will employ smooth transitions from the new work areas to existing grades with less than 4.0% slope. No changes will be made to grades at the development perimeter.

1.11 IMPACTS ON PRIVATE SERVICES

The 150 mm dia. watermain and the 250 mm dia. sanitary sewer running south-north across the development area have been verified as active, and will be rerouted to the west and north via the Access Road west of the proposed building. They will be connected to the mains along North Access Road, as at present, but at locations further west. Temporary shut down for both existing sanitary and water services will be required for making the final connection. Buildings P and S, located to the south, will be out of service when making the final connection. The rerouting has to be completed prior to the excavation of the remaining portion of the existing watermain and sanitary services running under the proposed building. Please refer to Figure 3 Overall Site Utility in Appendix A.

A new transformer has been proposed to be located on the south boulevard of the North Service Road which will be seating on top of the existing 600 mm dia. Storm sewer running east-west. The existing storm will need to be rerouted to avoid future maintenance issue by crossing under the transformer and duct bank. The reroute will intercept the existing storm sewer running from existing STMH27 to existing STMH42 by installing two storm manhole and catchbasin manhole, the by pass portion will be relocated to the North Service Road with installing two storm manholes to provide two 90 degree turn. A temporary one land shut down will be required during construction. A temporary pumping by-pass is also required during wet weather condition. Please refer to servicing plan C04 for details.

1.12 DEVELOPMENT PHASING

No development phasing is expected for the current proposal.

1.13 GEOTECHNICAL SUTDY

A geotechnical investigation report has been prepared by the Paterson Group (Report PG4624-1, June 3, 2019), and its recommendations has been taken into account in developing the engineering specifications. A copy of the report can be found in Appendix A. Paterson Group has also prepared a follow up commentary based on a geotechnical review of test pits excavated at the subject site to assess subsurface conditions. Based on this recent investigation, the long-term ground water level is anticipated at a 4 to 5 m depth. The ground water level has been taken into account in designing the underground Stormtech storage and infiltration chambers. A copy of the geotechnical memorandum can be found in the stormwater management report in Appendix C.

1.14 DRAWING REQUIREMENT

The engineering plans submitted for site plan approval are in compliance with City requirements.

2 WATER DISTRIBUTION

2.1 CONSISTENCY WITH MASTER SERVICING STUDY AND AVAILABILITY OF PUBLIC INFRASTRUCTURE

There is an existing 203mm diameter private watermain on North Access Road providing water to adjacent institutional and College owned residential properties. The new Athletics and Recreation Centre will be protected with a supervised automatic fire protection sprinkler system, and will require a 203mm diameter water service. An existing private fire hydrant will be relocated along North Access Road within 45m of the Siamese connection. No changes are required to the existing City water distribution system to allow servicing for this property.

There is an existing 150 mm diameter water service running north-south across the development area. This existing water service is serves Buildings P and S, and supplies nearby fire hydrants. Rerouting the existing 150 mm diameter water service must be done prior to the construction of the building foundation. As reported by the school, the building P and S are experiencing slow flow with servicing by the existing north-south 150 mm dia. watermain. Since the by-pass is required due to the proposed building location. The school wants to take the opportunity to increase the pipe size for the by-pass portion from 150 mm dia. to 200 mm dia. to eliminate slow flow in building P and S. And The new by-pass water service will be upsized to 200mm dia. and will connect to the existing 203mm diameter municipal watermain on North Access Road with a new 200x200 tee connection at the intersection of the Access Road west of the proposed building and North Access Road. The new 200mm diameter water service will be extended south close to the existing parking median through Access Road, then extended east toward the existing 150mm diameter water service. No changes are required to the existing City water distribution system for this relocation.

2.2 SYSTEM CONSTRAINTS AND BOUNDARY CONDITIONS

Boundary conditions have been provided by the City of Ottawa at the 203 mm diameter watermain on Navaho Drive for the development, and are included in Appendix B. A fire flow of 133 l/s (8,000 l/min) was used for the development which was calculated in Section 2.4. The boundary conditions were supplied by the City of Ottawa, based on fire flows and domestic demands estimated by WSP for the proposed Athletics and Recreation Centre.

Table 2-1: Boundary Conditions

BOUNDARY CONDITIONS	
SCENARIO	HGL (m)
Maximum HGL	134.8
Minimum HGL (Peak Hour)	127.0
Max Day + Fire Flow	120.0

2.3 CONFIRMATION OF ADEQUATE DOMESTIC SUPPLY AND PRESSURE

Water demands are based on Table 4.2 of the Ottawa Design Guidelines – Water Distribution. As previously noted, the development is considered as institutional development, consisting of an Athletics and Recreation Centre providing food

service, gymnasium and leisure facilities. A water demand calculation sheet is included in Appendix B, and the total water demands are summarized as follows:

Average Day	0.72 l/s
Maximum Day	1.09 l/s
Peak Hour	1.96 l/s

The 2010 City of Ottawa Water Distribution Guidelines stated that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

Water pressure at municipal connection check:

Min. HGL – Pavement elevation = 127.0m – 85.98m = 41.02m = 402.17 kPa

Water pressure at building connection (at average day) check:

Max. HGL – Finished floor elevation = 134.8m – 87.00 = 47.8m = 468.64 kPa

Water pressure at building connection (at max. hour demand) check:

Min. HGL – Finished floor elevation = 127.0m-87.0m = 33.0m = 392.17 kPa

Water pressure at building connection (at max. day + fire demand):

(Max Day + Fire) HGL- Finished floor elevation = 120.0m-87.0m = 323.54 kPa

The minimum water pressure inside the building at the connection is determined with the minimum HGL condition, resulting in a pressure of 392.17 kPa which exceeds the minimum requirement of 276 kPa per the guidelines.

2.4 CONFIRMATION OF ADEQUATE FIRE FLOW PROTECTION

The fire flow rate has been calculated using the Fire Underwriters Survey (FUS) method. The method takes into account the type of building construction, the building occupancy, the use of sprinklers and the exposures to adjacent structures. Assuming fire resistive construction and a fully supervised sprinkler system, a fire flow demand of 8,000 l/min has been calculated. A copy of the calculation is included in Appendix B.

The demand of 8,000 l/min can be delivered through two existing private fire hydrants. The existing hydrant located north of Building G is within 150 m of the building, and is rated at 3800 l/min. The second hydrant located at the south side of the Building G is within 35 m of the building, and is rated at 5700 l/min. The two existing hydrants have a combined total of 9500 l/min.

The proposed building on site will be serviced by a single 203 mm service off the 203 mm private watermain. The service will run into the water entry room. The proposed building will be fully sprinklered and fire protection will be provided with the fire department Siamese connection within 45 m of the existing private fire hydrant at the entrance from North Access Road. The Siamese connection is located on the north side of the building.

The boundary condition for Maximum Day and Fire Flow results in a pressure of 323.54 kPa at the ground floor level. In the guidelines, a minimum residual pressure of 140 kPa must be maintained in the distribution system for a fire flow and maximum day event. As a pressure of 323.54 kPa is achieved, the fire flow requirement is exceeded.

2.5 CHECK OF HIGH PRESSURE

High pressure is not a concern. The maximum water pressure inside the building at the connection is determined with the maximum HGL condition, resulting in a pressure of 468.64 kPa which is less than the 552 kPa threshold in the guideline in which pressure control is required. Based on this result, pressure control is not required for this building.

2.6 PHASING CONSTRAINTS

No phasing constraints exist.

2.7 RELIABILITY REQUIREMENTS

A shut off valve will be provided for the building water service at the study boundary from North Access Road. Water can be supplied to the service stub from both the North Access Road from the east and west, and can be isolated.

2.8 NEED FOR PRESSURE ZONE BOUNDAY MODIFICATION

There is no need for a pressure zone boundary modification.

2.9 CAPABILITY OF MAJOR INFRASTRUCTURE TO SUPPLY SUFFICIENT WATER

The current infrastructure is capable of meeting the domestic demand based on City requirements and fire demand as determined by FUS requirements for the proposed building.

2.10 DESCRIPTION OF PROPOSED WATER DISTRIBUTION NETWORK

A 203 mm water service is proposed to be provided into the proposed Athletics and Recreation Centre. A relocated existing private hydrant is located within 45 metres of the fire department connection on the north side of the building as per OBC requirements.

2.11 OFF-SITE REQUIREMENTS

As reported by the school, the building P and S are experiencing slow flow with servicing by the existing north-south 150 mm dia. watermain. Since the by-pass is required due to the proposed building location. The school wants to take the opportunity to increase the pipe size for the by-pass portion from 150 mm dia. to 200 mm. dia. in order to eliminate slow flow in building P and S.
The flow capacity of a water pipe is commonly modelled by the Hazen-Williams equation:

$$V = 0.849 * C_{hw} * R^{(0.63)} * S^{(0.54)}$$

Where: V is Velocity
C_{hw} is the Hazen-Williams friction coefficient
R is the hydraulic radius
S is the slope of the total head line

With the current 150 mm dia. watermain the velocity is 0.74 m/s, and with the proposed 200 mm dia. watermain the velocity will be 0.97 m/s. Flow rate is to be 13.0 l/s for 150 mm dia. watermain and 30.5 l/s for 200 mm dia. watermain. The head loss for the 150 mm dia. watermain within the 189 meter by-pass span is 13.2 kPa, but the head loss for the 200 mm dia. watermain within the 189 meter by-pass span is just 13.2 kPa by using the Hazens-Williams equation. By upsizing the existing watermain from 150 mm dia. to 200 mm. dia., the head loss will be the same but the flow is greater, thus it will be able to eliminate slow flow in building P and S.

Other than the by-pass watermain, no other off-site improvements to watermains, feedermains, pumping stations, or other water infrastructure are required to maintain existing conditions and service the adjacent buildings, other than the connection of the new private watermain to the City watermain in the south frontage of the site.

2.12 CALCULATION OF WATER DEMANDS

Water demands were calculated by as described in Sections 2.3 and 2.4 above.

2.13 MODEL SCHEMATIC

The water works consist only a single building service, a model schematic is not required for this development.

3 WASTEWATER DISPOSAL

3.1 DESIGN CRITERIA

In accordance with the City of Ottawa's Sewer Design Guidelines, the following design criteria have been utilized in order to predict wastewater flows generated by the subject site and complete the sewer design;

- Minimum Velocity 0.6 m/s
- Maximum Velocity 3.0 m/s
- Manning Roughness Coefficient 0.013
- Total est. hectares institutional use 1.549
- Average sanitary flow for institutional use 28,000 L/Ha/day
- Commercial/Institutional Peaking Factor 1.5
- Infiltration Allowance (Total) 0.33 L/s/Ha
- Minimum Sewer Slopes – 200 mm diameter 0.32%

The area of 1.12 ha represents the area of the new building and immediate surrounding area to the sides of the new building. This is the sanitary collection area that is being considered to contribute to the new 200mm sanitary service extending from the existing 250mm sanitary service along North Access Road to the new building.

3.2 CONSISTENCY WITH MASTER SERVICING STUDY

The outlet for the sanitary service from the proposed building is the 250 mm diameter municipal sewer on North Access Road. The Ottawa Sewer Design Guidelines provide estimates of sewage flows based on institutional development.

The typical operation hours for Athletics and Recreation Centre will be 16 hours/day. Average daily demand for the Athletics and Recreation Centre will be increased by a factor of 16/8.
The criteria to determine anticipated actual peak flow based on site used as described in Ottawa Sewer Design Guidelines Appendix 4-A are as follows;

- Institutional (16 hours/day) 56000 L/ha/day = 0.648 L/s/ha
- Peak flow = (0.648 L/s/ha x 1.549 ha x 1.5 peaking factor) + 0.33 l/s/ha x 1.549 ha = 2.02 L/s

The on-site sanitary sewer network has been designed in accordance with 2.02 L/s as described above.

3.3 REVIEW OF SOIL CONDITIONS

There are no specific local subsurface conditions that suggest the need for a higher extraneous flow allowance.

3.4 DESCRIPTION OF EXISTING SANITARY SEWER

The outlet sanitary sewer is the existing 250 mm diameter sewer on North Access Road. This local sewer will outlet to a sanitary trunk sewer along the Woodroffe corridor, then discharge to municipal wastewater treatment facility.

There is an existing 250mm diameter sanitary sewer running north-south across the subjected developing area has been found active. This existing 250mm diameter sanitary sewer is carrying the waste water from Buildings P, S and V. Rerouting the existing 250mm diameter sanitary sewer must be completed prior to the construction of the foundation. The new 250mm sanitary sewer will be connected downstream at the existing 250mm diameter sanitary sewer on the south boulevard of North Access Road with a new sanitary manhole 4 at the south intersection of Access Road and North Access Road. Then the

new 250mm diameter sanitary sewer will be extended south via Access Road, with a new sanitary manhole 3 to provide 90 degrees turning, then extended east toward the existing 250mm diameter sanitary sewer with a new sanitary manhole 2 for connection. The contributing flows and outlet sewer are unchanged from existing conditions.

3.5 VERIFICATION OF AVAILABLE CAPACITY IN DOWNSTREAM SEWER

The capacity of the downstream 250 mm diameter sewer at 0.33% slope is 34.16 L/s, which is adequate for the flow assumptions from the proposed site as noted above. This existing sewer also services approximately 6 ha of College property on the north side of the North Access Road. Assuming this existing area generates a proportional flow to that estimated above for the 1.549 ha ARC building, then the combined existing and anticipated flow estimate is 9.80 L/s.

3.6 CALCULATIONS FOR NEW SANITARY SEWER

The 200 mm diameter sanitary service from the sanitary monitoring manhole at loading area to the building will have a slope of 1.0 %, and a capacity of 32.80 L/s, with a velocity of 1.04 m/s. the 200 mm diameter sanitary service from the sanitary monitoring manhole to the existing sanitary manhole MHSAN46 will have a slope of 0.35 %, and a capacity of The capacity of 19.40 L/s, with a velocity of 0.62 m/s. The servicing pipe capacity exceeds the estimated peak sanitary flow rate of 2.02 L/s for the proposed development site.

3.7 DESCRIPTION OF PROPOSED SEWER NETWORK

The proposed sanitary sewer network on site will consist of a 200 mm diameter building service, a new 1200 mm diameter monitoring manhole at the loading area, and the 250mm sewer rerouting described in Section 3.4.

3.8 ENVIRONMENTAL CONSTRAINTS

There are no previously identified environmental constraints that impact the sanitary servicing design in order to preserve the physical condition of watercourses, vegetation, or soil cover, or to manage water quantity or quality.

3.9 PUMPING REQUIREMENTS

The proposed development will have no impact on existing pumping stations and will not require new pumping facilities.

3.10 FORCE-MAINS

No force-mains are required specifically for this development.

3.11 EMERGENCY OVERFLOWS FROM SANITARY PUMPING STATIONS

No pumping stations are required for this site, except as required internally for the plumbing design to service the lower area of the building.

3.12 SPECIAL CONSIDERATIONS

There is no known need for special considerations for sanitary sewer design related to existing site conditions.

4 SITE STORM SERVICING

4.1 EXISTING CONDITION

The site currently is dominated by an asphalt parking lot holding about 350 spaces. The campus is serviced with a series of storm sewers which collect runoff from the various buildings and significant parking lots. Most runoff from the Campus is ultimately directed to a 2100 mm diameter trunk storm sewer which runs south to north and is located along the east side of the Student Commons Building. The 2100 mm diameter storm sewer ultimately outlets to the Pinecrest Creek, north of Baseline Road. There are a series of smaller sewers adjacent to the site including a 600 mm diameter storm sewer in North Access Road and 375 mm and 450 mm diameter storm sewers in Access Road east of Student Commons Building. Drainage in excess of the minor system capacity currently flows overland to the North Access Road.

4.2 ANALYSIS OF AVAILABLE CAPACITY IN PUBLIC INFRASTRUCTURE

The 2018 Morrison Hershfield Stormwater Management Brief – Stormwater Management Pond indicates that the present contributing area to the 600mm diameter storm sewer on the North Access Road is 5.44 ha, comprised of 1.83 ha impervious area, and 3.61 ha of imperious area. Using the Rational Method, with coefficient of 0.25 for pervious areas and 0.9 for impervious areas, and a 10 minute time of concentration, results in an estimated 2 year flow of 794 L/s from this area. Using utility records from the College, the slope of the existing storm sewer immediately north of the building is 2.6%, which equates to a capacity in excess of 900 L/s. As the proposed stormwater management works for the ARC will significantly reduce runoff rates, capacity in the minor system is not a concern.

4.3 DRAINAGE DRAWING

Drawing C04 shows the receiving storm sewer and site storm sewer network. Drawing C03 provides proposed grading and drainage, and includes existing grading information. Drawing C05 provides a post-construction drainage sub-area plan, including both site and roof information. Figure 2 provides a pre-development drainage sub-area plan for the existing parking area. Site sub-area information is also provided on the storm sewer design sheet attached in Appendix C.

4.4 WATER QUANTITY CONTROL OBJECTIVE

Refer to the Stormwater Management Report in Appendix C for the water quantity objective for the site.

4.5 WATER QUALITY CONTROL OBJECTIVE

As the proposed modification in use of the site will result in fewer parked vehicles, and drainage from within the proposed building will be directed to the sanitary sewer, a conceptual net improvement in stormwater water quality is anticipated. As noted from the pre-consultation with City of Ottawa, the designated water quality control objective is to achieve 80% TSS removal. This objective will be achieved through the use of an oil and grit separator for the runoff generated from the site, achieving the TSS removal requirements as well as oil capture. As noted in the Stormwater Management Report, the high degree of initial runoff capture and infiltration will also provide a significant contribution to quality treatment.

4.6 DESIGN CRITERIA

The stormwater system was designed following the principles of dual drainage, making accommodation for both major and minor flow.

Some of the key criteria include the following:

- Design Storm (minor system) — 1:2 year return (Ottawa)
- Rational Method Sewer Sizing
- Initial Time of Concentration — 10 minutes
- Runoff Coefficients
  - Landscaped Areas — C = 0.25
  - Asphalt/Concrete — C = 0.90
  - Traditional Roof — C = 0.90
- Pipe Velocities — 0.80 m/s to 6.0 m/s
- Minimum Pipe Size — 250 mm diameter (200 mm CB Leads and service pipes)

4.7 PROPOSED MINOR SYSTEM

The detailed design for this site will maintain the existing storm sewer network to Access Road west of the development site, with the exception of replacement of one section of 375mm sewer with one of 450mm near the northwest corner of the site. This modification is required to achieve a 2 year discharge rate, without accounting for the flow reduction being implemented for quantity and quality control. Temporary pumping of storm water will be required during replacement of the existing storm sewer downstream of existing CB107 with a 450mm diameter storm sewer.

A limited amount of uncontrolled surface flow will also enter the existing storm sewer network to the north along the North Access Road, consistent with existing conditions. There were no feasible methods of controlling these small areas.

Using the above noted criteria, the existing on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated pre and post development storm sewer drainage area plan and figure are included in Appendix C.

In the geotechnical report, Paterson stated that the long-term groundwater level is anticipated at a 4 to 5 m depth. A perimeter drainage system is required for the partial basement area to handle water infiltration adjacent to foundation walls. The inverts of the existing 600 mm dia. storm sewer along the north side of the proposed building is higher than the partial basement area. Gravity drainage pipe is not applicable for this situation. There, the weeping tile outside of the foundation walls will direct infiltration water to the sump pit in the basement area and then discharge to the existing 600 mm dia. storm sewer with two outlets, one from the south and one from the north side of the basement. Refer to appendix C for the declaration letter by a Certified Mechanical Engineer regarding the pumping details.

4.8 STORMWATER MANAGEMENT

Refer to Stormwater Management report in Appendix C for details.

4.9 INLET CONTROLS

Refer to Stormwater Management report in Appendix C for details.

4.10 ON-SITE DETENTION

Refer to Stormwater Management report in Appendix C for details.

Roof drains connect into the below ground storm system upstream of the ICD to satisfy the City-mandated Pinecrest Creek/Westboro SWM targets (for water quantity/flood control management, as well as runoff volume reduction). It would not be feasible to satisfy these requirements if rooftop areas discharged downstream of the ICD control (i.e. left site uncontrolled). The Owner has been made aware of the roof drainage arrangement.

4.11 WATERCOURSES

The minor flow will be ultimately directed to the Pinecrest Creek, north of Baseline Road.

4.12 PRE AND POST DEVELOPMENT PEAK FLOW RATES

Pre and post development peak flow rates for the impacted areas of the site have been noted in storm sewer design sheet.

4.13 DIVERSION OF DRAINAGE CATCHMENT AREAS

There will be no diversion of existing drainage catchment areas arising from the proposed work described in this report.

4.14 DOWNSTREAM CAPACITY WHERE QUANTITY CONTROL IS NOT PROPOSED

This checklist item is not applicable to this development as quantity control is provided.

4.15 IMPACTS TO RECEIVING WATERCOURSES

No significant negative impact is anticipated to downstream receiving watercourses due to proposed quantity and quality control measures, the separation of the site from the eventual receiving watercourse as a result of discharge through City owned sewers, and the planned stormwater management pond on the north side of Baseline Road.

4.16 MUNICIPAL DRAINS AND RELATED APPROVALS

There are no municipal drains on the site or associated with the drainage from the site.

4.17 MEANS OF CONVEYANCE AND STORAGE CAPACITY

The means of flow conveyance and storage capacity are described in the Stormwater Management Report.

4.18 HYDRAULIC ANALYSIS

Hydraulic calculations for the site storm sewers are provided in the storm sewer design sheet and the Stormwater Management Report.

4.19 IDENTIFICATION OF FLOODPLAINS

There are no designated floodplains on the site of this development.

4.20 FILL CONSTRAINTS

There are no known fill constraints applicable to this site related to any floodplain. The site is generally being raised higher relative to existing conditions. No fill constraints related to soil conditions are anticipated, as confirmed in the geotechnical report.

5 SEDIMENT AND EROSION CONTROL

5.1 GENERAL

During construction, existing storm sewer system can be exposed to sediment loadings. A number of construction techniques designed to reduce unnecessary construction sediment loadings will be used including;

- Filter cloths will remain on open surface structures such as manholes and catchbasins until these structures are commissioned and put into use;
- Installation of silt fence, where applicable, around the perimeter of the proposed work area.

During construction of the services, any trench dewatering using pumps will be fitted with a "filter sock." Thus, any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filter sock as needed including sediment removal and disposal.

All catchbasins, and to a lesser degree, manholes, convey surface water to sewers. Consequently, until the surrounding surface has been completed, these structures will be covered to prevent sediment from entering the minor storm sewer system. These measures will stay in place and be maintained during construction and build-out until it is appropriate to remove them.

During construction of any development both imported and native soils are placed in stockpiles. Mitigative measures and proper management to prevent these materials entering the sewer system are needed.

During construction of the deeper watermains and sewers, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally placed before any catchbasins are installed.

Refer to the Erosion and Sedimentation Control Plan C06 provided in Appendix D.

6 APPROVAL AND PERMIT REQUIREMENTS

6.1 GENERAL

The proposed development is subject to site plan approval and building permit approval.

No approvals related to municipal drains are required.

No permits or approvals are anticipated to be required from the Ontario Ministry of Transportation, National Capital Commission, Parks Canada, Public Works and Government Services Canada, or any other provincial or federal regulatory agency.

7 CONCLUSION CHECKLIST

7.1 CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the proposed development can meet all provided servicing constraints and associated requirements. It is recommended that this report be submitted to the City of Ottawa in support of the application for site plan approval.

7.2 COMMENTS RECEIVED FROM REVIEW AGENCIES

Comments received from the City of Ottawa are provided in Appendix A.

APPENDIX

A

- PRE-CONSULTATION MEETING NOTES
- TOPOGRAPHIC SURVEY PLAN
- GEOTECHNICAL REPORT BY PATERSON GROUP (REFER TO PREVIOUS SUBMISSION)
- GEOTECHNICAL REVIEW COMMENTS BY PATERSON GROUP (REFER TO PREVIOUS SUBMISSION)
- ALGONQUIN COLLEGE OTTAWA CAMPUS OVERALL SITE UTILITY FIGURE 3
- RESPONSE TO CITY ENGINEERING COMMENTS

1385 Woodroffe Avenue
Pre-Consultation Meeting Minutes

Location: Room 4102E, City Hall
Date: March 6, 3pm to 4pm

Attendee	Role	Organization
Stream Shen	Planner	City of Ottawa
Mark Fraser	Project Manager (Engineer)	
Mark Young	Urban Designer	
Rosanna Baggs	Project Manager (Transportation)	
Bess Nakashima	Planning Assistant	
Lucas Smith	Project Manager	Colliers Project Leaders
Philip Belanger	Project Manager	
John Dalziel	Project Advisor	Algonquin Student Association
Angelo Montenegrino	Architect	HOK Architects
David Rosetti	Construction Manager	PCL Constructors
James Johnston	Engineer	WSP

Comments from Applicant

1. The applicant is proposing a 3-storey, 100,000 sq ft Athletic Recreational Centre (ARC) east of the student's commons in the current parking lot.
2. The ARC will consolidate existing uses on campus and will not be servicing anyone outside of the school's student population. There are longer-term plans for the campus that may utilize the existing buildings.
3. The ARC will be connected to the student commons through an elevated skywalk.
4. 250 parking spaces will be permanent removed, with 250 additional spaces being unavailable during construction. Parking pass will not be issued next season for those spaces. There may be some temporary parking spaces (50 spaces) constructed elsewhere on campus to offset some parking pressures.
5. The building will be applying for LEED Gold standard.
6. Looking to maintain existing access points within the parking lot.
7. The building will be heated and cooled from the central system.

8. Existing servicing connections are available close by. Further investigation is required.
9. The applicant is anticipating construction in spring 2019.

Planning and Urban Design Comments

1. This is a pre-consultation for a Site Plan Control application, Manager Approval, subject to Public Consultation. Application form, timeline and fees can be found here. https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms
2. Please note that there are proposed changes coming to the site plan by-law and fee schedule. It is available for viewing under the February 14 Planning Committee agenda. http://app05.ottawa.ca/SIREPub/agendaminutes/index_en.aspx
3. The site is located in the Mixed Use Centre designation within the City's Official Plan is subject to the Urban Design Review Panel process. A pre-consultation is not required, but can be accommodated if the applicant choose to do so. https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/urban-design-review-panel
4. Staff has confirmed with legal that the proposal is subject to both the site plan control application and building permit application. However, development charges is not applicable to this project.
5. This site is located within the Baseline and Woodroffe Secondary Plan. One of the requirement identified within the secondary plan is that each submission shall be supported by an up to date master concept plan showing the entire college property. It would also be helpful to understand any future proposed buildings in the immediate vicinity so that that the public realm planning can be better coordinated. https://www.google.com/search?q=baseline+and+woodrofe+secondary+plan&sourceid=ie7&rls=com.microsoft:en-US:IE-Address&ie=&oe=&gws_rd=ssl
6. Please consider how the pedestrian will interact with the site. Consider improvements to the public realm surrounding the building, its ground level connection to the student commons and the placement of building entrances and lobbies.
7. One suggestion is to remove the parking lot entrance adjacent to the proposed building and create a pedestrian only environment. If this is not feasible, consider

modifying the surface treatment so that pedestrian use is being prioritized over vehicle access. This can be done through the use of different surface material (e.g. pavers) or through a raised pedestrian crossing.

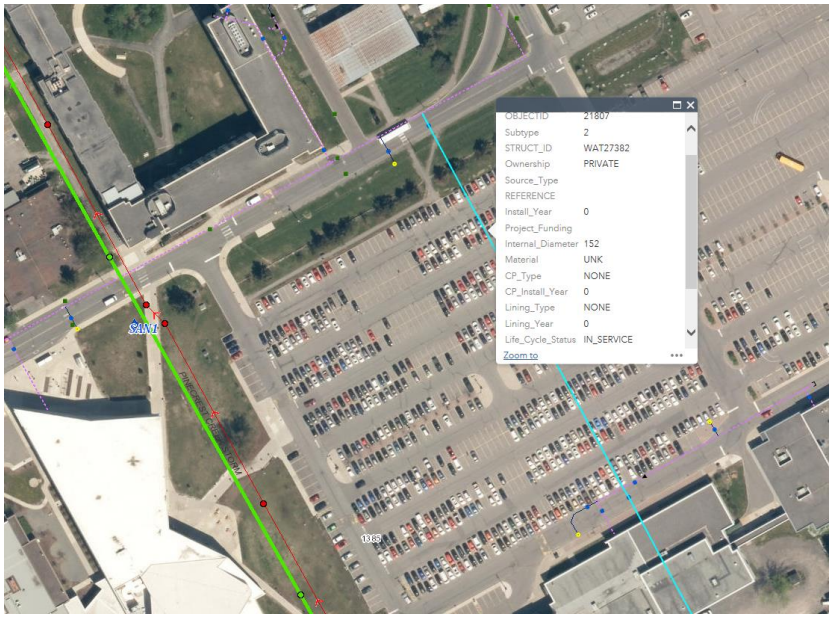
8. Please provide direct pedestrian paths to avoid cow path.
9. Please consider the implementation of way finding signage as part of this proposal.
10. Please consult with the Ward Councillor prior to submission.

Engineering Comments

General:

- Algonquin College shall move forward with finalizing Site Plan Control proposal **D07-12-18-0036.** Site Plan Approval shall be obtained and Algonquin College shall enter into a Site Plan Agreement with the City before any future works are to commence. These works have no approval status and the City has not authorized these works to commence to date.
- As per the attached correspondence the Ministry of the Environment, Conservation and Parks dated 2018-10-22 does not consider the College Campus to be industrial lands therefore an ECA is not anticipated to be required for the subject works.
- Local Conservation Authority (RVCA) clearance is required.
- Any easements on the subject site shall be identified and respected by any development proposal and shall adhere to the conditions identified in the easement agreement. All easements shall be shown on the engineering plans. Any proposed encroachments such as a covered walkway are subject to review and may not be supported. Sufficient details shall be provided to demonstrate the walkway will not be an obstruction that prevents the City from performing maintenance on the underground sewers. Previous approvals do not set a precedent for future applications and are reviewed on a case by case basis. A copy of the easement agreement shall be provided as part of the Site Plan Control application package.
- Please provide an **Existing Conditions/Removals Plan** as part of the engineering drawing set. **A Topographic Survey** of the impacted drainage area is required.
- The location of the mechanical room within the building shall take into consideration the location of available services.
- Please note that servicing and site works shall be in accordance with the following documents:
    - Ottawa Sewer Design Guidelines (October 2012)
    - Ottawa Design Guidelines-Water Distribution (July 2010)

- Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003
- Technical Bulletin PIEDTB-2016-01
- Technical Bulletins ISTB-2018-01, ISTB-2018-02 and ISTB-2018-03.
- Ottawa Design Guidelines – Water Distribution (2010)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)



Disclaimer:

The City of Ottawa does not guarantee the accuracy or completeness of the data and information contained on the above image(s) and does not assume any responsibility or liability with respect to any damage or loss arising from the use or interpretation of the image(s) provided. This image is for schematic purposes only.

Stormwater Management Criteria:

- Algonquin College is located with the Pinecrest Creek watershed. Any new development or redevelopment projects within the Pinecrest Creek Watershed are required to implement stormwater management measure that meet the criteria outlined in the *Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area, JFSA, dated June 2012.* No future projects are permitted to proceed without adhering to these guidelines.

- The drainage and stormwater management system shall be in accordance with the attached ***Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area, JFSA, dated June 2012*** as the College is located with the Pinecrest Creek Watershed. These guidelines provide direction for the implementation of stormwater management measures (water quality, peak flow and volume control criteria) for redevelopment within the Pinecrest Creek/Westboro Area. Excerpts from this report are anticipated to be provided as supporting documentation.
- On site removal of 80% of TSS is required to be achieved and lot level /source control measures are required to be implemented in accordance with *Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area, JFSA, dated June 2012.*
- Algonquin College and Morrison Hershfield Limited are in the process of finalizing a long term stormwater management plan for the campus. The subject proposal is located outside of the SWM Pond catchment area however the stormwater management plan provides direction for future development. Please refer to *Algonquin College Ottawa Campus Stormwater Management Brief, Stormwater Management Pond, prepared by Morrison Hershfield dated February 4, 2019* **[Please note that this document does not have any approval status to date as it is still subject to review] DROPBOX Link:** https://www.dropbox.com/sh/tx22htgqinkm799/AACATTxElJglFu6FTCvuLJ23a?dl=0
- It is recommended that the Stormwater Management Servicing Report for the Student Commons Building prepared by IBI Group to establish a level of detail expected.
- The control area is the existing catchment area.
- As per *Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14)* **there shall be no surface ponding on private parking areas during the 2-year storm rainfall event**. Depending on the SWM strategy proposed underground or additional underground storage may be required to satisfy this requirement.
- When using the modified rational method to calculate the storage requirements for the site any underground storage (pipe storage etc.) should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which underestimates the storage requirement prior to the 1:100 year head elevation being reached. Please note that if you wish to utilize any underground storage as available storage, the $Q_{(release)}$ must be modified to compensate for the lack of head on the orifice. An assumed average release rate equal to 50% of the peak allowable rate shall be applied. Otherwise, disregard the underground storage as available storage or provide modeling to support SWM strategy.
- Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.

- Emergency overland flow shall be directed to the North Service Road.
- Post-development site grading shall match existing grades.
- Please provide a **Pre-Development Drainage Area Plan** as part of the engineering drawing set to define the pre-development drainage area(s)/patterns.
- A stress-test (100-year plus 20%) of the stormwater management system shall be preformed as per Section 8.3.12 of the City's sewer design guidelines. Drainage systems shall be stress tested using design storms calculated on the basis of a 20% increase in the City's IDF curves rainfall values.
- A stormwater summary table shall be provided in the report.

Storm Sewer:

- A new connection to the 2100mm dia. Pinecrest Creek Storm Sewer is not permitted. The existing storm connection shall be used as an outlet.

Sanitary:

- A direct connection to the 525mm dia. trunk sewer will only be permitted if no other options are available as a new connection is not desirable. A connection to the private sanitary sewer within the North Service Road is the preferred connection. Any proposed connection to a trunk sewer is subject to a case-by-case review. Any offline maintenance hole is to be located outside of the City 10m wide easement if it is determine that a connection is acceptable.
- Analysis and demonstration that there is sufficient/adequate residual capacity to accommodate any increase in wastewater flows in the receiving (private) and downstream (public) wastewater systems are required to be provided.
- Please review the wastewater design flow parameters *in Technical Bulletin PIEDTB-2018-01.*

Water:

- An existing private 152mm dia. watermain will be required to be relocated and blanked at the main within the North Service Road. This watermain shall be relocated through the east access to the parking lot with a W3 chamber installed within the access.
- The maximum fire flow capacity of a fire hydrant shall be reviewed and documented to ensure a sufficient number of fire hydrants are available to service the proposed development. Please review Technical Bulletin ISTB-2018-0. A **fire hydrant coverage plan** shall be provided.
- The subject site is located within the 2W Pressure Zone.
- Please provide the following information to the City of Ottawa via email to request water distribution network boundary conditions for the subject site. Please note that once this information has been provided to the City of Ottawa it takes approximately 5-10 business days to receive boundary conditions.
    - Type of Development

- Site Address
- A plan showing the proposed water service connection location(s).
- **Average Daily Demand** (L/s)
- **Maximum Daily Demand** (L/s)
- **Peak Hour Demand** (L/s)
- **Fire Flow** (L/min)

  [*Fire flow demand requirements shall be based on Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection 1999*]
- **FUS Fire Flow Calculations**

Exterior Site Lighting:

- Please note that any proposed light fixtures (both pole-mounted and wall mounted) must be part of the approved Site Plan. All external light fixtures must meet the criteria for Full Cut-off Classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage. Please provide the City with a **Site Lighting Plan and Photometric Plan.**

Snow Storage:

- Any portion of the subject property which is intended to be used of permanent or temporary snow storage shall be as shown on the approved site plan and grading plan. Snow storage shall not interfere with approved grading and drainage patters or servicing. Snow storage areas shall be setback from the property lines, foundations, fencing or landscaping a minimum of 1.5m. Snow storage areas shall not occupy driveways, aisles, required parking spaces or any portion of a road allowance. If snow is to be removed from the site please indicate this on the plan(s).

Phase One Environmental Site Assessment:

- A Phase 1 ESA is required to be completed in accordance with Ontario Regulation 153/04 in support this development proposal to determine the potential for site contamination.

Geotechnical Investigation:

- A Geotechnical Study shall be prepared in support of this development proposal.
- Soil infiltration rates are to be provided to support proposed SWM infiltration measures.

Please note that these comments are considered preliminary based on the conceptual information provided to date and therefore maybe amended as additional details become available and presented to the City.

Transportation Comments

- Follow Traffic Impact Assessment Guidelines
    - Traffic Impact Assessment will be required.
    - Start this process asap.
    - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
- Noise Impact Studies required for the following:
    - Stationary (if there will be any exposed mechanical equipment due to the proximity to neighbouring noise sensitive land uses)
- Show how the surrounding area will tie into the landscaping for the new building, ie sidewalks, new parking configuration, pedestrian crossings to the residents, etc.
- On site plan:
    - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    - Show lane/aisle widths.
    - Grey out any area that will not be impacted by this application.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,



Stream Shen MCIP RPP
Planner II
Development Review - West

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend: **S** indicates that the study or plan is required with application submission.
A indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information and guidance on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

All paper plans should be prepared and submitted in **folded full size A1** sheets.

A digital copy of all submission material should also be provided along with the hard copies.

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	4	1. Site Servicing Plan	2. Site Servicing Study	S	4
S	4	3. Grade Control and Drainage Plan	4. Geotechnical Study	S	4
S	4	5. Composite Utility Plan	6. Groundwater Impact Study		3
	3	7. Servicing Options Report	8. Wellhead Protection Study		3
S	4	9. Transportation Impact Assessment	10.Erosion and Sediment Control Plan / Brief	S	4
S	4	11.Storm water Management Report	12.Hydro geological and Terrain Analysis		3
S	4	13.Hydraulic Water main Analysis	14.Noise Study (if there is exposed mechanical)	S	2
	PDF only	15.Roadway Modification Functional Design	16.Confederation Line Proximity Study		3

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	15	17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		2
	15	19.Draft Plan of Condominium	20.Planning Rationale	S	2
S	5	21.Site Plan	22.Minimum Distance Separation (MDS)		3
	15	23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		3
	3	25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		3
S	3	27.Landscape Plan	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
S	2	29.Survey Plan	30.Shadow Analysis		3
S	1	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)	S	Available online
S	5	33.Campus Master Plan	34.Site Lighting Plan	S	2

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S	2	35.Phase 1 Environmental Site Assessment	36.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		3
A	2	37.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	38.Assessment of Landform Features		3
	3	39.Record of Site Condition	40.Mineral Resource Impact Assessment		3
	3	41.Tree Conservation Report	42.Environmental Impact Statement / Impact Assessment of Endangered Species		3
	3	43.Mine Hazard Study / Abandoned Pit or Quarry Study	44.Integrated Environmental Review (Draft, as part of Planning Rationale)		3

Meeting Date: February 6, 2019

Application Type: *Site Plan Control, Manager Approval, Public*

File Lead (Assigned Planner): Stream Shen

Infrastructure Approvals Project Manager: Mark Fraser

Site Address (Municipal Address): 1385 Woodroffe

*Preliminary Assessment: 1☒ 2☐ 3☐ 4☐ 5

*One (1) indicates that considerable major revisions are required before a planning application is submitted, while five (5) suggests that proposal appears to meet the City's key land use policies and guidelines. **This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.**

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, the* Planning, Infrastructure and Economic Development Department *will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the Planning, Infrastructure and Economic Development Department.

James Fookes

From: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Sent: Monday 22 October 2018 3:29 PM
To: James Fookes
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi James,

If the parcels were consolidated into one, an ECA would not be required. The MOE does not consider the college to be industrial lands.

Hope this helps clarify things.

Regards,

Emily Diamond
Environmental Officer
Ministry of the Environment, Conservation and Parks
Ottawa District Office
2430 Don Reid Drive
Ottawa, Ontario, K1H 1E1
Tel: 613-521-3450 ext 238
Fax: 613-521-5437
e-mail: emily.diamond@ontario.ca

From: James Fookes [mailto:JFookes@morrisonhershfield.com]
Sent: October 22, 2018 3:27 PM
To: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi Emily,

Just following up on my message below. Our view is that the Algonquin College Woodroffe campus does not meet the definition of “Industrial Lands”, but the City is requiring that we clarify this with you. Please let me know.

Thanks,
James

From: James Fookes
Sent: Wednesday 03 October 2018 11:58 AM
To: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi Emily,

Thank you for this information. The College has advised that there is no particular reason why the site is split into two parcels, and they are looking into consolidating it into a single parcel, which is preferable to them for a number of reasons.

In the event that the College does complete the consolidation of the parcels, can you advise whether an ECA would still be required? The City's Development Review Project Manager (Mark Fraser) mentioned that the MOECP may consider the College campus to be "Industrial Lands" as defined under O.Reg. 525/98, and requested that we ask you to clarify this.

Thanks and regards,
James

James Fookes, P.Eng.
Senior Water and Wastewater Engineer
jfookes@morrisonhershfield.com

MORRISON HERSHFIELD
People • Culture • Capabilities

2440 Don Reid Drive | Ottawa, ON K1H 1E1 Canada
Dir: 613 739 2910 x1022225 | Cell: 613 869 9592 | Fax: 613 739 4926
morrisonhershfield.com

From: Diamond, Emily (MECP) [mailto:Emily.Diamond@ontario.ca]
Sent: Tuesday 25 September 2018 9:25 AM
To: James Fookes <JFookes@morrisonhershfield.com>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Good Morning James,

Based on the information provided, an ECA would be required for the proposed stormwater pond servicing Algonquin College. Regardless of who owns the two parcels, the Ministry considers the parcels to be separate. The exemption set out under Ontario Regulation 525/98 would only apply if the stormwater pond was servicing one parcel with a single PIN.

Regards,

Emily Diamond
Environmental Officer
Ministry of the Environment, Conservation and Parks
Ottawa District Office
2430 Don Reid Drive
Ottawa, Ontario, K1H 1E1
Tel: 613-521-3450 ext 238
Fax: 613-521-5437
e-mail: emily.diamond@ontario.ca

From: James Fookes [mailto:JFookes@morrisonhershfield.com]
Sent: September 24, 2018 11:44 AM
To: Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Cc: Des Rochers, Christina (MECP) <Christina.Desrochers@ontario.ca>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi Emily,

I would appreciate if we could get some feedback regarding the Stormwater Management Pond at Algonquin. Let me know if you need more details from me, or would like to set up a pre-consultation meeting.

Regards,
James

James Fookes, P.Eng.
Senior Water and Wastewater Engineer
jfookes@morrisonhershfield.com

MORRISON HERSHFIELD
People • Culture • Capabilities

2440 Don Reid Drive | Ottawa, ON K1H 1E1 Canada
Dir: 613 739 2910 x1022225 | Cell: 613 869 9592 | Fax: 613 739 4926
morrisonhershfield.com

From: James Fookes
Sent: Tuesday 11 September 2018 9:11 AM
To: Des Rochers, Christina (MECP) <Christina.Desrochers@ontario.ca>; Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Thanks Christina. I look forward to hearing from Emily. We have a meeting with the City at 11am tomorrow, so any feedback that can be provided in advance of that would be very much appreciated.

Regards,
James

From: Des Rochers, Christina (MECP) [mailto:Christina.Desrochers@ontario.ca]
Sent: Monday 10 September 2018 5:17 PM
To: James Fookes <JFookes@morrisonhershfield.com>; Diamond, Emily (MECP) <Emily.Diamond@ontario.ca>
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi James,

I forwarded your original email to Emily Diamond after we spoke last week and actually touched base with her this morning. I will forward this new information along to her and she will hopefully get back to you soon.

Thanks.

Christina

Christina Des Rochers
Water Inspector | Inspectrice de l'eau
Safe Drinking Water Branch | Direction du contrôle de la qualité de l'eau potable
Ministry of the Environment, Conservation and Parks | Ministère de l'Environnement, de la Protection de la nature et des Parcs
Tel. 613-521-3450 ex. 231
Fax. 613-521-5437
Spills Action Centre | Centre d'intervention en cas de déversement 1-800-268-6060

Please consider the environment before printing this email note

---

From: James Fookes [mailto:JFookes@morrisonhershfield.com]
Sent: September-10-18 5:02 PM

To: Des Rochers, Christina (MECP)
Subject: RE: SWM Pond at Algonquin College - ECA Requirements

Hi Christina,

I'm just following up regarding my email below. Do you know if your colleague has had a chance to look into this?

Also we have some new information about the separate parcel of land issue. Our planning colleagues at Fotenn have confirmed the 'Algonquin College of Applied Arts and Technology' owns both parcels and (according to the Planning Act) they should be considered one parcel of land. The parcel abstracts for the two different PINS are attached.

Thanks and regards,
James

James Fookes, P.Eng.
Senior Water and Wastewater Engineer
jfookes@morrisonhershfield.com

MORRISON HERSHFIELD
People • Culture • Capabilities

2440 Don Reid Drive | Ottawa, ON K1H 1E1 Canada
Dir: 613 739 2910 x1022225 | Cell: 613 869 9592 | Fax: 613 739 4926
morrisonhershfield.com

From: James Fookes
Sent: Wednesday 05 September 2018 11:32 AM
To: Des Rochers, Christina (MOECC) <Christina.Desrochers@ontario.ca>
Subject: SWM Pond at Algonquin College - ECA Requirements

Hi Christina,

Firstly, I'm not sure whether you are the appropriate person to contact about this – if not I would appreciate if you could forward this email appropriately.

We are involved in the design of a stormwater management pond at Algonquin College (1385 Woodroffe Avenue, Ottawa). We had previously been of the opinion that the pond did not require an ECA, since it only services the College property (i.e. institutional land use), and discharges to a sewer that is not a combined sewer. However, through the Site Plan Control process, the City of Ottawa has commented that:

1. Part of the catchment appears to be a separate parcel of land (130 Lotta Ave), and although also owned by the College, this would trigger an ECA; and,
2. In the City's opinion the site could be considered Industrial Land as defined under O. Reg. 525/98.

The City has requested that the contact the MOECP District Office to determine whether an ECA is required.

We would appreciate a pre-consultation to discuss this, if possible today or first thing tomorrow, to clarify this before a meeting that the college has scheduled with us tomorrow. We are available to meet whenever suits you – just email or call and we will come downstairs.

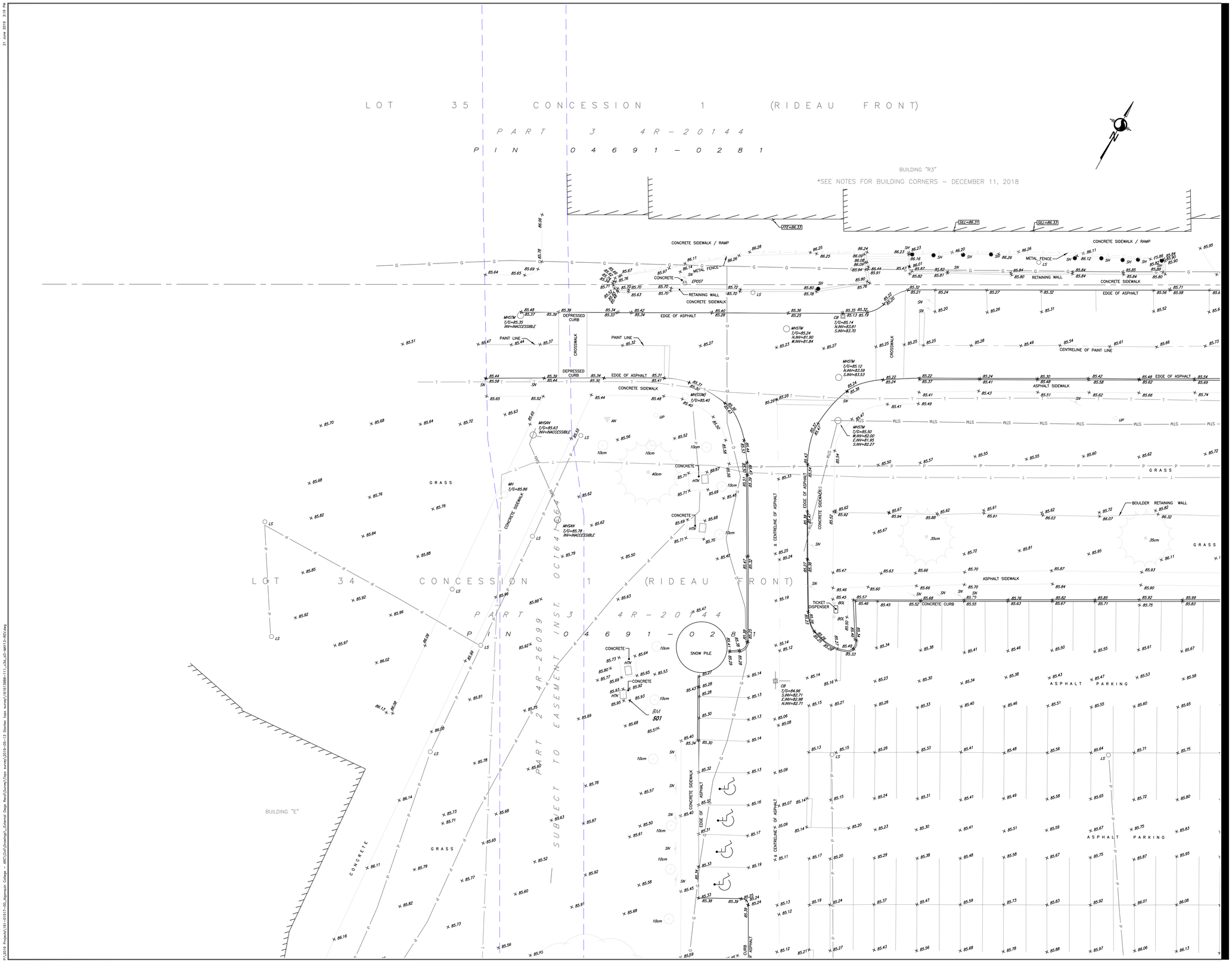
Thanks and regards,
James

James Fookes, P.Eng.

Senior Water and Wastewater Engineer
jfookes@morrisonhershfield.com



2440 Don Reid Drive | Ottawa, ON K1H 1E1 Canada
Dir: 613 739 2910 x1022225 | Cell: 613 869 9592 | Fax: 613 739 4926
morrisonhershfield.com



Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

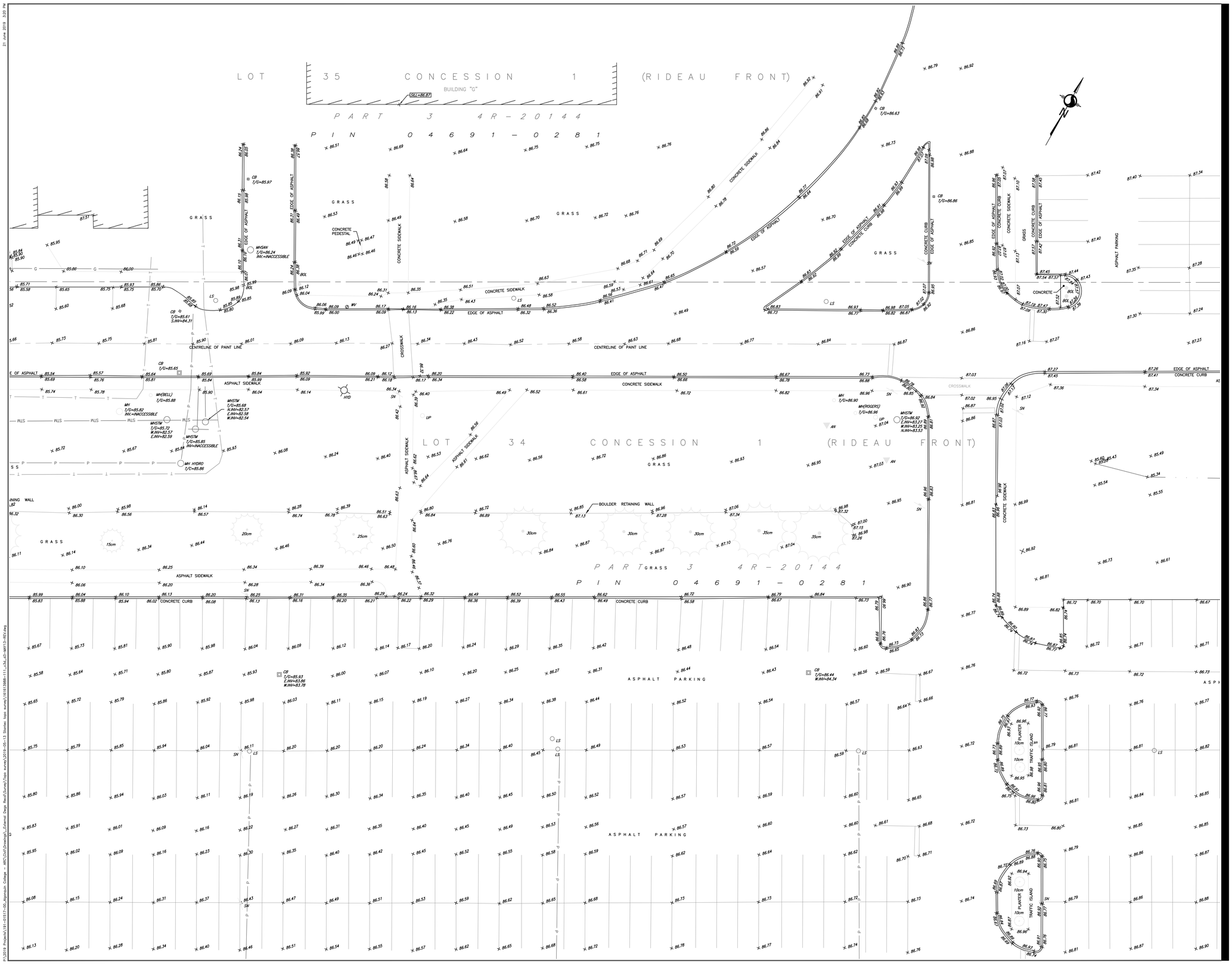
DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IB⌀	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
SWCB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB_BELL	"	TERMINAL BOX - BELL
TB_CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111

21 June 2019 - 3:16 PM
P:\2019 Projects\161613988-111_Algonquin College – AMC\Civil\Drawings_External Dwgs Revit\Survey\Topo survey\2019-05-13 Stantec topo survey\161613988-111_c3d_d3-MAP13-REV.dwg



21 June 2019 3:20 PM

P:\2019 Projects\161-01517-00_Algonquin College – AMC\Civil\Drawings_External Dwgs Read\Survey\Topo survey\2019-06-13 Stantec topo survey\161613988-111_c_34_43-MAY13-RDY.dwg

Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE " LIMIT OF ", AS SHOWN ON PLAN ", HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM 76°30'W)
DATUM: NAD 83 (ORIGINAL)

DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

	DENOTES	
■	"	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SM	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111



21 June 2019 3:21 PM

P:\2019 Projects\161-015117-00_Algonquin College – AECV\Civil\Drawings_External Dwgs Recd\Survey\Topo survey\2019-06-13 Stantec topo survey\161613988-111_x36_x5-MAY13-REV.dwg

Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

	DENOTES	
■		FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
DMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SM	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111



Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

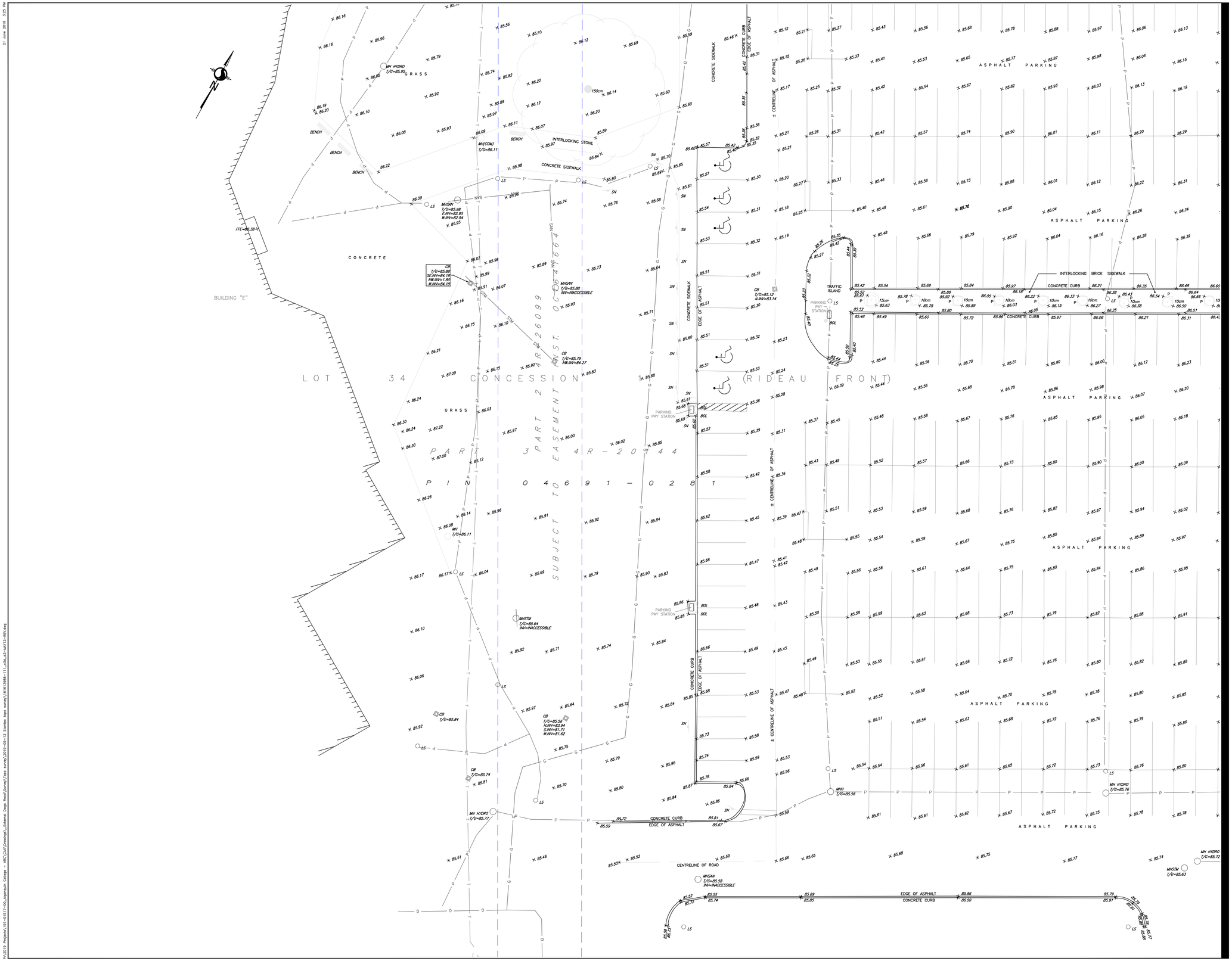
DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBØ	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
•	"	•
•	"	•
•	"	•
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111

21 June 2019 3:23 PM
P:\2019 Projects\161-01517-00_Algonquin College - ARC\CAD\Drawings_External Orgs Recd\Survey\Topo survey\2019-05-13 Stantec topo survey\161613988-111_ch4_r3-MM13-MTO.dwg



21 June 2019 3:25 PM

P:\2019 Projects\161613988-111_Algonquin College - ARC\Civil\Drawings_External Dwgs Recd\Survey\Topo survey\2019-05-13 Stantec topo survey\161613988-111_c3d_d3-MM13-MTO.dwg

Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111

Stantec

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35
CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

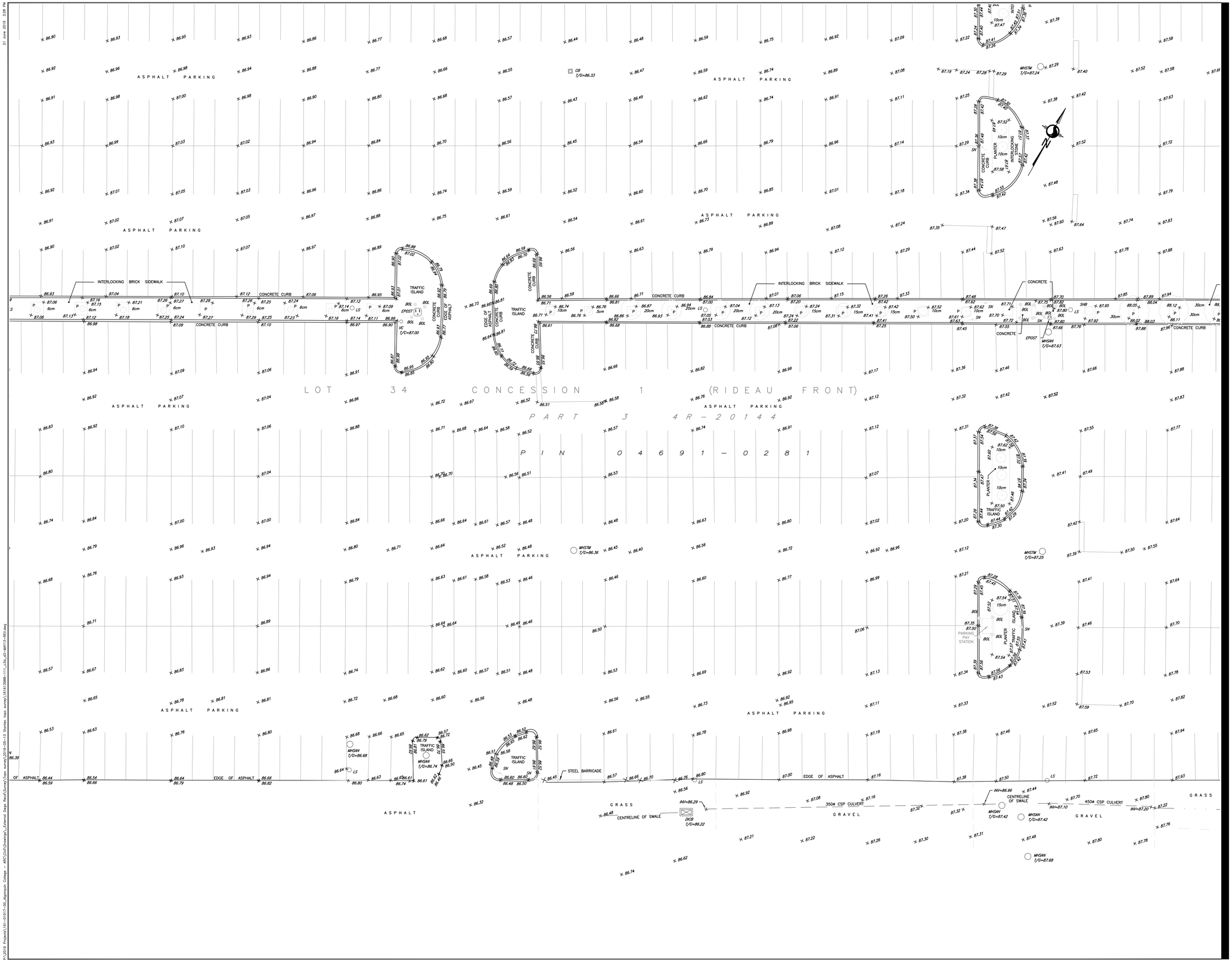
DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
OSRP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SM	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111

P:\2019 Projects\161613988-111_c3d_p3-MAP13-REV.dwg
21 June 2019 3:26 PM



21 June 2019 3:28 PM

P:\2019 Projects\161-01517-00_Algonquin College – AM\CIVIL\Drawings_Extend Dwgs Rec'd\Survey\Topo survey\2019-06-13 Stantec topo survey\161613888-111_c_A3_43-MM13-RDV.dwg

Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of

PART OF LOTS 34 & 35 CONCESSION 1 (RIDEAU FRONT)

(GEOGRAPHIC TOWNSHIP OF NEPEAN)

CITY OF OTTAWA

Scale 1:200

5 0 5 10 METRES

METRIC CONVERSION

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

BEARING NOTE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE

ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE

PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SM	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111



Stantec Geomatics Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

© Copyright 2018 Stantec Geomatics Ltd. The reproduction, alteration or use of this REPORT in whole or in part without the express permission of Stantec Geomatics Ltd. is STRICTLY PROHIBITED.

TOPOGRAPHIC SKETCH of
PART OF LOTS 34 & 35
CONCESSION 1 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF NEPEAN)
CITY OF OTTAWA

Scale 1:200

0 5 0 5 10 METRES

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

BEARING NOTE
BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE * LIMIT OF *, AS SHOWN ON PLAN *, HAVING A BEARING OF XX°XX'XX".

VERTICAL DATUM NOTE
ELEVATIONS ARE OF GEODETIC ORIGIN AND ARE REFERRED TO A BENCHMARK SHOWN ON WEBSTER & SIMMONDS 1999 SURVEY, HAVING AN ELEVATION OF 85.35.

HORIZONTAL DATUM NOTE
PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
(MTM, ZONE 9, CM76°30'W)
DATUM: NAD 83 (ORIGINAL)

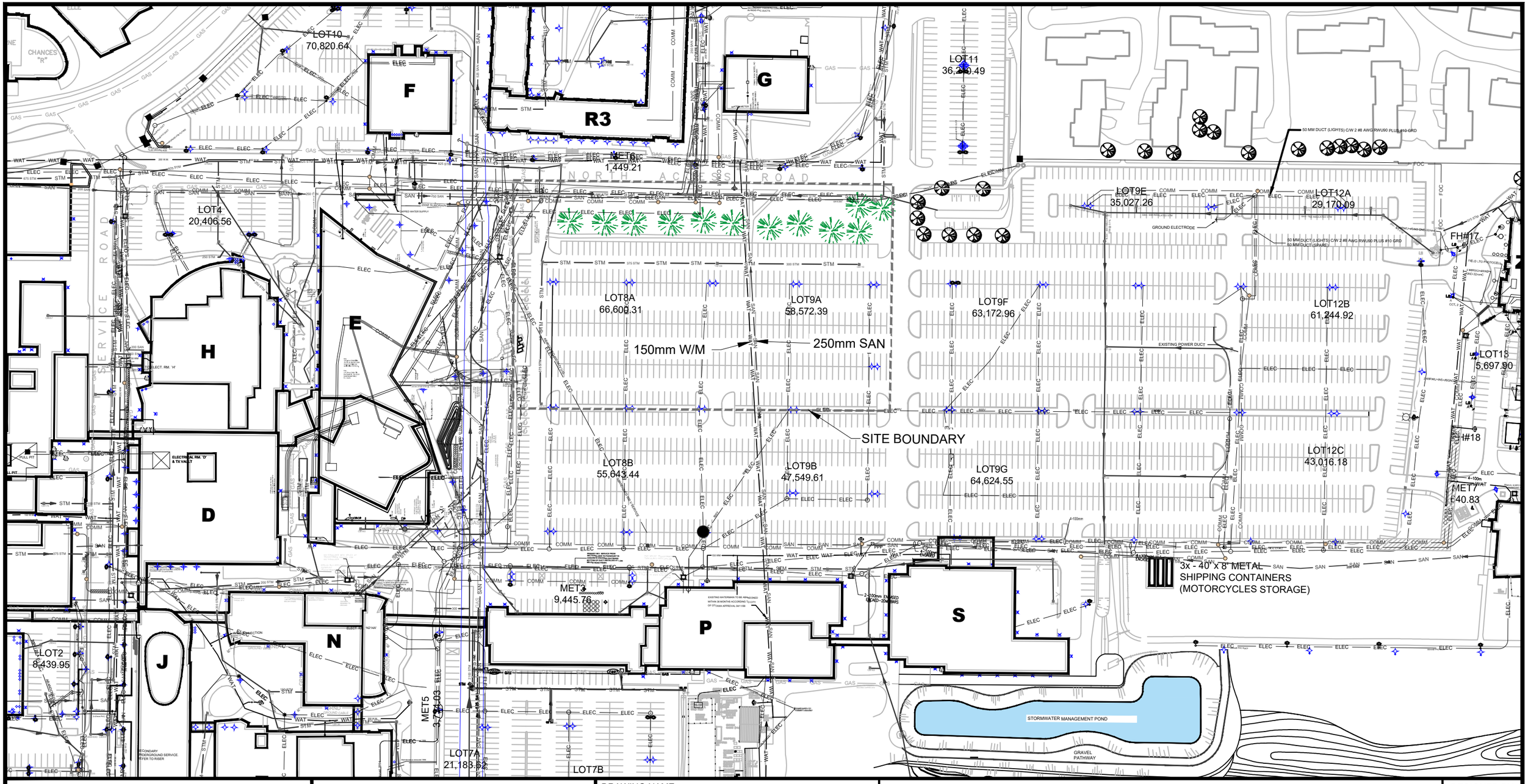
DUE TO SNOW COVER CONDITIONS SOME LOW LYING FEATURES MAY NOT BE IDENTIFIED.

LEGEND

■	DENOTES	FOUND MONUMENTS
□	"	SET MONUMENTS
IB	"	IRON BAR
IBø	"	ROUND IRON BAR
SIB	"	STANDARD IRON BAR
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
CP	"	CONCRETE PIN
WIT	"	WITNESS
PIN	"	PROPERTY IDENTIFICATION NUMBER
MEAS	"	MEASURED
PROP	"	PROPORTIONED
OU	"	ORIGIN UNKNOWN
SG	"	STANTEC GEOMATICS LTD.
ORP	"	OBSERVED REFERENCE POINT
P	"	PLANTER
*	"	*
*	"	*
*	"	*
ACU	"	AIR CONDITIONING UNIT
AN	"	ANCHOR
ANT	"	ANTENNA
BH	"	BOREHOLE
BKR	"	BIKE RACK
BENCH	"	BENCH
BOL	"	BOLLARD
BOUL	"	BOULDER
CB	"	CATCH BASIN
DCB	"	DOUBLE CB
DICB	"	SWALE CB
CBMH	"	CB MANHOLE
DCBMH	"	DOUBLE CB MANHOLE
CBSI	"	SIDE INLET CB
CSV	"	VALVE CURB STOP
DRN	"	DRAIN
EPOST	"	ELECTRICAL OUTLET
FP	"	FLAG POLE
FL	"	FLOOD LIGHT
FTF	"	FUEL TANK FILLER CAP
GC	"	GARBAGE CAN
GFL	"	PIPE FLANGE (GAS)
GFP	"	GAS FUEL PUMP
GP	"	POLE GUYWIRE
GSR	"	GAS SERVICE REGULATOR
GV	"	GAS VALVE
HLS	"	LIGHT STANDARD HYDRO
HM	"	HYDRO METER
HTN	"	HYDRO TRANSFORMER
HW	"	HAND WELL
HYD	"	FIRE HYDRANT
JBX	"	JUNCTION BOX
MB	"	MAILBOX
MP	"	MONITORING PIN
MH	"	MAINTENANCE HOLE UNIDENTIFIED
MHBELL	"	MAINTENANCE HOLE BELL
MHF	"	MAINTENANCE HOLE FIBRE OPTIC
MHH	"	MAINTENANCE HOLE HYDRO
MHI	"	MAINTENANCE HOLE INVERT
MHSAN	"	MAINTENANCE HOLE SANITARY
MHSTM	"	MAINTENANCE HOLE STORM
MHT	"	MAINTENANCE HOLE TRAFFIC
MW	"	MONITORING WELL
NPB	"	NEWS PAPER BOX
OLP	"	LIGHT STANDARD ORNAMENTAL
OW	"	OBSERVATION WELL
PKM	"	PARKING METER
PLQ	"	PLAQUE
PLR	"	PILLAR
RLC	"	RED LIGHT CAMERA
SAT	"	SATELLITE DISH
SCLP	"	SCULPTURE
SCP	"	SUMP/CATCH PIT
SCV	"	SPRINKLER CONTROL VALVE
SH	"	SPRINKLER HEAD
SIA	"	SIAMESE CONNECTION
SN	"	SIGN
SPAN	"	SOLAR PANEL
SPT	"	SEPTIC TANK LID
TBL	"	TABLE
TB BELL	"	TERMINAL BOX - BELL
TB CATV	"	TERMINAL BOX - CABLE
TCB	"	TRAFFIC CONTROL BOX
TPIT	"	TEST PIT
TSL	"	TRAFFIC SIGNAL LIGHT
UMB	"	MARKER BELL UNDERGROUND
UMC	"	MARKER CABLE UNDERGROUND
UMG	"	MARKER GAS UNDERGROUND
UMO	"	MARKER OIL UNDERGROUND
UP	"	UTILITY POLE
VB	"	VALVE BOX
VC	"	VALVE CHAMBER
WV	"	WATER VALVE
	"	TREE STUMP
	"	TREE CONIFEROUS
	"	TREE DECIDUOUS

DRAWN: DM/NJ CHECKED: BW PM: BW FIELD: ES PROJECT No.: 161613988-111

21 June 2019 3:53 PM
P:\2019 Projects\161-161613988-111_c3d_d3-MAY13-R21.dwg



300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM

PROJECT: ATHLETICS AND RECREATION CENTRE (ARC)

ADDRESS: ALGONQUIN COLLEGE OTTAWA, ONTARIO

PROJECT NO.: 191-01517-00

DRAWING NAME: OVERALL SITE UTILITY

DATE: 2019-11-21

SCALE: N.T.S

REVIEWED BY:

DESIGNED BY: BY OTHERS

DRAWN BY: BY OTHERS

SHEET: FIG3

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\2 Working Drawings\Xref's\2018-11-26 Site Utility Plan.dwg
PLOTDATE: Nov 20, 2019 - 11:45am, cawy069741

MEMO

2611 Queensview Drive, Suite 300, Ottawa ON K2B 8K2 Tel: 613-829-2800 ~ Fax: 613-829-8299

TO:	Ahmed Elsayed, P.Eng., Project Manager Stream Shen, MCIP, RPP, Planner II, File Lead City of Ottawa Planning, Infrastructure and Economic Development Department Development Review - West	**DATE:**	December 18, 2019
FROM:	Ding Bang (Winston) Yang, P.Eng. Ben Worth, P.Eng. C.Eng. MICE	**PROJECT NO.:**	191-01517-00
PROJECT:	Athletics and Recreation Centre (ARC) – Algonquin College 1385 Woodroffe Avenue		
SUBJECT:	Response to site plan control application third round comments dated December 11, 2019 City of Ottawa File D07-12-19-0114		

The following paragraphs respond to the engineering review comments provided in the City of Ottawa email dated December 11, 2019 pertaining to the site plan and site servicing engineering submission for a proposed Athletics and Recreation Centre (ARC) and associated site changes at Algonquin College. The response numbers correspond to those of the City comments.

The responses listed here indicate changes made to the Servicing and Stormwater Management Reports and civil engineering drawings, revised copies of which accompany the submission of this response. A new revision note and date have been added to all drawings. Responses from other parties are also being submitted for comments not covered by this memo.

Engineering Comments

Servicing plan, C04, prepared by WSP, 191-01517-00, revision 05, dated 2019-11-21.

1. Please updated the stormtech chambers to match the details that are included in the report with all needed changes for the proposed services.
   WSP: The servicing plan has been updated with the latest stormtech chambers design.

2. Roof top drains are shown to connect upstream the ICD, this does not follow the city guidelines. Please provide a statement in the report mentioning that owner is aware that the city does not allow that due to the risks associated and is willing to proceed with what is proposed and that the city is not responsible for any future problems that might happen due to that.
   WSP: Roof drains connect into the below ground storm system upstream of the ICD to satisfy the City-mandated Pinecrest Creek/Westboro SWM targets (for water quantity/flood control management, as well as runoff volume reduction). It would not be feasible to satisfy these requirements if rooftop areas discharged downstream of the ICD control (i.e. left site uncontrolled). Our client has been advised of this situation to ensure the owner is specifically aware of the roof drainage arrangement. A statement describing this situation, and confirming the owner is aware of the approach, has been provided in Section 4.10 of the Servicing Report.

Grading Plan, C03, prepared by WSP, 191-01517-00, revision 04, dated 2019-11-21.

1. The report mentioned the ponding at the depressed area in sub-catchment A-8, please show the ponding above CB11 which is expected to be the elevation used to size the hydrovex, also that would be the max HGL elevation expected for the site.
   WSP: Ponding in sub-catchment A-8 (above CB11) is now shown on the Grading plan, as determined through the SWM model. Please also note that the model has been used to dynamically calculate maximum ponding depth at each CB location, based on the catchment area/runoff rate and inlet capacity of the CB grate—therefore the statement above implying that a constant/max HGL elevation should be determined for the entire site is not accurate in this instance.

Notes and Details, C01, prepared by WSP, 191-01517-00, revision 05, dated 2019-11-21.

1. Please update ponding table as per above comments, also include all details for stormtech chambers, stormceptor and hydrovex.
   WSP: Ponding table has been updated. The details for stormtech chambers, stormceptor and hydrovex have been added to the drawings package.

List of Report(s):

Athletics and Recreation Centre (ARC) Algonquin College, Ottawa, ON, Servicing Report, WSP, 191-01517-00, revision 02, dated 2019-11-21

1. There is discrepancy in the report about the relocated watermain, point 2.1 mentions 150mm and point 2.11 mentions 200mm, please modify.
   WSP: The by-pass water service has been upsized to 200 mm dia. in size. Section 2.1 has been modified.

2. Please include some description about how the foundation drains will be connected, if any pumping is required please include a declaration from a certified mechanical engineer that the design will be in accordance with the servicing report.
   WSP: A paragraph discussing the foundation drains has been added to section 4.7. and the declaration letter from a certified mechanical engineer has been attached to Appendix C.

APPENDIX

APPENDIX

B

- WATERMAIN BOUNDARY CONDITIONS FROM CITY OF OTTAWA
- EMAILS FROM CITY OF OTTAWA
- FIRE UNDERWRITERS SURVEY – FIRE FLOW CALCULATION
- WATER DEMAND CALCULATION

Yang, Winston

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: June-20-19 10:42 AM
To: Winston Yang
Cc: Johnston, Jim
Subject: RE: Boundary Condition Request for Athletics and Recreation Centre (ARC) - Algonquin College
Attachments: 1385 Woodroffe June 2019.pdf; 191-01517-00_FUS calculation.pdf; 191-01517-00_SK1 _Site Location-SK1.pdf; RE: ARC - Algonquin College; RE: ARC - Algonquin College

Hi Winston,

The following are boundary conditions, HGL, for hydraulic analysis at 1385 Woodroffe Ave. (zone 2W) assumed to be connected to the 203mm dia. watermain on Navaho Dr.

Minimum HGL = 127.0m, same at both connections
Maximum HGL = 134.8m, same at both connections.
MaxDay + Fireflow (133L/s) = 120.0m, same at both connections

These are for current conditions and are based on computer model simulation.

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.

If you have any questions please let me know.

Regards,

Mark Fraser
Project Manager, Planning Services
Development Review Central Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

*Please consider your environmental responsibility before printing this e-mail

This message, including any document or file attached, is intended only for the addressee and may contain privileged and /or confidential information. Any person is strictly prohibited from reading, using, disclosing or copying this message. If you received this message in error, please notify the sender and delete the message. Thank you.

From: Fraser, Mark
Sent: June 17, 2019 8:51 AM
To: 'Winston Yang' <Winston.Yang@ibigroup.com>
Cc: Jim Johnson <james.johnston@wspgroup.com>
Subject: RE: Boundary Condition Request for Athletics and Recreation Centre (ARC) - Algonquin College

Hi Winston,

Please accept this email as confirmation that boundary conditions, HGL, for hydraulic analysis have been requested from the Water Resources Assets Unit based on the water demands provided for the subject development. Please note that it takes approximately 5-10 business days to receive and provide you with boundary conditions.

The watermain within the North Service Road is private therefore fire flow information is not available. Boundary conditions will be provided at the nearest public watermain.

Increase or Decrease for Occupancy

Low Contents Fire Hazard

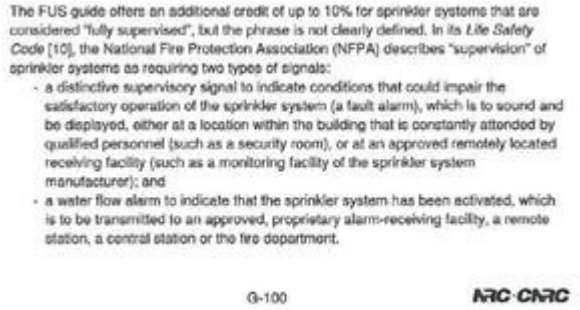
- A Low Contents Fire Hazard has been identified and a 25% reduction has been applied. It will be a requirement to provide justification for this charge value selection.

Exposure

- It will be a requirement to document the separation distances between the building and nearby structures on a sketch to support the applied 5% exposure charge.

Fully Supervised Sprinkler System

- If a Fully Supervised Sprinkler System is assumed, a letter from the mechanical engineer will be required. Please ensure all parts required for a fully supervised sprinkler system are mentioned in the letter as discussed in Technical Bulletin ISTB-2018-02 (p .G-100 of NRC'S clarification of FUS calculations).



The FUS guide offers an additional credit of up to 10% for sprinkler systems that are considered "fully supervised", but the phrase is not clearly defined. In its *Life Safety Code* [10], the National Fire Protection Association (NFPA) describes "supervision" of sprinkler systems as requiring two types of signals:

- a distinctive supervisory signal to indicate conditions that could impair the satisfactory operation of the sprinkler system (a fault alarm), which is to sound and be displayed, either at a location within the building that is constantly attended by qualified personnel (such as a security room), or at an approved remotely located receiving facility (such as a monitoring facility of the sprinkler system manufacturer); and
- a water flow alarm to indicate that the sprinkler system has been activated, which is to be transmitted to an approved, proprietary alarm-receiving facility, a remote station, a central station or the fire department.

G-100 NRC·CNRC

Hydrant Capacity Requirement

- It will be a requirement to document that the aggregate fire flow capacity of all contributing fire hydrants within 150m of the proposed building is not less than the required fire flow.

If you have any questions please let me know.

Regards,

Mark Fraser

Project Manager, Planning Services
Development Review West Branch
City of Ottawa | Ville d'Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West. 4th Floor, Ottawa ON, K1P 1J1
Tel:613.580.2424 ext. 27791
Fax: 613-580-2576
Mail: Code 01-14
Email: Mark.Fraser@ottawa.ca

*Please consider your environmental responsibility before printing this e-mail

This message, including any document or file attached, is intended only for the addressee and may contain privileged and /or confidential information. Any person is strictly prohibited from reading, using, disclosing or copying this message. If you received this message in error, please notify the sender and delete the message. Thank you.

From: Yang, Winston <Winston.Yang@wsp.com>
Sent: June 14, 2019 12:09 PM
To: Fraser, Mark <Mark.Fraser@ottawa.ca>

Cc: Johnston, Jim <James.Johnston@wsp.com>
Subject: Boundary Condition Request for Athletics and Recreation Centre (ARC) - Algonquin College

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.

ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

Hi Mark,

We are working on the Site Servicing Study for the proposed Athletics and Recreation Centre (ARC) at Algonquin College. The proposed development is a two storeys with a partial basement to the east. The building is proposed to be serviced from the 203 mm Diameter watermain along the North Service Road. Please see attached SK1 for site location. The total gross building area is confirmed to be 11,658 m² by the Architect. The architect has also confirmed that the type of construction of the proposed building is non-combustible construction. Mechanical Engineer has confirmed that the building will be protected with a supervised automatic fire protection sprinkler system. Please see attached emails for your reference.

The domestic water demands were calculated using the City of Ottawa's Water Design Guidelines where the institutional consumption rate of 28,000 L/ha/d was used to estimate average day demand. But the average daily demand for the ARC will be increased by a factor of 16/8 since we have assumed the ARC will be operated 16 hours a day instead of 8 hours a day. Site area was confirmed to be 11,176 m². Maximum daily demand was calculated by multiplying average day by a factor of 1.5. Maximum hour demand was calculated by multiplying maximum daily demand by a factor of 1.8.

The fire flow required was determined following the Fire Underwriter Survey (FUS) method.
The resulting FUS fire flow is 8,000 L/min or 133 L/s. Please see attached pdf for the detail FUS calculation.

In summary:
Average Daily Demand = 0.72 L/s
Maximum Daily Demand = 1.09 L/s
Maximum Hour Demand = 1.96 L/s
Required Fire Flow = 133 L/s

Please provide fire flow information for the fire hydrant along the North Service Road in the vicinity of the property.

Should you have any questions please do not hesitate to contact me.

Thank you,

Ding Bang (Winston) Yang, P.Eng.
Project Engineer
Infrastructure

T+ 1 613-690-0538

2611 Queensview Drive, Suite 300

Ottawa, Ontario,
K2B 8K2, Canada

www.wsp.com

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-mail system and destroy any printed copies. You are receiving this communication because you are listed as a current WSP contact. Should you have any questions regarding WSP's electronic communications policy, please consult our Anti-Spam Commitment at www.wsp.com/casl. For any concern or if you believe you should not be receiving this message, please forward this message to caslcompliance@wsp.com so that we can promptly address your request. Note that not all messages sent by WSP qualify as commercial electronic messages.

AVIS : Ce message, incluant tout fichier l'accompagnant (« le message »), peut contenir des renseignements ou de l'information privilégiés, confidentiels, propriétaires ou à divulgation restreinte en vertu de la loi. Ce message est destiné à l'usage exclusif du/des destinataire(s) voulu(s). Toute utilisation non permise, divulgation, lecture, reproduction, modification, diffusion ou distribution est interdite. Si vous avez reçu ce message par erreur, ou que vous n'êtes pas un destinataire autorisé ou voulu, veuillez en aviser l'expéditeur immédiatement et détruire le message et toute copie électronique ou imprimée. Vous recevez cette communication car vous faites partie des contacts de WSP. Si vous avez des questions concernant la politique de communications électroniques de WSP, veuillez consulter notre Engagement anti-pourriel au www.wsp.com/lcap. Pour toute question ou si vous croyez que vous ne devriez pas recevoir ce message, prière de le transférer au conformitelcap@wsp.com afin que nous puissions rapidement traiter votre demande. Notez que ce ne sont pas tous les messages transmis par WSP qui constituent des messages électroniques commerciaux.

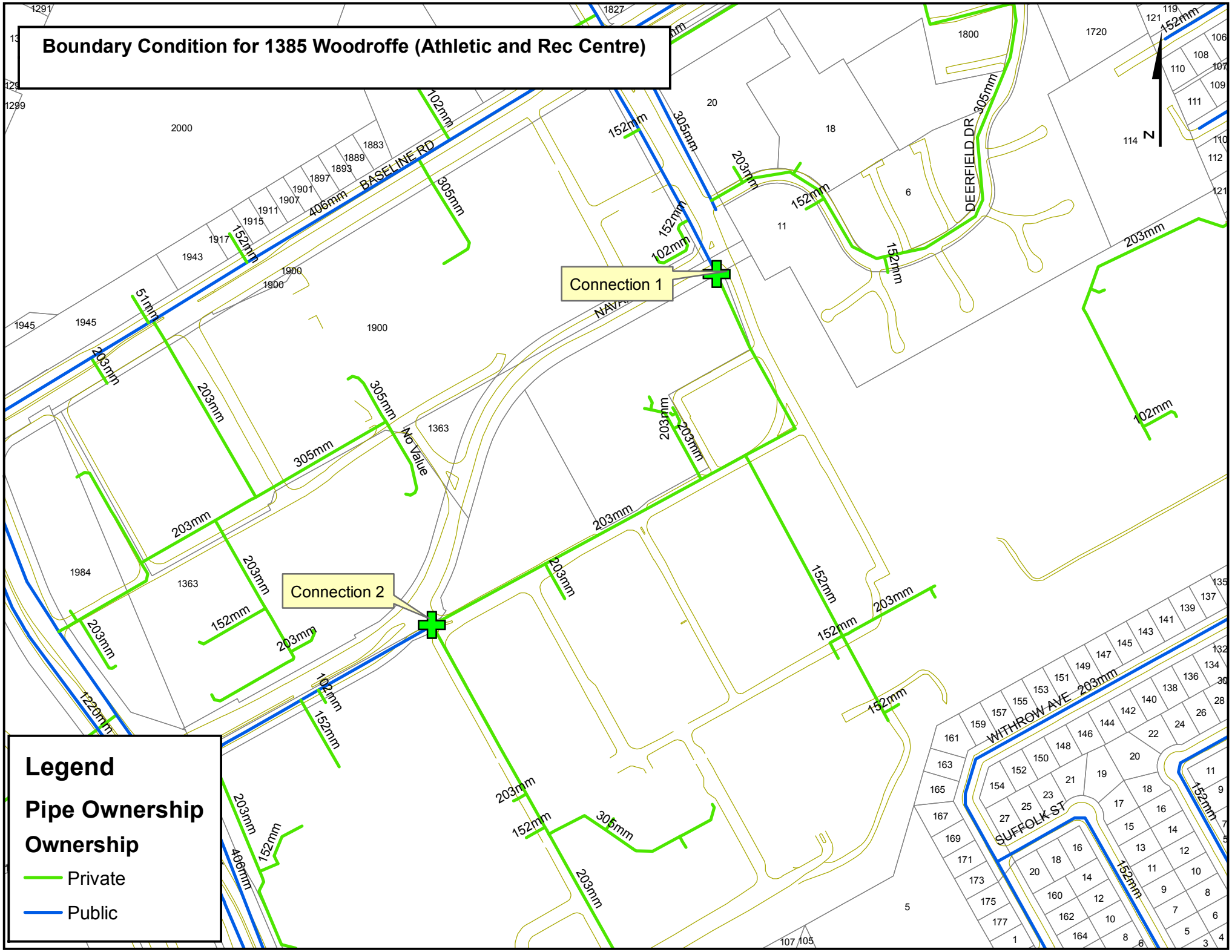
-LAEmHhHzdJzBlTWfa4Hgs7pbKl

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

Le présent courriel a été expédié par le système de courriels de la Ville d'Ottawa. Toute distribution, utilisation ou reproduction du courriel ou des renseignements qui s'y trouvent par une personne autre que son destinataire prévu est interdite. Je vous remercie de votre collaboration.

'


Boundary Condition for 1385 Woodroffe (Athletic and Rec Centre)
Connection 1
Connection 2
BASELINE RD
DEERFIELD DR
WITHROW AVE
SUFFOLK ST
No Value
Legend
Pipe Ownership
Ownership
Private
Public

Yang, Winston

From: LeRoy, Tom <Tom.LeRoy@wsp.com>
Sent: June-07-19 3:37 PM
To: Yang, Winston; Richard Smith
Cc: Angelo Montenegrino; Johnston, Jim; Bourgoin, Andre
Subject: RE: ARC - Algonquin College

Hi Winston,

To follow up on our conversation: the building will be protected with a supervised automatic fire protection sprinkler system.

Tom LeRoy, P.Eng., LEED® AP
Project Manager
Buildings – Mechanical & Electrical Engineering

T+ 1 613-690-3908

wsp.com

From: Yang, Winston
Sent: June-07-19 2:39 PM
To: Richard Smith <richard.smith@hok.com>; LeRoy, Tom <Tom.LeRoy@wsp.com>
Cc: Angelo Montenegrino <angelo.montenegrino@hok.com>; Johnston, Jim <James.Johnston@wsp.com>
Subject: ARC - Algonquin College

Hi Richard and Tom,

We are going to put up the request to ask the city to provide the boundary condition at our connection point along the north service road.
The existing private fire hydrant is located within 45m from the building, no private fire hydrant is required for this development.

Before we submit the request, we want to get confirmation from you regarding the following:

1) The gross floor area will be
   Lower level: 3002 m²
   Level 1: 4650 m²
   Level 2: 3285 m²
   Mezzanine: 721 m²
   Total: 11,658 m²
2) The type of construction of the proposed building, ordinary construction or noncombustible construction.
3) (Tom) The type of sprinkler system. (Will the building be equipped with Automatic Sprinkler Protection?)
4) The estimated maximum occupancy limit for ARC during a typical day.

Should you have any questions please do not hesitate to contact me or Jim.

Yours truly,

Ding Bang (Winston) Yang, P.Eng.
Project Engineer
Infrastructure

T+ 1 613-690-0538

2611 Queensview Drive, Suite 300
Ottawa, Ontario,
K2B 8K2, Canada

www.wsp.com

Yang, Winston

From: Richard Smith <richard.smith@hok.com>
Sent: June-07-19 4:41 PM
To: Yang, Winston; LeRoy, Tom
Cc: Angelo Montenegrino; Johnston, Jim
Subject: RE: ARC - Algonquin College

Hi Winston,
Responses below.

RICHARD SMITH
HOK
richard.smith@hok.com
t +1 613 683 1819

From: Yang, Winston [mailto:Winston.Yang@wsp.com]
Sent: Friday, June 7, 2019 2:39 PM
To: Richard Smith <richard.smith@hok.com>; LeRoy, Tom <Tom.LeRoy@wsp.com>
Cc: Angelo Montenegrino <angelo.montenegrino@hok.com>; Johnston, Jim <James.Johnston@wsp.com>
Subject: ARC - Algonquin College

Hi Richard and Tom,

We are going to put up the request to ask the city to provide the boundary condition at our connection point along the north service road.
The existing private fire hydrant is located within 45m from the building, no private fire hydrant is required for this development.

Before we submit the request, we want to get confirmation from you regarding the following:

1) The gross floor area will be
   Lower level: 3002 m²
   Level 1: 4650 m²
   Level 2: 3285 m²
   Mezzanine: 721 m²
   Total: 11,658 m² Correct
2) The type of construction of the proposed building, ordinary construction or noncombustible construction.
3) (Tom) The type of sprinkler system. (Will the building be equipped with Automatic Sprinkler Protection?)
4) The estimated maximum occupancy limit for ARC during a typical day. In progress. Am waiting on final occupancy calc's from Judy. Can this one wait till we have real numbers?

Should you have any questions please do not hesitate to contact me or Jim.

Yours truly,

Ding Bang (Winston) Yang, P.Eng.
Project Engineer
Infrastructure

T+ 1 613-690-0538

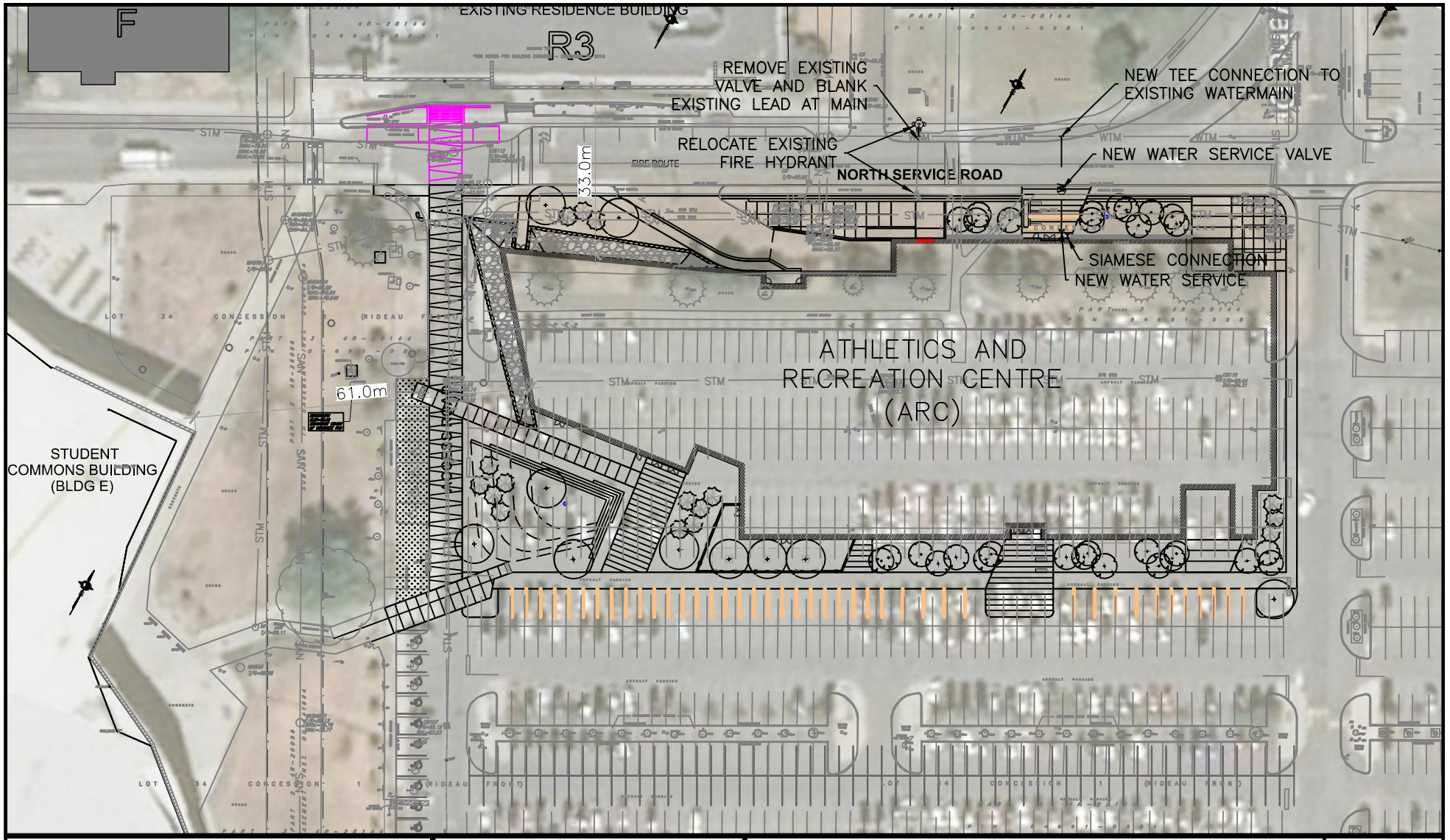
2611 Queensview Drive, Suite 300
Ottawa, Ontario,
K2B 8K2, Canada

www.wsp.com

NOTICE: This communication and any attachments ("this message") may contain information which is privileged, confidential, proprietary or otherwise subject to restricted disclosure under applicable law. This message is for the sole use of the intended recipient(s). Any unauthorized use, disclosure, viewing, copying, alteration, dissemination or distribution of, or reliance on, this message is strictly prohibited. If you have received this message in error, or you are not an authorized or intended recipient, please notify the sender immediately by replying to this message, delete this message and all copies from your e-mail system and destroy any printed copies. You are receiving this communication because you are listed as a current WSP contact. Should you have any questions regarding WSP's electronic communications policy, please consult our Anti-Spam Commitment at www.wsp.com/casl. For any concern or if you believe you should not be receiving this message, please forward this message to caslcompliance@wsp.com so that we can promptly address your request. Note that not all messages sent by WSP qualify as commercial electronic messages.

AVIS : Ce message, incluant tout fichier l'accompagnant (« le message »), peut contenir des renseignements ou de l'information privilégiés, confidentiels, propriétaires ou à divulgation restreinte en vertu de la loi. Ce message est destiné à l'usage exclusif du/des destinataire(s) voulu(s). Toute utilisation non permise, divulgation, lecture, reproduction, modification, diffusion ou distribution est interdite. Si vous avez reçu ce message par erreur, ou que vous n'êtes pas un destinataire autorisé ou voulu, veuillez en aviser l'expéditeur immédiatement et détruire le message et toute copie électronique ou imprimée. Vous recevez cette communication car vous faites partie des contacts de WSP. Si vous avez des questions concernant la politique de communications électroniques de WSP, veuillez consulter notre Engagement anti-pourriel au www.wsp.com/lcap. Pour toute question ou si vous croyez que vous ne devriez pas recevoir ce message, prière de le transférer au conformitelcap@wsp.com afin que nous puissions rapidement traiter votre demande. Notez que ce ne sont pas tous les messages transmis par WSP qui constituent des messages électroniques commerciaux.

-LAEmHhHzdJzBITWfa4Hgs7pbKI



wsp

300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM

PROJECT:
ATHLETICS AND RECREATION CENTRE (ARC)

ALGONQUIN COLLEGE
OTTAWA, ON K2G 1V8

PROJECT NO.: 191-01517-00

DRAWING NAME:
SITE LOCATION

DESIGNED BY: D.B.Y.

DRAWN BY: D.B.Y.

DATE: 2019-06-14

REVIEWED BY: D.B.Y.

SCALE: NTS

SHEET: SK1

Fire Flow Design Sheet (FUS)
Athletics and Recreation Centre (ARC)
Algonquin College
City of Ottawa
WSP Project No. 191-01517-00
Date: 14-Jun-19

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 1999

1. An estimate of the Fire Flow required for a given fire area may be estimated by: $F = 220\ C\ \sqrt{A}$

F = required fire flow in litres per minute
C = coefficient related to the type of construction
- 1.5 for wood construction (structure essentially combustible)
- 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
- 0.8 for noncombustible construction (unprotected metal structural components, masonry or metal walls)
- 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = total floor area in square metres (including all storeys, but excluding basements at least 50% below grade)

A = 11658 m^2
C = 0.8
F = 19003.1 L/min

rounded off to 19,000 L/min (min value of 2000 L/min)

2. The value obtained in 1. may be reduced by as much as 25% for occupancies having a low contents fire hazard.

Non-combustible	-25%
Limited Combustible	-15%
Combustible	0%
Free Burning	15%
Rapid Burning	25%

Reduction due to low occupancy hazard -25% x 19,000 = -4,750 L/min

3. The value obtained in 2. may be reduced by as much as 50% for buildings equipped with automatic sprinkler protection.

Adequate Sprinkler confirms to NFPA13	-30%
Water supply common for sprinklers & fire hoses	-10%
Fully supervised system	-10%
No Automatic Sprinkler System	0%

Reduction due to Sprinkler System -50% x 14,250 = -7,125 L/min

4. The value obtained in 2. is increased for structures exposed within 45 metres by the fire area under consideration.

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

Side 1	33	5%	north side
Side 2	300	0%	east side
Side 3	110	0%	south side
Side 4	61	0%	west side
		5%	(Total shall not exceed 75%)

Increase due to separation 5% x 14,250 = 713 L/min

5. The flow requirement is the value obtained in 2., minus the reduction in 3., plus the addition in 4.

The fire flow requirement is 8,000 L/min (Rounded to nearest 1000 L/min)
or **133 L/sec**
or 2,113 gpm (us)
or 1,760 gpm (uk)

Based on method described in:
"Water Supply for Public Fire Protection - A Guide to Recommended Practice", 1991
by Fire Underwriters Survey

Water Demand Calculation Sheet

Project:	**Athletics and Recreation Centre (ARC)**	**Date:**	**14/06/2019**
Location:	**Algonquin College, City of Ottawa**	**Design:**	**WY**
WSP Project No.	**191-01517-00**	**Page:**	**1 of 1**

Proposed Buildings	Residential				Non-Residentail			Average Daily			Maximum Daily			Maximum Hourly			Fire
	Units			Beds	Industrial	Institutional	Commercial	Demand (l/s)			Demand (l/s)			Demand (l/s)			Demand
	SF	APT	ST		(ha)	(ha)	(ha)	Res.	Non-Res.	Total	Res.	Non-Res.	Total	Res.	Non-Res.	Total	(l/min)
Athletics and Recreation Centre (ARC)						1.12			0.72	0.72		1.09	1.09		1.96	1.96	8,000

Population Densities

Single Family	3.4	person/unit
Semi-Detached	2.7	person/unit
Duplex	2.3	person/unit
Townhome (Row)	2.7	person/unit
Bachelor Apartment	1.4	person/unit
1 Bedroom Apartment	1.4	person/unit
2 Bedroom Apartment	2.1	person/unit
3 Bedroom Apartment	3.1	person/unit
4 Bedroom Apartment	4.1	person/unit
Avg. Apartment	1.8	person/unit

Average Daily Demand

Residentail	280	l/cap/day
Industrial	35000	l/ha/day
Institutional	28000	l/ha/day
Commercial	28000	l/ha/day

Maximum Daily Demand

Residential	2.5	x avg. day
Industrial	1.5	x avg. day
Institutional	1.5	x avg. day
Commercial	1.5	x avg. day

Maximum Hourly Demand

Residential	2.2	x max. day
Industrial	1.8	x max. day
Institutional	1.8	x max. day
Commercial	1.8	x max. day

Typical Operating Hours for Athletics and Recreation Centre will be 16 hours/day

Average Daily Demand for the Athletics and Recreation Centre will be increased by a factor of 16/8

Instituional 56000 l/ha/day

APPENDIX

APPENDIX

C

- STORMWATER MANAGEMENT MEMO BY WSP
- STORM SEWER DESIGN SHEET
- POST-DEVELOPMENT STORM DRAINAGE AREA PLAN C05
- PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN FIGURE 2
- GRADING PLAN C03
- SERVICING PLAN C04
- STORMTECH CHAMBERS MC-3500
- STORMCEPTOR STC-750
- DECLARATION LETTER BY CERTIFIED MECHANICAL ENGINEER

MEMO

TO: Jim Johnston, Winston Yang - WSP

FROM: Ben Worth

SUBJECT: **Algonquin College ARC – Stormwater Management Strategy**

DATE: **December 18, 2019**

Please read this document in conjunction with the WSP comment responses memo to the City (dated December 2019).

Note that the following revisions have been made to the proposed SWM modelling analysis since the previous City submission:

- *Updating volumes available within proposed infiltration chamber to reflect the final proposed design (per details received from StormTech/ADS).*
- *Small modifications to elevations of outlet controls from the infiltration chamber to ensure consistency with proposed design, and minor revision to HydroVex valve specification.*
- *Adding storage node in sub-catchment A-8 to specifically calculate anticipated ponding depth above CB11 (which had previously been aggregated with infiltration storage chamber volume), per City comment request.*

INTRODUCTION

This memo is provided to document the proposed stormwater management (SWM) strategy for the Algonquin College Athletics and Recreation Centre (ARC) project.

The subject site is located on the Algonquin College campus, south off Navajo Drive, immediately east of the Student Commons Building.

Suite 300
2611 Queensview Drive
Ottawa, ON, Canada K2B 8K2

T: +1 613 829-2800
F: +1 613 829-8299
wsp.com

EXISTING CONDITIONS

In existing conditions, the subject site consists of an asphalt-surfaced parking lot and grassed verge area adjacent to Navajo Drive. There is an existing storm sewer system draining northward along the western edge of the subject site, and westward within Navajo Drive. Surface grades currently drain runoff to the north and west, and there is an existing overland flow path running northward toward Navajo Drive along the west edge of the site. Please refer to the Stantec topographic survey, 2019, for illustration of existing conditions.

The Geotechnical Engineer on the project (Paterson Group Consulting Engineers) provided a Subsoil Infiltration Review memo (dated March 5, 2019), which analyzed borehole results and geotechnical investigations, and concluded that a design infiltration rate for the soils on site would lie within the range of 7 to 26 mm/hour. These results were also supplemented by onsite permeameter testing, which calculated infiltration rates of 9.5 to 20.5 mm/hour (per Paterson memo, dated July 25, 2019). These values indicate that an infiltration-based SWM system is feasible.

Additional Geotechnical investigations were also completed on site recently to establish design groundwater elevations (per Paterson memo, dated September 16, 2019). This memo states that long-term groundwater level is anticipated at a depth of 4 to 5 m. Using a conservative value here, and based on the location of test pits, a design groundwater elevation of 81.5 m was deemed suitable for design of SWM features.

PROPOSED CONDITIONS

The proposed ARC facility includes a multi-level athletics and recreation building in the northern part of the site, surrounded by reconfigured hard and soft landscaped areas, and a re-graded parking lot area to the south.

The primary offsite storm drainage connection will be from the south-west corner of the site, to the existing storm sewer that runs northward within the access road. Several local CB connections are also proposed along the north side of the site from landscaped areas out to the existing storm sewer system. The existing storm sewers along the west and north sides of the building combine at the northwest corner of the building, and then discharge to a municipal storm trunk sewer located in an easement to the west of the proposed building site.

The existing overland flow path running northward along the western edge of the site will be maintained unaffected in post-development conditions.

DESIGN CRITERIA

As confirmed by City of Ottawa staff during the pre-consultation process, the project is subject to the requirements of the *SWM Guidelines for the Pinecrest Creek/Westboro Area* (JFSA, on behalf of the City of Ottawa, ref. June 2012 “Final Draft” document). Key criteria applicable to the ARC project are summarized below.

Excerpt from Table 3.1 (SWM Guidelines for the Pinecrest Creek/Westboro Area):

COMMERCIAL/INSTITUTIONAL AND INDUSTRIAL DEVELOPMENTS - DISCHARGING UPSTREAM OF THE OTTAWA RIVER PARKWAY PIPE (ORPP) INLET			
Runoff Volume Reduction	**Water Quality TSS Removal**	**Water Quantity Flood Flow Mgmt.**	**Water Quantity Erosion Control**
A minimum on-site retention of the 10 mm design storm; refer to LID references for guidance on prudent approach to planning infiltration-based LID best management practices.	*On-site removal of 80% of TSS; some of which would be accomplished by on-site retention of first 10 mm of rainfall and detention of the 25 mm design storm.*	*The more stringent of the following criteria will govern: (i) 1:100 year discharge from site not to exceed 33.5 L/s/ha) or; (ii) Requirements of City of Ottawa Sewer Design Guidelines.*	*Control (detain) the runoff from the 25 mm design storm such that the peak outflow from the site does not exceed 5.8 L/s/ha.*

PROPOSED SWM STRATEGY

OVERVIEW

Please refer to engineering drawings C04 and C05 for details of the SWM system proposed to achieve compliance with the applicable design criteria. Key features of the system include:

- Controlled flow rooftop drains (Watts Adjustable Accutrol units, or similar) to utilize storage available on the rooftop and limit discharge rates.
- Bio-retention features in soft landscaped areas surrounding the proposed building (CB overflows set 150 mm above base of depressed landscape area).
- A stormwater infiltration retention/detention chamber below the proposed parking lot area to achieve target flow controls and runoff retention targets.

It should be noted that as part of the College's sustainability strategy for the development, the proposed SWM system has been designed to achieve compliance with the Rainwater Management LEED credits (BD+C: New Construction, v4.1), which requires on-site retention and treatment beyond the requirements set out by the *SWM Guidelines for the Pinecrest Creek/Westboro Area* targets.

CATCHMENT ANALYSIS

The appended **Table 1** summarizes the sub-catchment area breakdown in proposed conditions. It should be read in conjunction with Drawing C05 (Post-Development Storm Drainage Area Plan).

Based on the total application site area of 1.557 ha, the applicable peak discharge targets are established as follows:

- Flood Flow Management: 100-year event controlled to 33.5 L/sec/ha: **52.2 l/sec**
- Erosion Control: 25mm design storm peak controlled to 5.8 l/sec/ha: **9.0 l/sec**

MODELLING & ANALYSIS

RUNOFF VOLUME REDUCTION

The runoff retention targets are achieved through provision of localized, depressed bio-retention features in soft landscaping areas in conjunction with a large, centralized sub-surface infiltration

chamber below the parking lot, which provides sufficient retention volume for impervious surfaces across the site.

The rightmost columns in **Table 1** summarize the applicable retention volumes (for both the City's Pinecrest Creek/Westboro criteria, and the targeted LEED credits).

Bio-retention features are proposed in each soft landscaped area; providing a total of 6.7 m^3 within catchments A4, A6, A12, A13, and A22. These volumes will be provided by depressing the finished surface locally, and elevating CB grate outflows by 150 mm from the base elevation of the area. Where feasible (and consistent with landscaping strategy), it is recommended that an amended topsoil mix be provided in each of these areas to promote infiltration.

The centralized infiltration chamber shall provide a total minimum retention volume of 339 m^3 below the level of the gravity outflow pipe. Additional volume will be provided as active storage (above the outflow elevation) to meet target peak flow control rates, as described further in subsequent sections of this memo. Please refer to Drawing C04 for proposed details of the chamber.

The total retention volume provided on site is 345.7 m^3. Minimum target to satisfy the *SWM Guidelines for the Pinecrest Creek/Westboro Area* is 155.7 m^3. As noted previously, the proposed strategy exceeds minimum requirements significantly given that LEED Rainwater Management credits are being targeted as part of the project's sustainability strategy.

Note that the previously established design groundwater elevation (81.5 m) was referenced in the design of the sub-surface chamber, and a minimum clearance of 1.0 m from the base of the chamber to the groundwater elevation has been provided—in accordance with best practice LID design approaches.

WATER QUALITY

The target water quality criteria (on-site treatment/removal of 80% of total suspended solids, TSS) will be achieved via significant runoff retention on site (up to 22.2 mm per LEED strategy), supplemented by an Oil-Grit Separator (OGS) unit at the primary storm drainage outlet, downstream of the infiltration chamber.

As noted in the *SWM Guidelines for the Pinecrest Creek/Westboro Area*, meeting the required retention targets in conjunction with detention of the 25 mm storm event (per Water Quantity Erosion Control criteria, discussed in the subsequent section) will provide significant water quality benefits. Provision of an OGS unit (specified to provide 80% TSS removal) in addition to these features is considered sufficient to meet water quality treatment requirements.

WATER QUANTITY

As noted previously, the *SWM Guidelines for the Pinecrest Creek/Westboro Area* set two separate targets for control of peak runoff rates; 52.2 l/sec for 100-year flood flow management, and 9.0 l/sec for erosion control detention of a 25 mm storm event.

Proposed features to achieve these targets include;

- Rooftop flow control drains to utilize storage on roof areas.
- Active storage within infiltration retention/detention chamber below parking lot, with vortex flow control device on outlet.

A HydroCAD model has been developed to simulate performance of the proposed system, and establish the necessary storage volumes and flow control rates required to meet the applicable design criteria. Full model results for each storm analysed are appended to this memo.

In accordance with City requirements, the storms analysed were:

1. SCS Type II 100-year, 24-hour event (defined as per Ottawa Sewer Design Guidelines)
2. 4-hour, 25mm depth event (Chicago Storm distribution)

The HydroCAD model was set up using the SCS TR-20 method to generate runoff hydrographs from each sub-catchment. Sub-catchments were created as per area takeoffs described in Table 1, and all areas were defined using appropriate Curve Numbers (CN)—values of 98 for all impervious (asphalt/rooftop areas), and reduced values to represent soft landscaped areas. Storage areas were defined using "pond" nodes in the model, with appropriate stage-storage relationships based on the volumes available in each area. Outflow controls from each storage node were defined using appropriate rating curves—i.e. catchbasin rating curves in most areas, and use of a HydroVex vortex control valve on the outlet of the infiltration retention/detention chamber.

Rooftop storage has been defined based on the average area available per roof drain, up to a maximum depth of 150 mm. Rating curves based on the proposed rooftop flow control drains have been used, and the number of drain outlets has been coordinated with architectural plans (12 no. outlets within roof sub-catchment A-15, 19 no. within A-16, and 14 no. within A-17).

It is assumed that all storage volumes within the site are empty at the start of each storm event analysed.

Per Table 1, two uncontrolled drainage areas have been included in the model; A-18 and A-19. Given grading constraints it has not been possible to configure the drainage system to collect runoff at these locations around the edge of the site, and runoff from these areas will therefore drain directly offsite onto surrounding lands. These uncontrolled areas are included in the analysis however, and the proposed system over-controls as required to ensure net runoff rates (including discharge from the uncontrolled areas) complies with the applicable targets.

The model was developed and tested in an iterative manner, to determine the necessary storage volumes and flow control rates from individual features. A summary of the minimum requirements follows:

- The infiltration retention/detention chamber shall provide a total minimum volume of 525 m^3 (configured with 339 m^3 below the level of the outlet, per runoff retention requirements) and the remainder as active storage above the outlet elevation.
- Outflow from the infiltration chamber shall be controlled with a Hydrovex 200-VHV-2 vortex flow control valve (or similar).
- Rooftop drainage outlets shall be Watts Adjustable Accutrol units (or similar), set to weir fully closed position for constant 5 GPM (0.32 l/sec) outflow, up to maximum head of 150 mm.

The model was then updated to reflect the proposed dimensions of the infiltration chamber (which exceeds the minimum volumes required), based on design layouts provided by StormTech/ADS. The final design has a total chamber volume of 637 m^3 (versus target minimum of 525 m^3), with 343 m^3 provided below the level of the outlet for retention (versus minimum target of 339 m^3).

The model results demonstrate that the proposed system achieves a net 100-year peak runoff rate of 50.2 l/sec, which is within the target rate of 52.2 l/sec.

Results of the 4-hour, 25 mm event show a net peak runoff rate from the site of 10.8 l/sec. It is acknowledged that this is above the target release rate of 9.0 l/sec, however in this situation the runoff leaving site is solely from the uncontrolled areas (A-18 and A-19), and the landscaped areas along the northern edge of the site which have limited control opportunities. All other areas are providing full retention of the rainfall volume. On this basis, the system is considered compliant with the *intent* of the criteria, and performance is functionally equivalent to the desired outcome.

SURFACE PONDING

To determine peak ponding depths at catchbasin (CB) locations on the surface, reference has been made to model output at each respective storage node. As noted above, ponding depths have been simulated in the model at each CB location by routing runoff from the contributing sub-catchment area to a storage node defined with a stage-storage relationship describing ponding volume available on the surface (based on proposed grading), and with outflow controlled by a stage-discharge rating curve based on a standard 600 mm square CB grate (per City of Ottawa standards).

The model results provide maximum water depths at each location, and these depths have been converted to ponding elevation for plotting maximum anticipated extents of ponding on the Civil Grading Plan. Results are provided for the 100-year event, as well as a 100-year plus 20% stress test event, as requested.

LEED RAINWATER MANAGEMENT

As noted previously, the sustainability strategy developed for the project has targeted compliance with the requirements of the LEED Sustainable Sites credit for Rainwater Management (BD+C: New Construction, v4.1). This credit offers points based on the proportion of rainfall retained on site ("infiltrate, evapotranspirate, or collect and reuse"); 1 point for the 80th percentile, 2 points for the 85th percentile, and 3 points for the 90th percentile.

Statistical analysis of daily rainfall data (from the Ottawa Macdonald–Cartier International Airport)—undertaken per the US EPA methodology referenced in LEED documentation—indicates that the 90th percentile rainfall depth in the Ottawa area is 22.2 mm. The SWM strategy has been developed to provide full retention of this rainfall depth in accordance with credit requirements. Full details will be provided as part of the LEED submission to the CaGBC in due course.

CONCLUSIONS

The proposed SWM strategy for the Algonquin College ARC facility, as described above in this memo—and per modelling analysis appended—complies with the SWM requirements of the City of Ottawa (as defined in the *SWM Guidelines for the Pinecrest Creek/Westboro Area*) with regard to Runoff Volume Reduction, Water Quality, and Water Quantity (for both Flood Flow Management and Erosion Control Detention criteria). Runoff volume reduction targets are exceeded significantly due to project targeting the Rainwater Management LEED credits (BD+C: New Construction, v4.1), which requires on-site retention and treatment beyond the requirements set out by the *SWM Guidelines for the Pinecrest Creek/Westboro Area* targets.



Respectfully submitted,

Ben Worth, P.Eng.
Manager, Water Resources

Appended:

- *Table 1: Sub-Catchment Breakdown & Runoff Retention Summary*
- *HydroCAD Model Output (Chicago 4hr-25mm & SCS II 24hr-100yr events)*
- *Hydrovex VHV Selection Chart (annotated)*
- *Watts Accutrol Roof Drain Specification Sheet*

Table 1 – Sub-Catchment Breakdown & Runoff Retention Summary

REF.	CATCHMENT AREA (HA)	RUNOFF COEFFICIENT	DISCHARGE LOCATION	RUNOFF RETENTION VOLUME TARGETS (M^3)		RUNOFF RETENTION VOLUMES PROVIDED (M^3)	
				10mm (City)	22.2mm (90th percentile LEED)	Bio-Retention Features	Centralized Infiltration Chamber
A1	0.111	0.88	To chamber	11.1	24.6		24.6
A2	0.148	0.87	To chamber	14.8	32.9		32.9
A3	0.120	0.90	To chamber	12.0	26.6		26.6
A4	0.017	0.25	Bio-retention, then to chamber	1.7	3.8	1.4	2.4*
A5	0.076	0.90	To chamber	7.6	16.9		16.9
A6	0.018	0.25	Bio-retention, then to chamber	1.8	4.0	1.9	2.1*
A7	0.065	0.90	To chamber	6.5	14.4		14.4
A8	0.073	0.41	To chamber	7.3	16.2		16.2
A9	0.022	0.25	Surface ponding, then offsite	2.2	4.9		4.9
A10	0.021	0.37	Surface ponding, then offsite	2.1	4.7		4.7
A11	0.055	0.90	Offsite via A-10	5.5	12.2		12.2
A12	0.011	0.25	Bio-retention, then offsite	1.1	2.4	0.9	1.6*
A13	0.011	0.25	Bio-retention, then offsite	1.1	2.4	2.1	0.4*
A14	0.005	0.90	Offsite via A-13	0.5	1.1		1.1
A15	0.221	0.90	Rooftop control, then to chamber	22.1	49.1		49.1
A16	0.253	0.90	Rooftop control, then to chamber	25.3	56.2		56.2
A17	0.198	0.90	Rooftop control, then to chamber	19.8	44.0		44.0
A18	0.101	0.75	Uncontrolled offsite	10.1	22.4		22.4
A19	0.018	0.45	Uncontrolled offsite	1.8	4.0		4.0
A20	(deleted)						-
A21	(deleted)						-
A22	0.013	0.25	Bio-retention, then to chamber	1.3	2.9	0.4	2.5*
	1.557	**0.81**		155.7	345.7	6.7	339.0
						345.7	

** Total cistern retention volume includes an additional 8.9 m^3 to offset shortfall from retention volumes available within individual bio-retention features, to ensure compliance with site-wide LEED target.*

Suite 300
2611 Queensview Drive
Ottawa, ON, Canada K2B 8K2

T: +1 613 829-2800
F: +1 613 829-8299
wsp.com

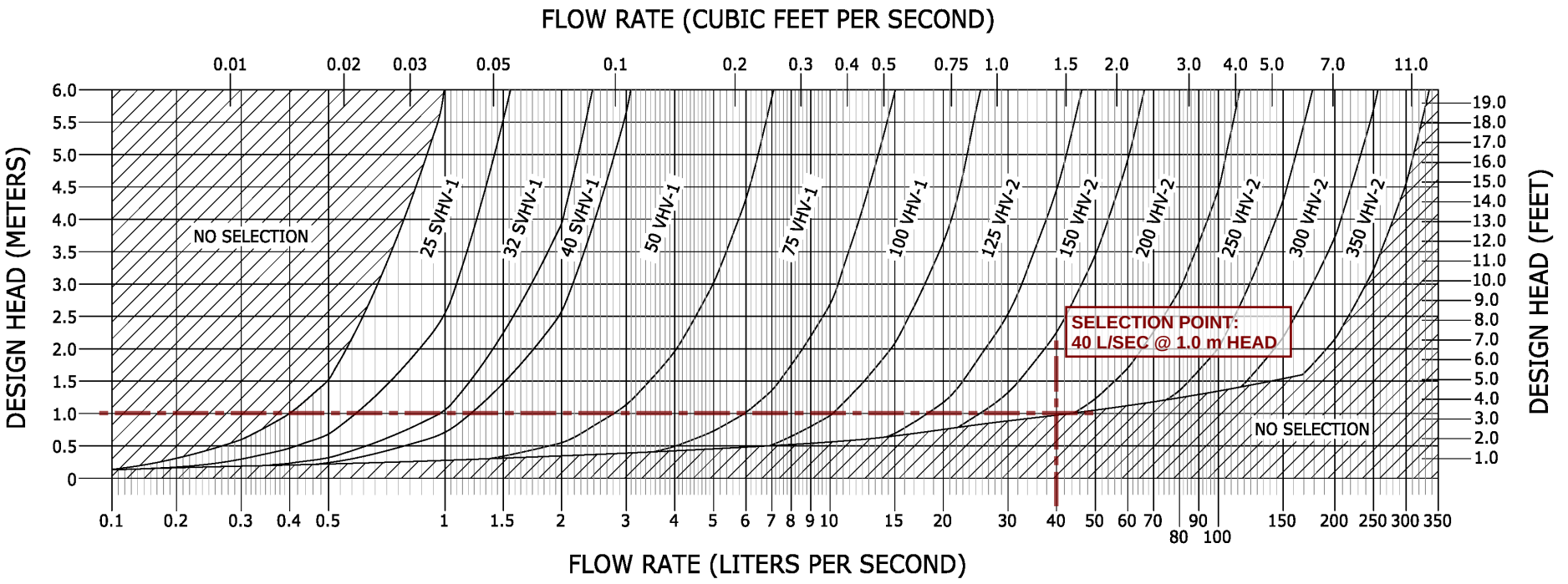


Figure 3 : HYDROVEX® VHV/SVHV Selection Chart

WATTS®	Adjustable Accutrol Weir Tag: _____	Adjustable Flow Control for Roof Drains

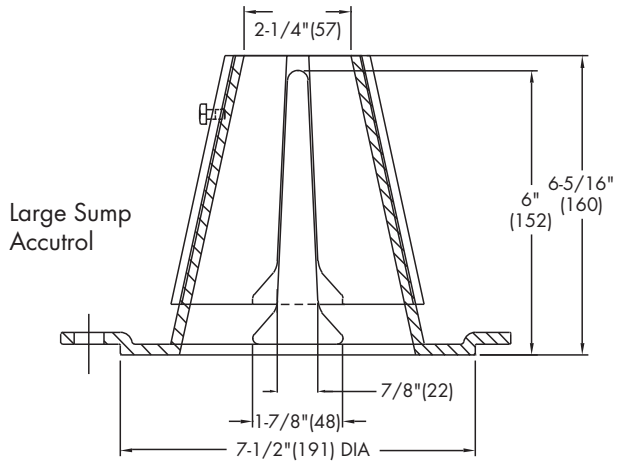
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

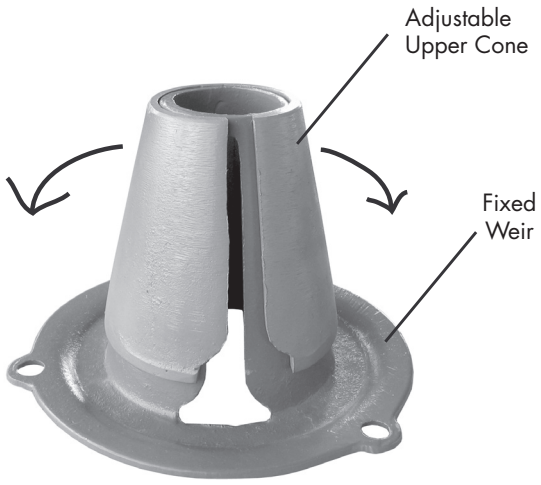
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name _____ Contractor _____

Job Location _____ Contractor's P.O. No. _____

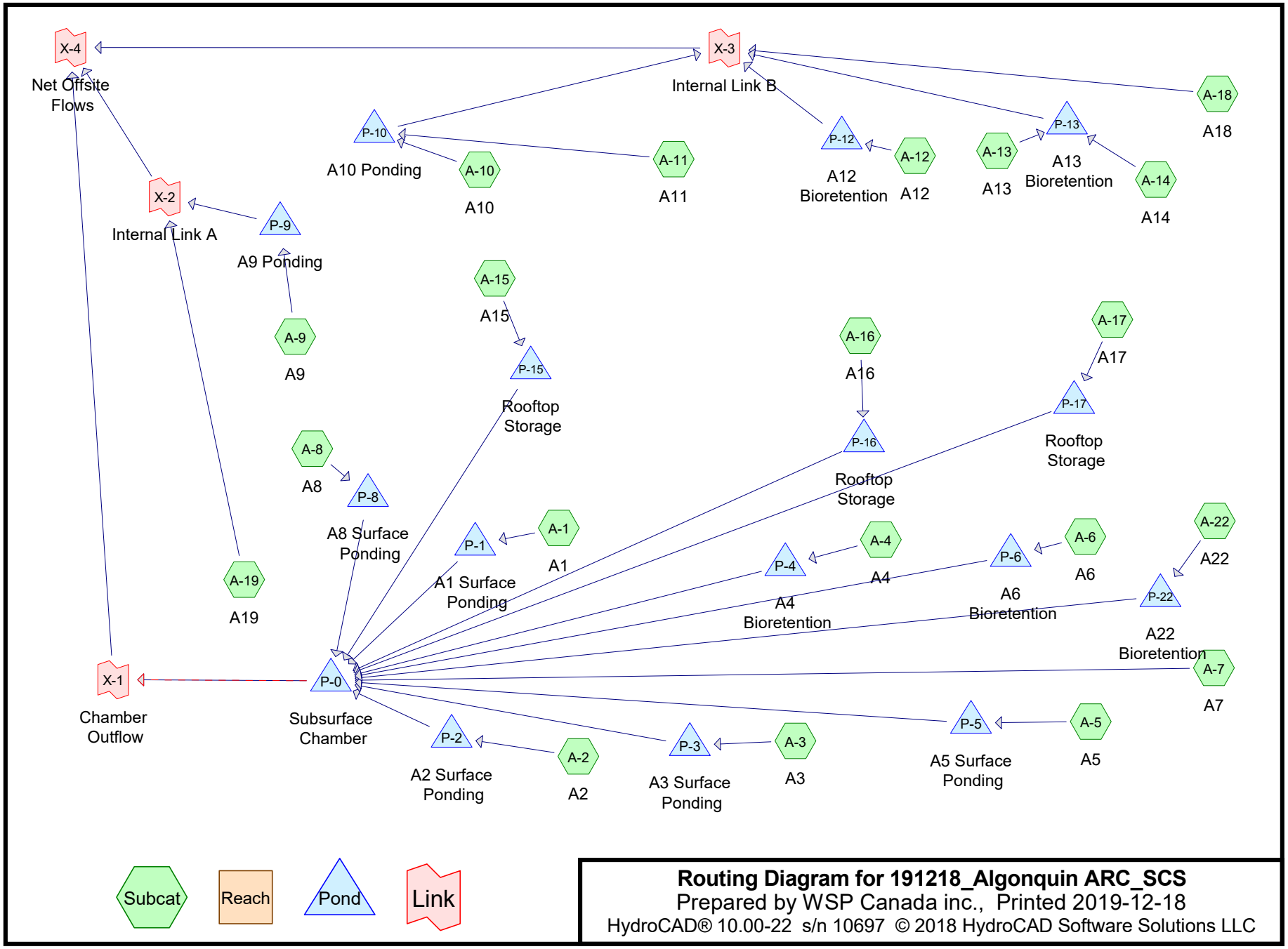
Engineer _____ Representative _____

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

WATTS®
A Watts Water Technologies Company

USA: Tel: (800) 338-2581 • Fax: (828) 248-3929 • Watts.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • Watts.ca
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091 • Watts.com

© 2016 Watts



Routing Diagram for 191218_Algonquin ARC_SCS

Prepared by WSP Canada inc., Printed 2019-12-18

HydroCAD® 10.00-22 s/n 10697 © 2018 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A-1: A1 Runoff Area=0.1110 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01340 m³/s 112.1 m³

Subcatchment A-10: A10 Runoff Area=0.0210 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00153 m³/s 11.8 m³

Subcatchment A-11: A11 Runoff Area=0.0550 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00664 m³/s 55.6 m³

Subcatchment A-12: A12 Runoff Area=0.0110 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00080 m³/s 6.2 m³

Subcatchment A-13: A13 Runoff Area=0.0110 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00080 m³/s 6.2 m³

Subcatchment A-14: A14 Runoff Area=0.0050 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00060 m³/s 5.1 m³

Subcatchment A-15: A15 Runoff Area=0.2210 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.02669 m³/s 223.3 m³

Subcatchment A-16: A16 Runoff Area=0.2530 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.03055 m³/s 255.6 m³

Subcatchment A-17: A17 Runoff Area=0.1980 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.02391 m³/s 200.0 m³

Subcatchment A-18: A18 Runoff Area=0.1010 ha 0.00% Impervious Runoff Depth=90 mm
Tc=10.0 min CN=94 Runoff=0.01145 m³/s 90.6 m³

Subcatchment A-19: A19 Runoff Area=0.0180 ha 0.00% Impervious Runoff Depth=70 mm
Tc=10.0 min CN=86 Runoff=0.00163 m³/s 12.5 m³

Subcatchment A-2: A2 Runoff Area=0.1480 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01787 m³/s 149.5 m³

Subcatchment A-22: A22 Runoff Area=0.0130 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00095 m³/s 7.3 m³

Subcatchment A-3: A3 Runoff Area=0.1200 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.01449 m³/s 121.2 m³

Subcatchment A-4: A4 Runoff Area=0.0170 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00124 m³/s 9.6 m³

Subcatchment A-5: A5 Runoff Area=0.0760 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00918 m³/s 76.8 m³

Subcatchment A-6: A6 Runoff Area=0.0180 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00131 m³/s 10.1 m³

Subcatchment A-7: A7 Runoff Area=0.0650 ha 100.00% Impervious Runoff Depth=101 mm
Tc=10.0 min CN=98 Runoff=0.00785 m³/s 65.7 m³

Subcatchment A-8: A8 Runoff Area=0.0730 ha 0.00% Impervious Runoff Depth=70 mm
Tc=10.0 min CN=86 Runoff=0.00663 m³/s 50.8 m³

Subcatchment A-9: A9 Runoff Area=0.0220 ha 0.00% Impervious Runoff Depth=56 mm
Tc=10.0 min CN=80 Runoff=0.00161 m³/s 12.4 m³

Pond P-0: Subsurface Chamber Peak Elev=84.118 m Storage=516.3 m³ Inflow=0.08634 m³/s 1,278.3 m³
Primary=0.03814 m³/s 935.3 m³ Secondary=0.00000 m³/s 0.0 m³ Outflow=0.03814 m³/s 935.3 m³

Pond P-1: A1 Surface Ponding Peak Elev=100.053 m Storage=2.6 m³ Inflow=0.01340 m³/s 112.1 m³
Outflow=0.01340 m³/s 112.1 m³

Pond P-10: A10 Ponding Peak Elev=100.041 m Storage=0.6 m³ Inflow=0.00815 m³/s 67.4 m³
Outflow=0.00813 m³/s 67.4 m³

Pond P-12: A12 Bioretention Peak Elev=100.154 m Storage=1.0 m³ Inflow=0.00080 m³/s 6.2 m³
Outflow=0.00080 m³/s 5.3 m³

Pond P-13: A13 Bioretention Peak Elev=100.157 m Storage=2.3 m³ Inflow=0.00140 m³/s 11.2 m³
Outflow=0.00139 m³/s 9.1 m³

Pond P-15: Rooftop Storage Peak Elev=200.144 m Storage=97.8 m³ Inflow=0.02669 m³/s 223.3 m³
Outflow=0.00378 m³/s 223.3 m³

Pond P-16: Rooftop Storage Peak Elev=200.137 m Storage=93.4 m³ Inflow=0.03055 m³/s 255.6 m³
Outflow=0.00630 m³/s 255.5 m³

Pond P-17: Rooftop Storage Peak Elev=200.142 m Storage=77.6 m³ Inflow=0.02391 m³/s 200.0 m³
Outflow=0.00441 m³/s 200.0 m³

Pond P-2: A2 Surface Ponding Peak Elev=100.058 m Storage=1.0 m³ Inflow=0.01787 m³/s 149.5 m³
Outflow=0.01787 m³/s 149.5 m³

Pond P-22: A22 Bioretention Peak Elev=100.155 m Storage=0.5 m³ Inflow=0.00095 m³/s 7.3 m³
Outflow=0.00095 m³/s 6.9 m³

Pond P-3: A3 Surface Ponding Peak Elev=100.054 m Storage=3.1 m³ Inflow=0.01449 m³/s 121.2 m³
Outflow=0.01448 m³/s 121.2 m³

Pond P-4: A4 Bioretention Peak Elev=100.156 m Storage=1.7 m³ Inflow=0.00124 m³/s 9.6 m³
Outflow=0.00122 m³/s 8.2 m³

Pond P-5: A5 Surface Ponding Peak Elev=100.046 m Storage=0.4 m³ Inflow=0.00918 m³/s 76.8 m³
Outflow=0.00916 m³/s 76.8 m³

Pond P-6: A6 Bioretention Peak Elev=100.156 m Storage=2.2 m³ Inflow=0.00131 m³/s 10.1 m³
Outflow=0.00127 m³/s 8.2 m³

Pond P-8: A8 Surface Ponding Peak Elev=100.032 m Storage=2.2 m³ Inflow=0.00663 m³/s 50.8 m³
Outflow=0.00643 m³/s 50.8 m³

Pond P-9: A9 Ponding Peak Elev=100.008 m Storage=0.2 m³ Inflow=0.00161 m³/s 12.4 m³
Outflow=0.00160 m³/s 12.4 m³

Link X-1: Chamber Outflow Inflow=0.03814 m³/s 935.3 m³
Primary=0.03814 m³/s 935.3 m³

Link X-2: Internal Link A Inflow=0.00323 m³/s 24.9 m³
Primary=0.00323 m³/s 24.9 m³

Link X-3: Internal Link B Inflow=0.02170 m³/s 172.5 m³
Primary=0.02170 m³/s 172.5 m³

Link X-4: Net Offsite Flows Inflow=0.05021 m³/s 1,132.7 m³
Primary=0.05021 m³/s 1,132.7 m³

Total Runoff Area = 15,570.0 m² Runoff Volume = 1,482.4 m³ Average Runoff Depth = 95 mm
19.59% Pervious = 3,050.0 m² 80.41% Impervious = 12,520.0 m²

Summary for Subcatchment A-1: A1

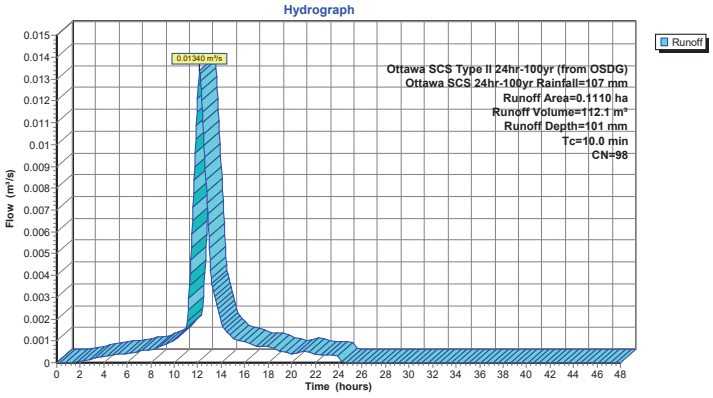
Runoff = 0.01340 m³/s @ 12.15 hrs, Volume= 112.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1110	98	
	0.1110		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-1: A1



Summary for Subcatchment A-10: A10

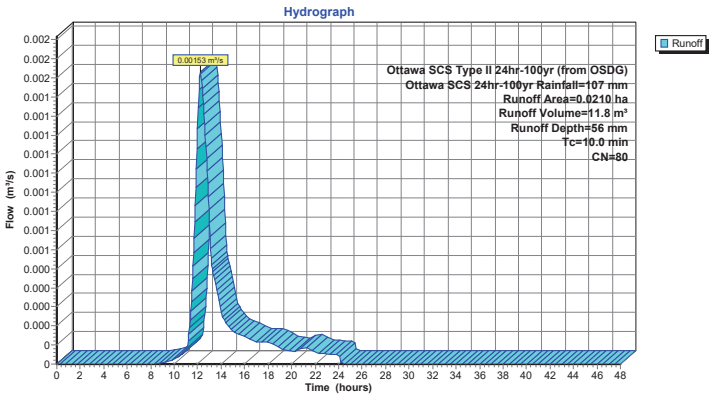
Runoff = 0.00153 m³/s @ 12.22 hrs, Volume= 11.8 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

Area (ha)	CN	Description
0.0210	80	
0.0210		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-10: A10



Summary for Subcatchment A-11: A11

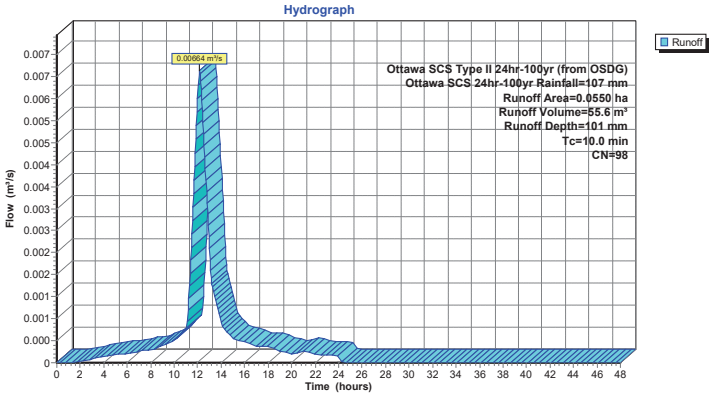
Runoff = 0.00664 m³/s @ 12.15 hrs, Volume= 55.6 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0550	98	
	0.0550		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-11: A11



Summary for Subcatchment A-12: A12

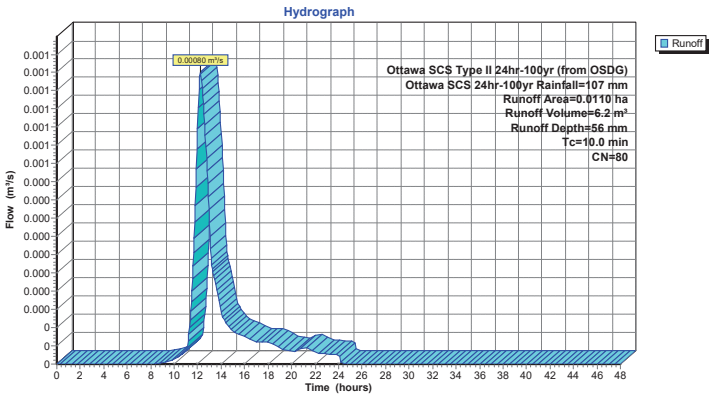
Runoff = 0.00080 m³/s @ 12.22 hrs, Volume= 6.2 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0110	80	
	0.0110		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-12: A12



Summary for Subcatchment A-13: A13

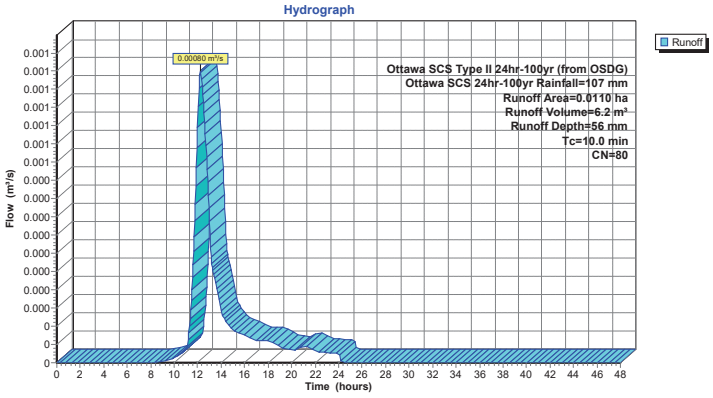
Runoff = 0.00080 m³/s @ 12.22 hrs, Volume= 6.2 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0110	80	
	0.0110		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-13: A13



Summary for Subcatchment A-14: A14

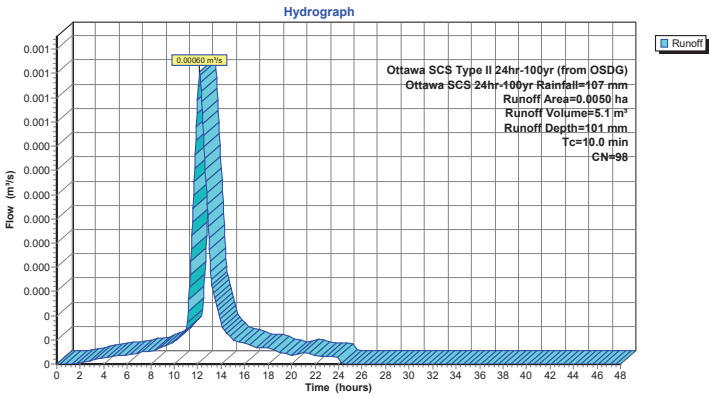
Runoff = 0.00060 m³/s @ 12.15 hrs, Volume= 5.1 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0050	98	
	0.0050		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-14: A14



Summary for Subcatchment A-15: A15

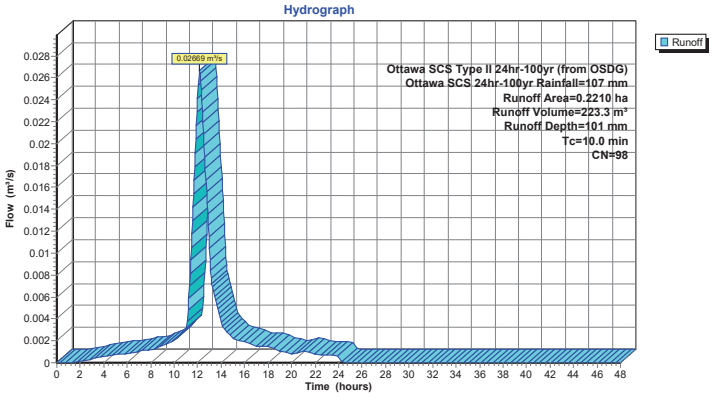
Runoff = 0.02669 m³/s @ 12.15 hrs, Volume= 223.3 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.2210	98	
	0.2210		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-15: A15



Summary for Subcatchment A-16: A16

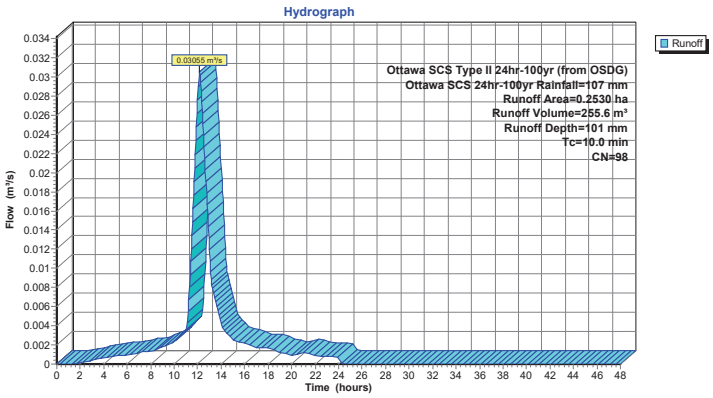
Runoff = 0.03055 m³/s @ 12.15 hrs, Volume= 255.6 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.2530	98	
	0.2530		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-16: A16



Summary for Subcatchment A-17: A17

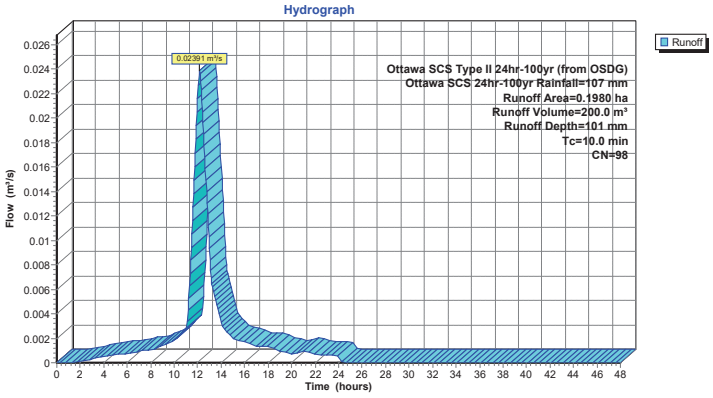
Runoff = 0.02391 m³/s @ 12.15 hrs, Volume= 200.0 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1980	98	
	0.1980		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-17: A17



Summary for Subcatchment A-18: A18

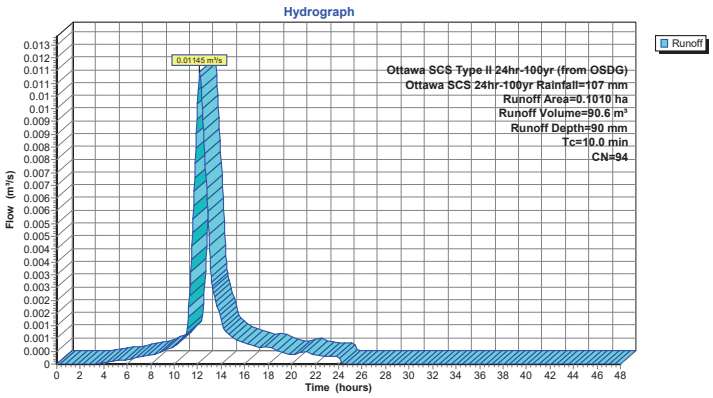
Runoff = 0.01145 m³/s @ 12.16 hrs, Volume= 90.6 m³, Depth= 90 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1010	94	
	0.1010		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-18: A18



Summary for Subcatchment A-19: A19

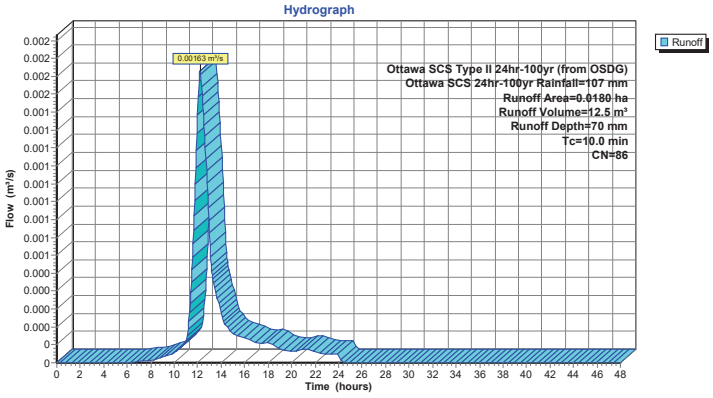
Runoff = 0.00163 m³/s @ 12.19 hrs, Volume= 12.5 m³, Depth= 70 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0180	86	
	0.0180		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-19: A19



Summary for Subcatchment A-2: A2

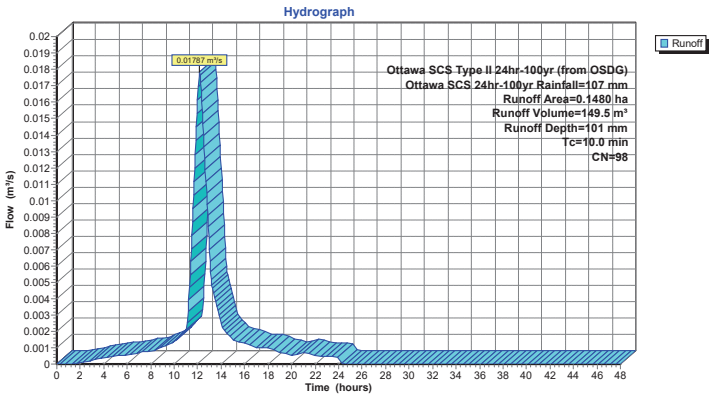
Runoff = 0.01787 m³/s @ 12.15 hrs, Volume= 149.5 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1480	98	
	0.1480		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-2: A2



Summary for Subcatchment A-22: A22

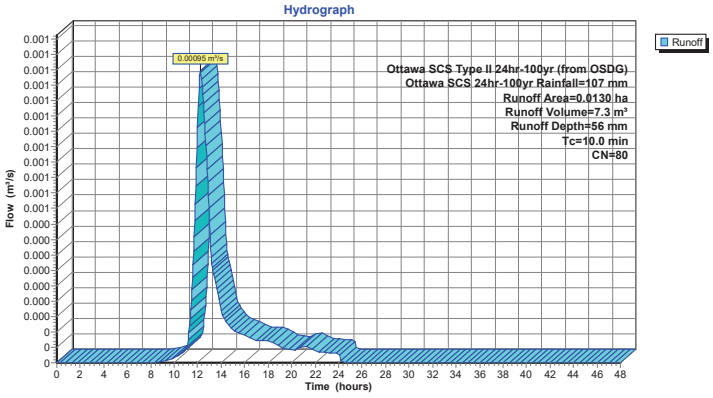
Runoff = 0.00095 m³/s @ 12.22 hrs, Volume= 7.3 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0130	80	
	0.0130		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-22: A22



Summary for Subcatchment A-3: A3

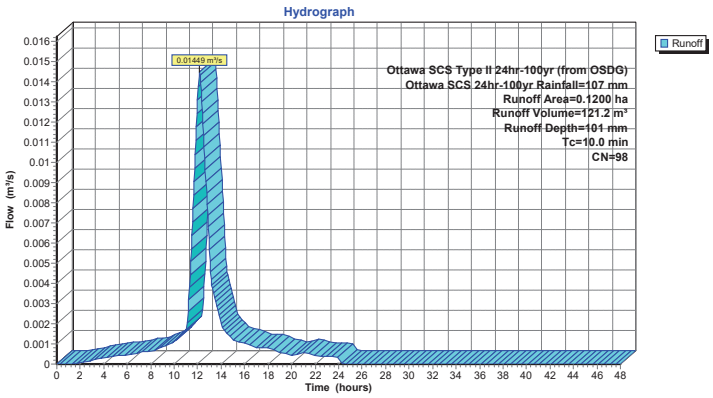
Runoff = 0.01449 m³/s @ 12.15 hrs, Volume= 121.2 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.1200	98	
	0.1200		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-3: A3



Summary for Subcatchment A-4: A4

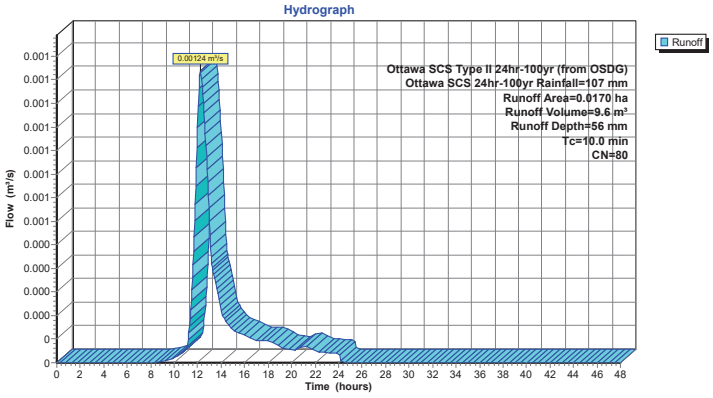
Runoff = 0.00124 m³/s @ 12.22 hrs, Volume= 9.6 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0170	80	
	0.0170		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-4: A4



Summary for Subcatchment A-5: A5

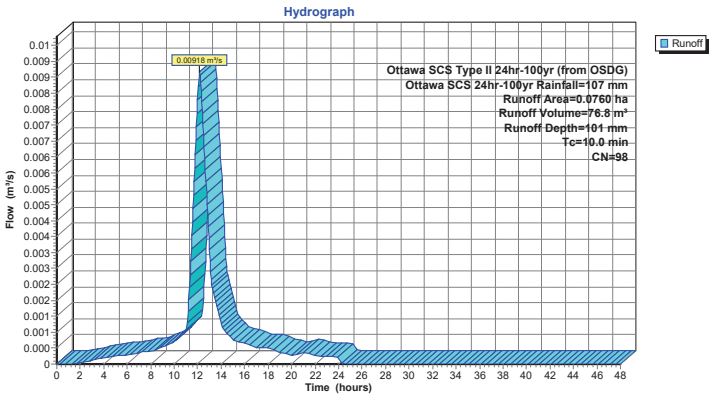
Runoff = 0.00918 m³/s @ 12.15 hrs, Volume= 76.8 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0760	98	
	0.0760		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-5: A5



Summary for Subcatchment A-6: A6

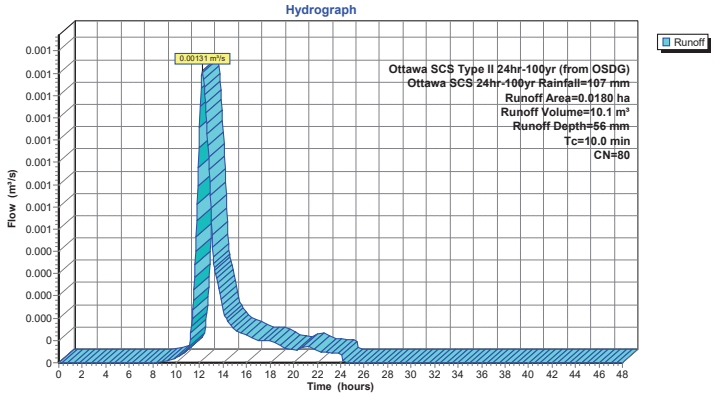
Runoff = 0.00131 m³/s @ 12.22 hrs, Volume= 10.1 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0180	80	
	0.0180		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-6: A6



Summary for Subcatchment A-7: A7

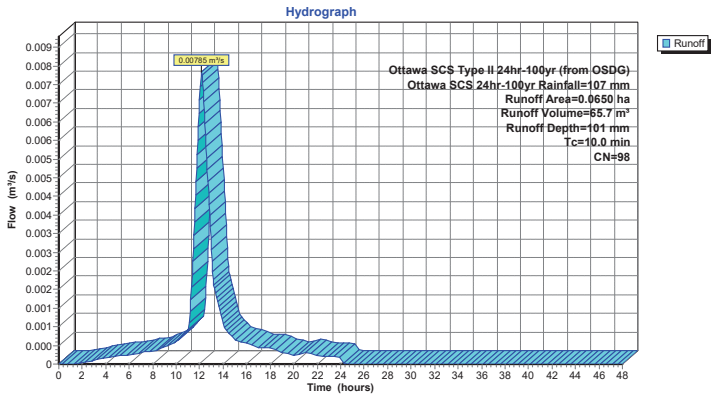
Runoff = 0.00785 m³/s @ 12.15 hrs, Volume= 65.7 m³, Depth= 101 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0650	98	
	0.0650		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-7: A7



Summary for Subcatchment A-8: A8

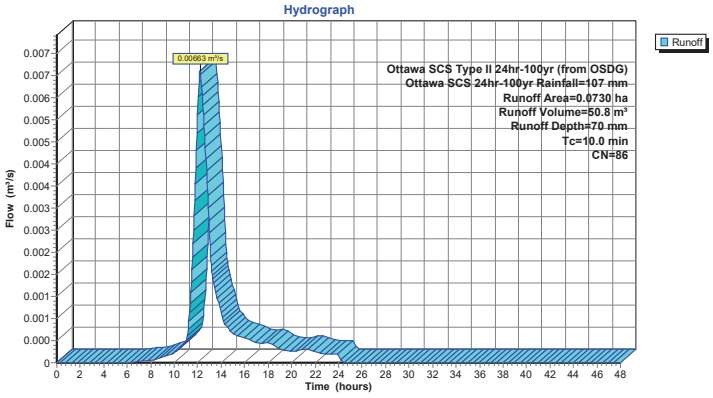
Runoff = 0.00663 m³/s @ 12.19 hrs, Volume= 50.8 m³, Depth= 70 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0730	86	
	0.0730		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-8: A8



Summary for Subcatchment A-9: A9

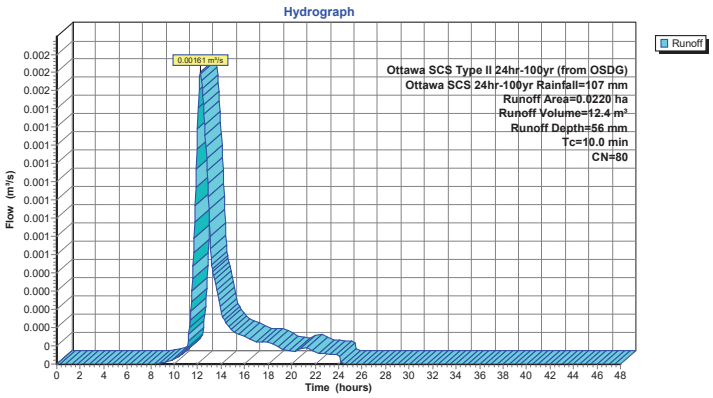
Runoff = 0.00161 m³/s @ 12.22 hrs, Volume= 12.4 m³, Depth= 56 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa SCS Type II 24hr-100yr (from OSDG) Ottawa SCS 24hr-100yr Rainfall=107 mm

	Area (ha)	CN	Description
*	0.0220	80	
	0.0220		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-9: A9



Summary for Pond P-0: Subsurface Chamber

Inflow Area = 13,130.0 m², 90.78% Impervious, Inflow Depth = 97 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.08634 m³/s @ 12.18 hrs, Volume= 1,278.3 m³
Outflow = 0.03814 m³/s @ 13.16 hrs, Volume= 935.3 m³, Atten= 56%, Lag= 58.5 min
Primary = 0.03814 m³/s @ 13.16 hrs, Volume= 935.3 m³
Secondary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 84.118 m @ 13.16 hrs Surf.Area= 0.0 m² Storage= 516.3 m³

Plug-Flow detention time= 299.5 min calculated for 935.3 m³ (73% of inflow)
Center-of-Mass det. time= 176.1 min (1,030.6 - 854.5)

Volume	Invert	Avail.Storage	Storage Description
#1	82.750 m	637.0 m³	**Subsurface Chamber** Listed below

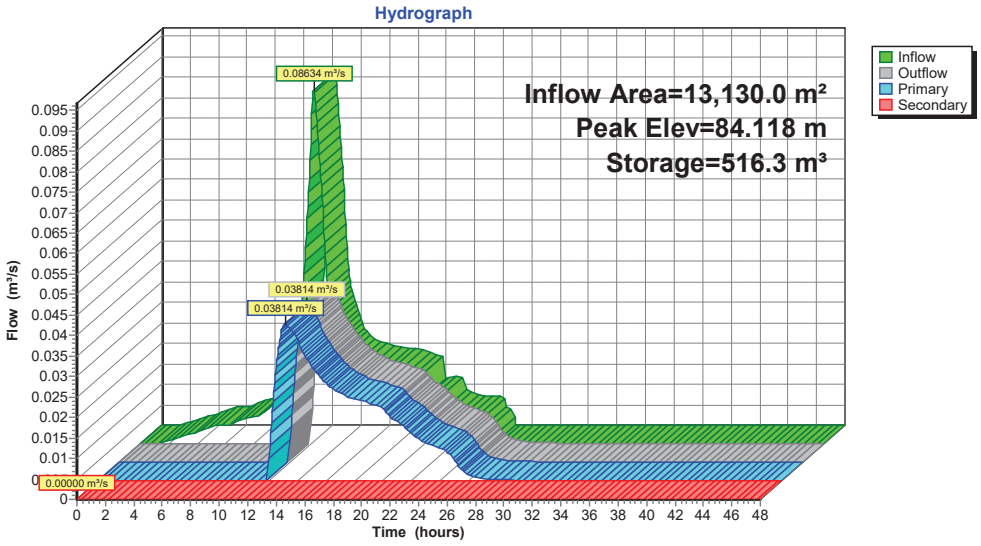
Elevation (meters)	Cum.Store (cubic-meters)
82.750	0.0
83.570	343.0
84.500	637.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	83.570 m	**375 mm Vert. Manifold Outlet** C= 0.800
#2	Primary	83.140 m	**HYDROVEX 200-VHV-2 X 0.90** Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 2.500 3.000 4.000 5.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.044000 0.056000 0.065000 0.073000 0.082000 0.094000 0.112000 0.135000
#3	Secondary	84.450 m	**Overflow Check** Head (meters) 0.000 0.300 Disch. (m³/s) 0.000000 1.000000

Primary OutFlow Max=0.03814 m³/s @ 13.16 hrs HW=84.118 m (Free Discharge)
└**2=HYDROVEX 200-VHV-2** (Custom Controls 0.03814 m³/s)
└**1=Manifold Outlet** (Passes 0.03814 m³/s of 0.23501 m³/s potential flow)

Secondary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=82.750 m (Free Discharge)
└**3=Overflow Check** (Controls 0.00000 m³/s)

Pond P-0: Subsurface Chamber



Summary for Pond P-1: A1 Surface Ponding

Inflow Area = 1,110.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.01340 m³/s @ 12.15 hrs, Volume= 112.1 m³
Outflow = 0.01340 m³/s @ 12.17 hrs, Volume= 112.1 m³, Atten= 0%, Lag= 0.8 min
Primary = 0.01340 m³/s @ 12.17 hrs, Volume= 112.1 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.053 m @ 12.17 hrs Surf.Area= 0.0 m² Storage= 2.6 m³

Plug-Flow detention time= 4.0 min calculated for 112.0 m³ (100% of inflow)
Center-of-Mass det. time= 4.0 min (773.9 - 769.9)

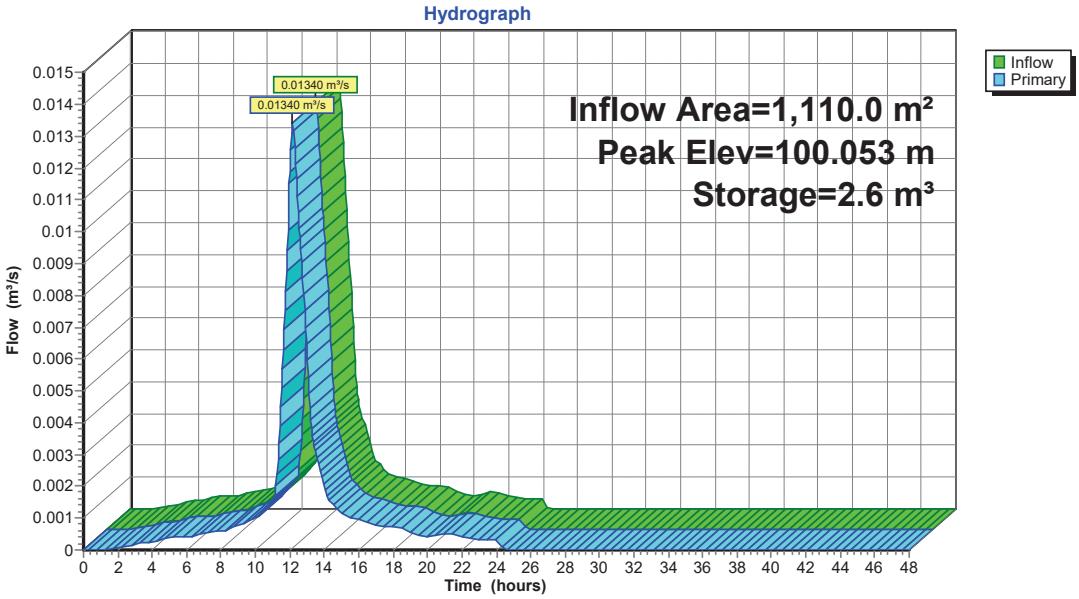
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	7.4 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	7.4

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.01336 m³/s @ 12.17 hrs HW=100.053 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.01336 m³/s)

Pond P-1: A1 Surface Ponding



Summary for Pond P-10: A10 Ponding

Inflow Area = 760.0 m², 72.37% Impervious, Inflow Depth = 89 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00815 m³/s @ 12.16 hrs, Volume= 67.4 m³
Outflow = 0.00813 m³/s @ 12.19 hrs, Volume= 67.4 m³, Atten= 0%, Lag= 1.4 min
Primary = 0.00813 m³/s @ 12.19 hrs, Volume= 67.4 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.041 m @ 12.19 hrs Surf.Area= 0.0 m² Storage= 0.6 m³

Plug-Flow detention time= 1.2 min calculated for 67.3 m³ (100% of inflow)
Center-of-Mass det. time= 1.2 min (785.0 - 783.8)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.2 m³	**Surface Ponding at CB** Listed below

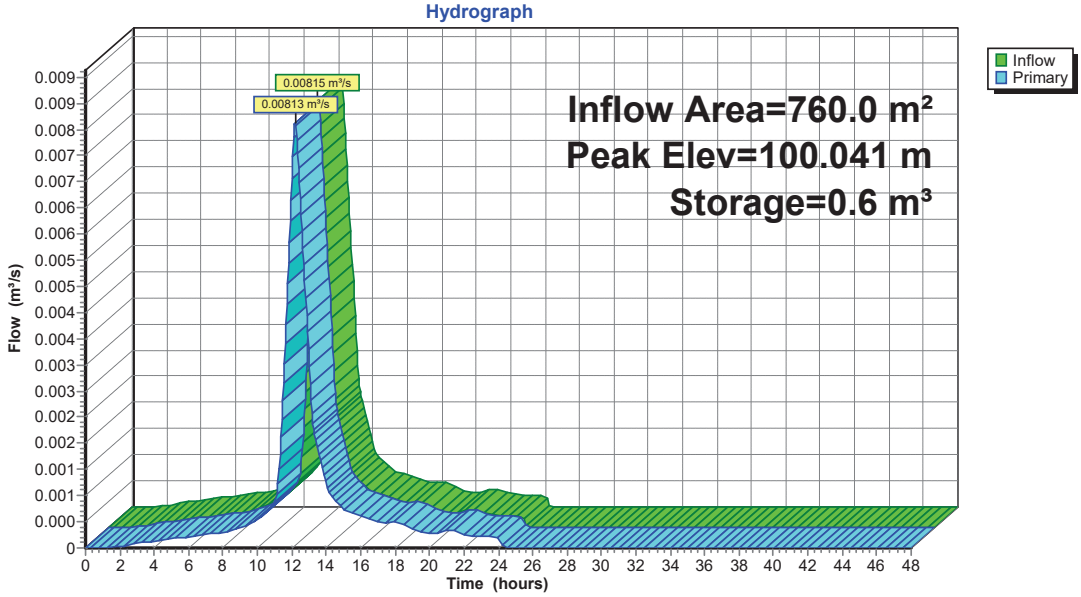
Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	2.2

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**600sq CB Inlet Sag_Single OPSD 400-01 400-03**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.500
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000 0.250000

Primary OutFlow Max=0.00812 m³/s @ 12.19 hrs HW=100.041 m (Free Discharge)
1=600sq CB Inlet Sag_Single OPSD 400-01 400-03 (Custom Controls 0.00812 m³/s)

Pond P-10: A10 Ponding

Hydrograph



Summary for Pond P-12: A12 Bioretention

Inflow Area = 110.0 m², 0.00% Impervious, Inflow Depth = 56 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00080 m³/s @ 12.22 hrs, Volume= 6.2 m³
Outflow = 0.00080 m³/s @ 12.26 hrs, Volume= 5.3 m³, Atten= 0%, Lag= 2.3 min
Primary = 0.00080 m³/s @ 12.26 hrs, Volume= 5.3 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.154 m @ 12.26 hrs Surf.Area= 0.0 m² Storage= 1.0 m³

Plug-Flow detention time= 93.6 min calculated for 5.3 m³ (85% of inflow)
Center-of-Mass det. time= 29.0 min (878.3 - 849.3)

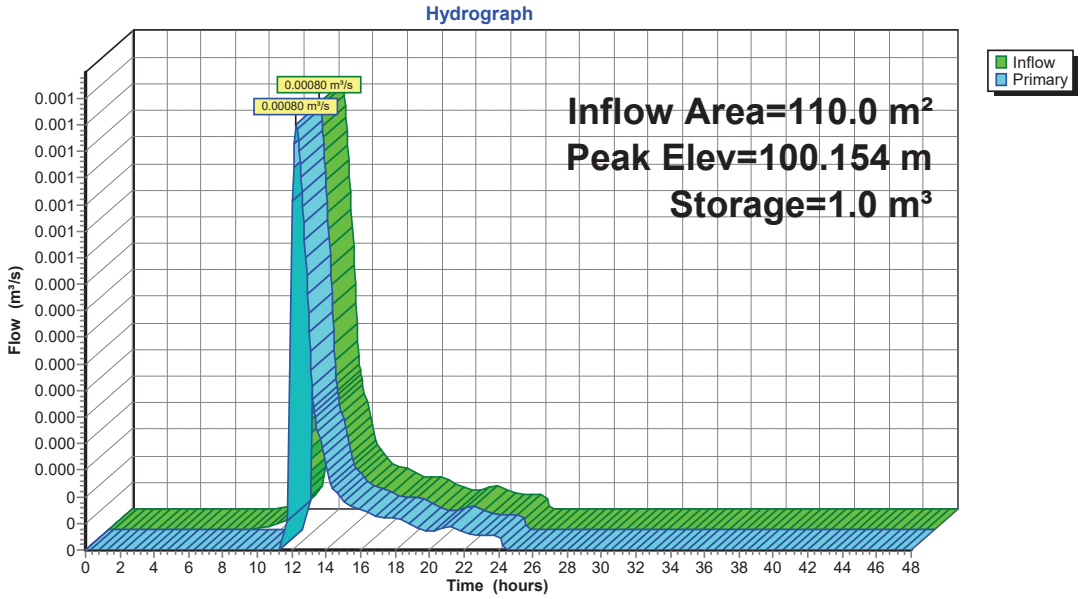
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	4.3 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	0.9
100.300	4.3

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00080 m³/s @ 12.26 hrs HW=100.154 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Custom Controls 0.00080 m³/s)

Pond P-12: A12 Bioretention



Summary for Pond P-13: A13 Bioretention

Inflow Area = 160.0 m², 31.25% Impervious, Inflow Depth = 70 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00140 m³/s @ 12.19 hrs, Volume= 11.2 m³
Outflow = 0.00139 m³/s @ 12.24 hrs, Volume= 9.1 m³, Atten= 1%, Lag= 3.0 min
Primary = 0.00139 m³/s @ 12.24 hrs, Volume= 9.1 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.157 m @ 12.24 hrs Surf.Area= 0.0 m² Storage= 2.3 m³

Plug-Flow detention time= 127.4 min calculated for 9.1 m³ (81% of inflow)
Center-of-Mass det. time= 50.3 min (863.9 - 813.6)

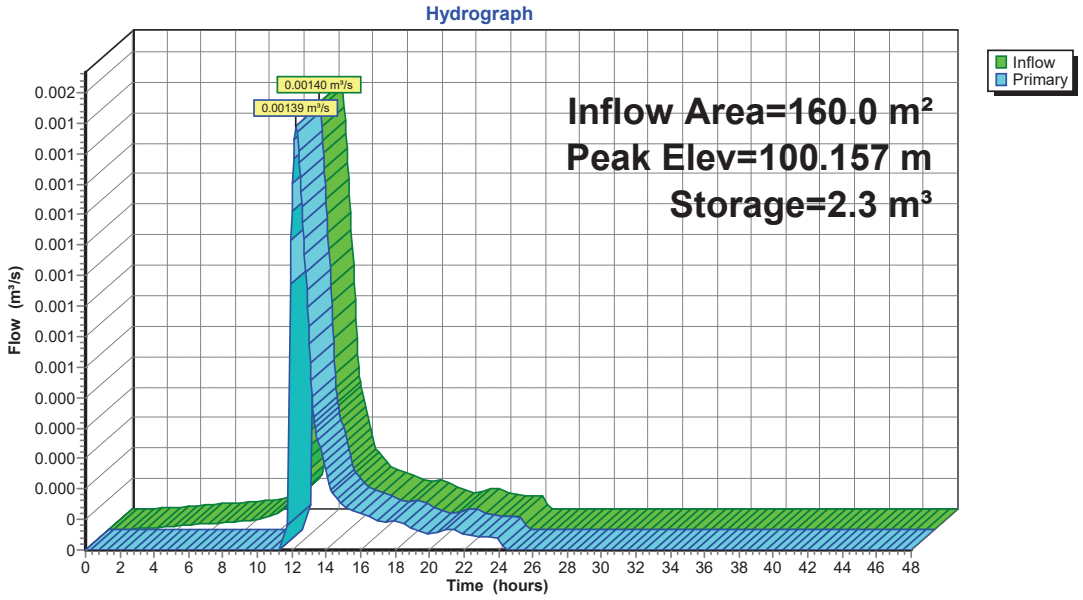
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	6.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	2.1
100.300	6.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00139 m³/s @ 12.24 hrs HW=100.157 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Custom Controls 0.00139 m³/s)

Pond P-13: A13 Bioretention



Summary for Pond P-15: Rooftop Storage

Inflow Area = 2,210.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.02669 m³/s @ 12.15 hrs, Volume= 223.3 m³
Outflow = 0.00378 m³/s @ 11.20 hrs, Volume= 223.3 m³, Atten= 86%, Lag= 0.0 min
Primary = 0.00378 m³/s @ 11.20 hrs, Volume= 223.3 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.144 m @ 14.00 hrs Surf.Area= 2,040.2 m² Storage= 97.8 m³

Plug-Flow detention time= 209.4 min calculated for 223.1 m³ (100% of inflow)
Center-of-Mass det. time= 209.4 min (979.3 - 769.9)

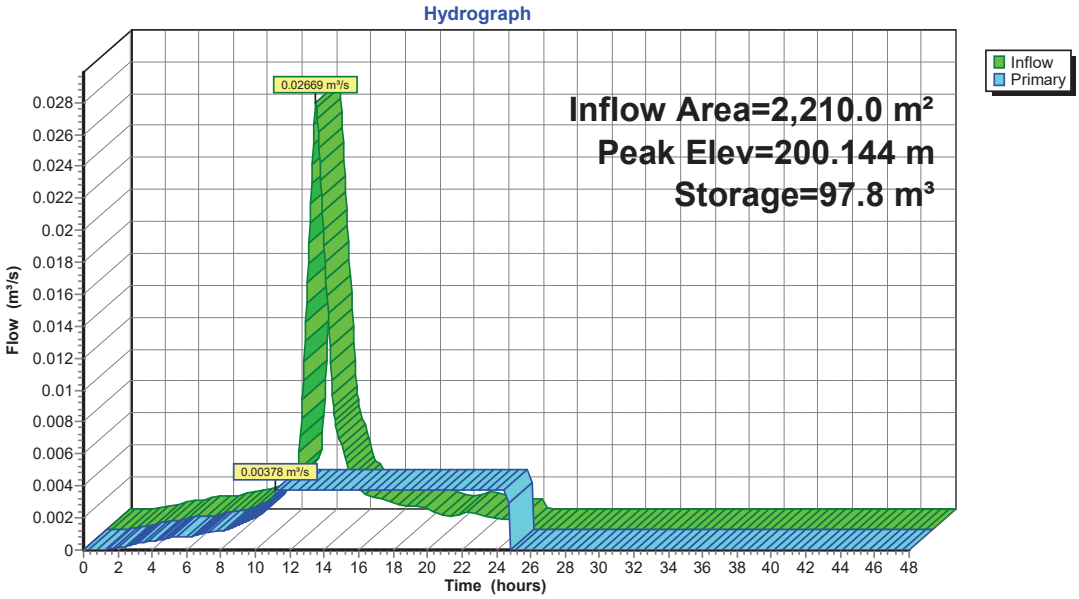
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	543.4 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 12

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	185.0	9.3	9.3	185.0
200.300	300.0	36.0	45.3	300.4

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 12.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00378 m³/s @ 11.20 hrs HW=200.026 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00378 m³/s)

Pond P-15: Rooftop Storage



Summary for Pond P-16: Rooftop Storage

Inflow Area = 2,530.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.03055 m³/s @ 12.15 hrs, Volume= 255.6 m³
Outflow = 0.00630 m³/s @ 11.30 hrs, Volume= 255.5 m³, Atten= 79%, Lag= 0.0 min
Primary = 0.00630 m³/s @ 11.30 hrs, Volume= 255.5 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.137 m @ 13.57 hrs Surf.Area= 2,050.9 m² Storage= 93.4 m³

Plug-Flow detention time= 108.7 min calculated for 255.3 m³ (100% of inflow)
Center-of-Mass det. time= 108.5 min (878.4 - 769.9)

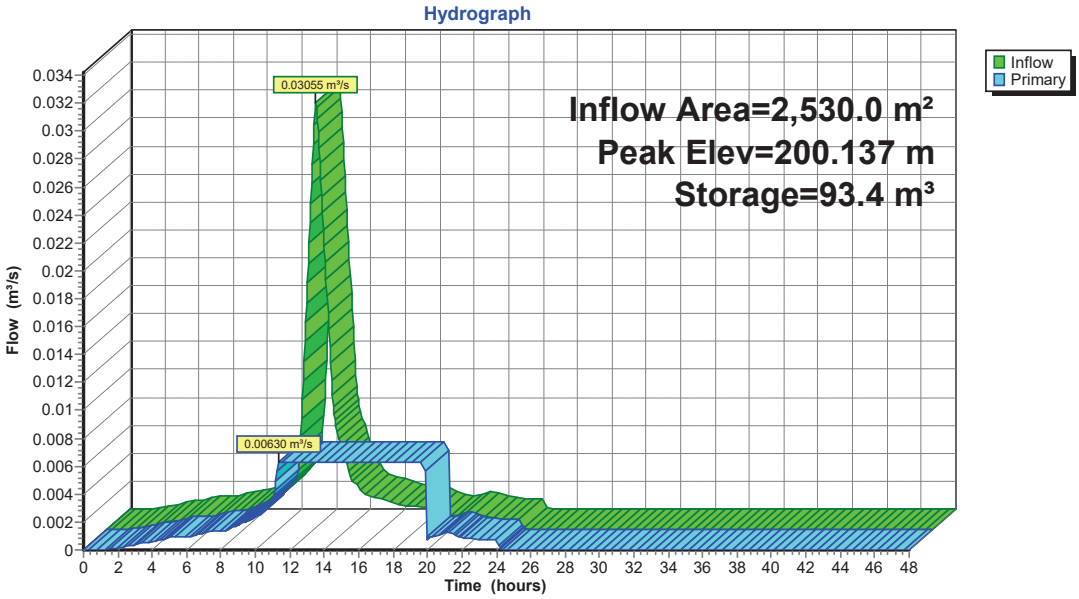
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	668.7 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 19

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	130.0	6.5	6.5	130.0
200.300	260.0	28.7	35.2	260.3

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 20.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00630 m³/s @ 11.30 hrs HW=200.026 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00630 m³/s)

Pond P-16: Rooftop Storage



Summary for Pond P-17: Rooftop Storage

Inflow Area = 1,980.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.02391 m³/s @ 12.15 hrs, Volume= 200.0 m³
Outflow = 0.00441 m³/s @ 11.30 hrs, Volume= 200.0 m³, Atten= 82%, Lag= 0.0 min
Primary = 0.00441 m³/s @ 11.30 hrs, Volume= 200.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.142 m @ 13.71 hrs Surf.Area= 1,637.3 m² Storage= 77.6 m³

Plug-Flow detention time= 132.8 min calculated for 200.0 m³ (100% of inflow)
Center-of-Mass det. time= 132.7 min (902.6 - 769.9)

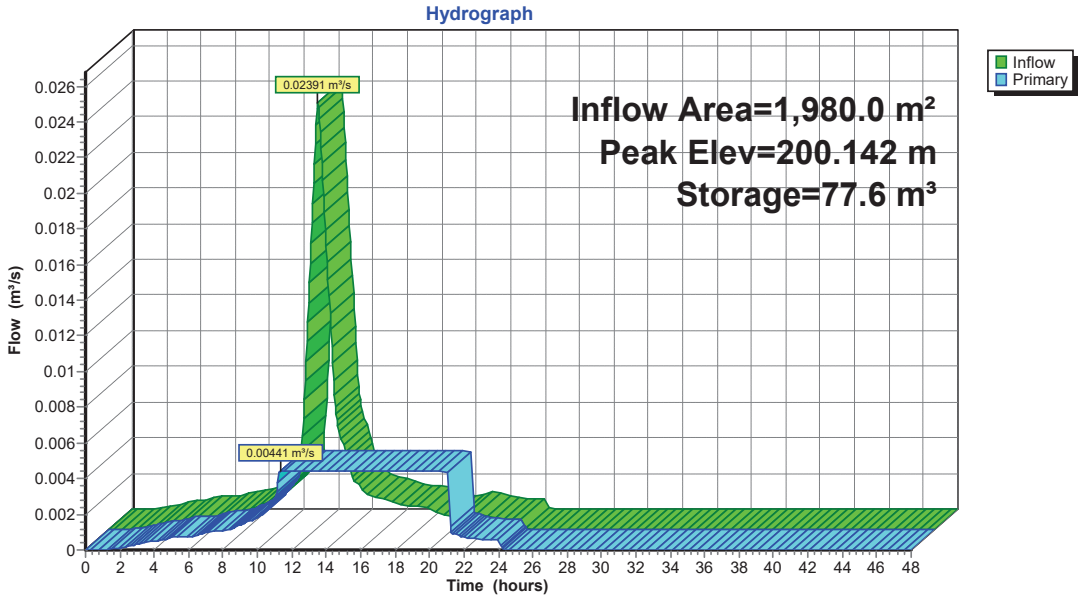
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	492.7 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 14

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	130.0	6.5	6.5	130.0
200.300	260.0	28.7	35.2	260.3

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 14.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00441 m³/s @ 11.30 hrs HW=200.029 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00441 m³/s)

Pond P-17: Rooftop Storage



Summary for Pond P-2: A2 Surface Ponding

Inflow Area = 1,480.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.01787 m³/s @ 12.15 hrs, Volume= 149.5 m³
Outflow = 0.01787 m³/s @ 12.16 hrs, Volume= 149.5 m³, Atten= 0%, Lag= 0.3 min
Primary = 0.01787 m³/s @ 12.16 hrs, Volume= 149.5 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.058 m @ 12.16 hrs Surf.Area= 0.0 m² Storage= 1.0 m³

Plug-Flow detention time= 1.3 min calculated for 149.4 m³ (100% of inflow)
Center-of-Mass det. time= 1.3 min (771.1 - 769.9)

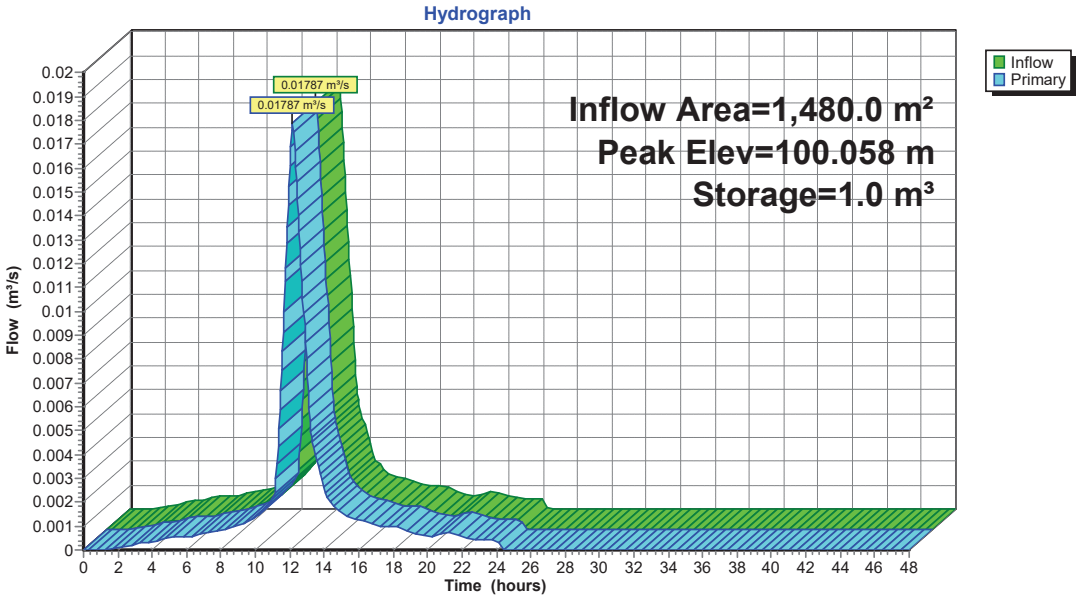
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	1.5 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.090	1.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.01784 m³/s @ 12.16 hrs HW=100.058 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.01784 m³/s)

Pond P-2: A2 Surface Ponding



Summary for Pond P-22: A22 Bioretention

Inflow Area = 130.0 m², 0.00% Impervious, Inflow Depth = 56 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00095 m³/s @ 12.22 hrs, Volume= 7.3 m³
Outflow = 0.00095 m³/s @ 12.25 hrs, Volume= 6.9 m³, Atten= 0%, Lag= 1.8 min
Primary = 0.00095 m³/s @ 12.25 hrs, Volume= 6.9 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.155 m @ 12.25 hrs Surf.Area= 0.0 m² Storage= 0.5 m³

Plug-Flow detention time= 41.3 min calculated for 6.9 m³ (95% of inflow)
Center-of-Mass det. time= 12.4 min (861.7 - 849.3)

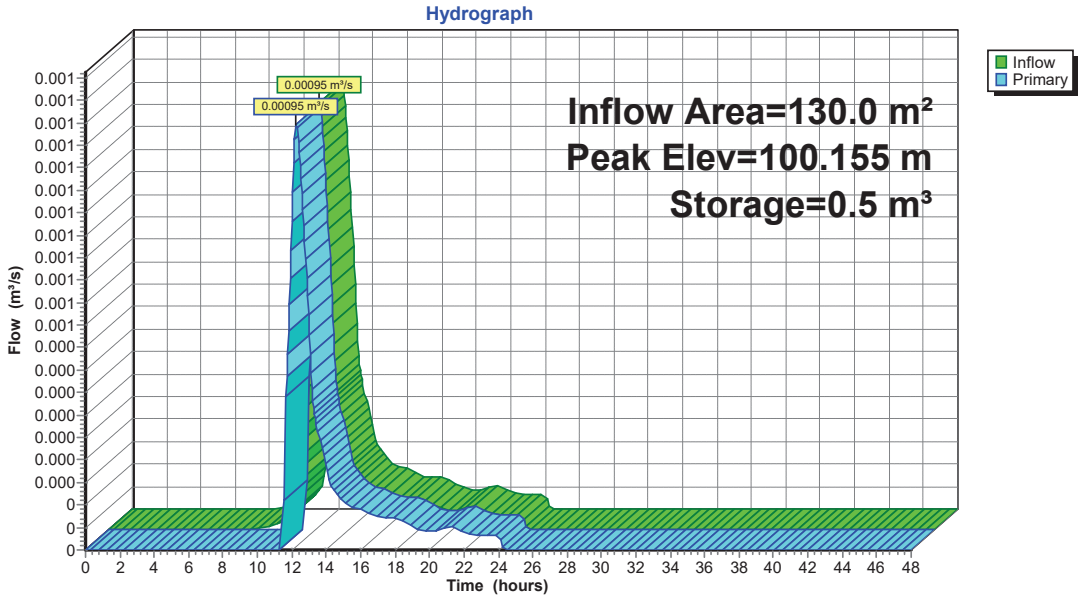
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.5 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	0.4
100.270	2.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00095 m³/s @ 12.25 hrs HW=100.155 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Custom Controls 0.00095 m³/s)

Pond P-22: A22 Bioretention



Summary for Pond P-3: A3 Surface Ponding

Inflow Area = 1,200.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.01449 m³/s @ 12.15 hrs, Volume= 121.2 m³
Outflow = 0.01448 m³/s @ 12.17 hrs, Volume= 121.2 m³, Atten= 0%, Lag= 0.9 min
Primary = 0.01448 m³/s @ 12.17 hrs, Volume= 121.2 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.054 m @ 12.17 hrs Surf.Area= 0.0 m² Storage= 3.1 m³

Plug-Flow detention time= 4.5 min calculated for 121.1 m³ (100% of inflow)
Center-of-Mass det. time= 4.5 min (774.3 - 769.9)

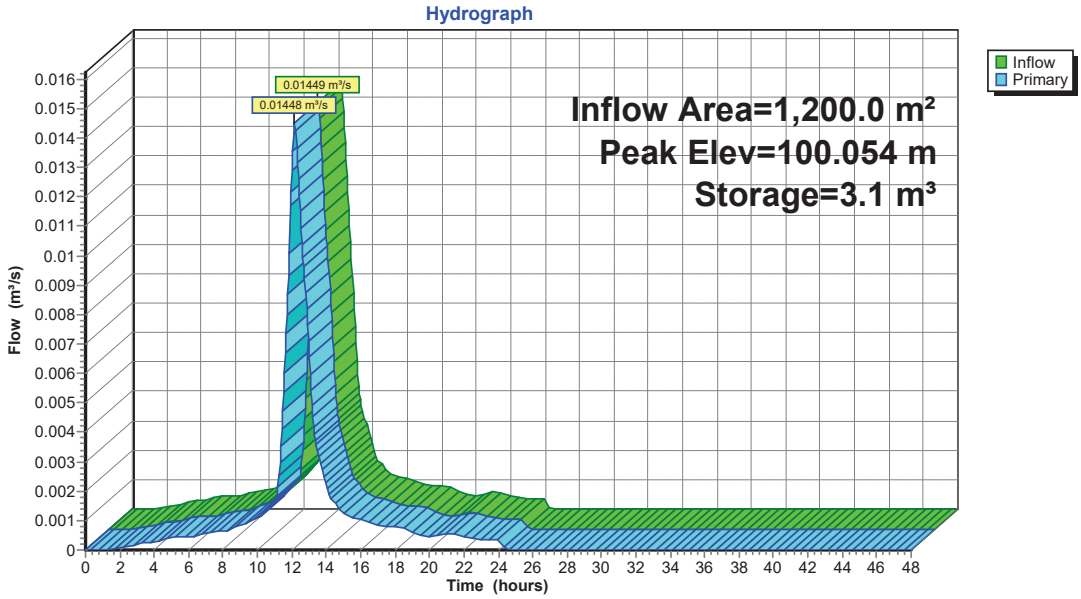
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	10.7 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.190	10.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.01443 m³/s @ 12.17 hrs HW=100.054 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.01443 m³/s)

Pond P-3: A3 Surface Ponding



Summary for Pond P-4: A4 Bioretention

Inflow Area = 170.0 m², 0.00% Impervious, Inflow Depth = 56 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00124 m³/s @ 12.22 hrs, Volume= 9.6 m³
Outflow = 0.00122 m³/s @ 12.30 hrs, Volume= 8.2 m³, Atten= 1%, Lag= 4.8 min
Primary = 0.00122 m³/s @ 12.30 hrs, Volume= 8.2 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.156 m @ 12.30 hrs Surf.Area= 0.0 m² Storage= 1.7 m³

Plug-Flow detention time= 95.7 min calculated for 8.2 m³ (85% of inflow)
Center-of-Mass det. time= 30.9 min (880.2 - 849.3)

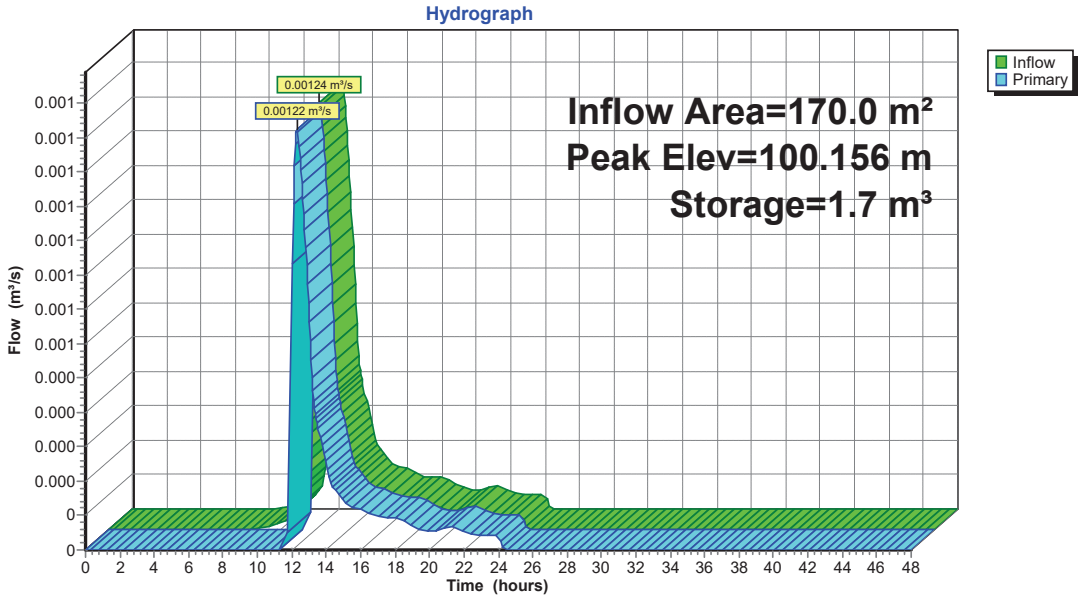
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	7.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	1.4
100.300	7.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00122 m³/s @ 12.30 hrs HW=100.156 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Custom Controls 0.00122 m³/s)

Pond P-4: A4 Bioretention



Summary for Pond P-5: A5 Surface Ponding

Inflow Area = 760.0 m²,100.00% Impervious, Inflow Depth = 101 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00918 m³/s @ 12.15 hrs, Volume= 76.8 m³
Outflow = 0.00916 m³/s @ 12.17 hrs, Volume= 76.8 m³, Atten= 0%, Lag= 0.8 min
Primary = 0.00916 m³/s @ 12.17 hrs, Volume= 76.8 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.046 m @ 12.17 hrs Surf.Area= 0.0 m² Storage= 0.4 m³

Plug-Flow detention time= 0.8 min calculated for 76.7 m³ (100% of inflow)
Center-of-Mass det. time= 0.8 min (770.7 - 769.9)

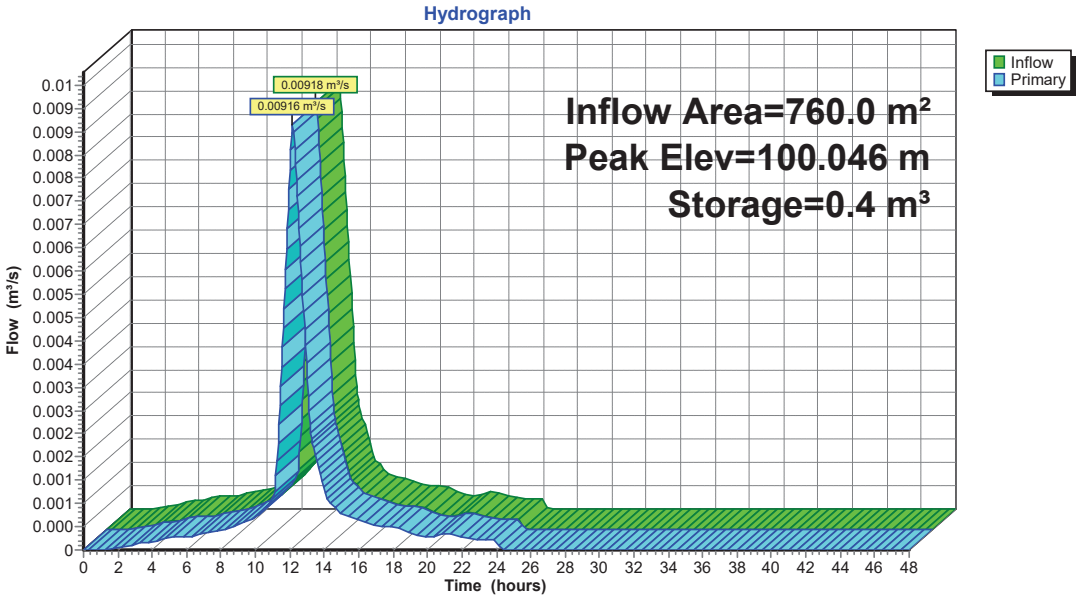
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.5 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.270	2.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00913 m³/s @ 12.17 hrs HW=100.046 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00913 m³/s)

Pond P-5: A5 Surface Ponding



Summary for Pond P-6: A6 Bioretention

Inflow Area = 180.0 m², 0.00% Impervious, Inflow Depth = 56 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00131 m³/s @ 12.22 hrs, Volume= 10.1 m³
Outflow = 0.00127 m³/s @ 12.36 hrs, Volume= 8.2 m³, Atten= 3%, Lag= 8.2 min
Primary = 0.00127 m³/s @ 12.36 hrs, Volume= 8.2 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.156 m @ 12.36 hrs Surf.Area= 0.0 m² Storage= 2.2 m³

Plug-Flow detention time= 116.2 min calculated for 8.2 m³ (81% of inflow)
Center-of-Mass det. time= 39.6 min (888.9 - 849.3)

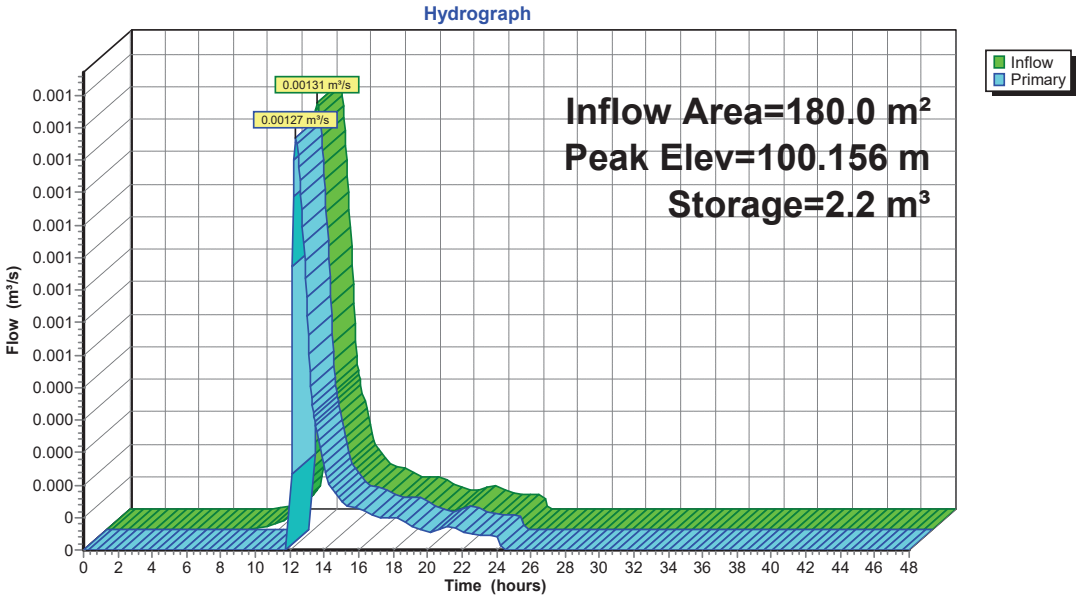
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	9.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	1.9
100.300	9.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00127 m³/s @ 12.36 hrs HW=100.156 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Custom Controls 0.00127 m³/s)

Pond P-6: A6 Bioretention



Summary for Pond P-8: A8 Surface Ponding

Inflow Area = 730.0 m², 0.00% Impervious, Inflow Depth = 70 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00663 m³/s @ 12.19 hrs, Volume= 50.8 m³
Outflow = 0.00643 m³/s @ 12.30 hrs, Volume= 50.8 m³, Atten= 3%, Lag= 6.5 min
Primary = 0.00643 m³/s @ 12.30 hrs, Volume= 50.8 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.032 m @ 12.30 hrs Surf.Area= 0.0 m² Storage= 2.2 m³

Plug-Flow detention time= 5.7 min calculated for 50.7 m³ (100% of inflow)
Center-of-Mass det. time= 5.7 min (836.5 - 830.8)

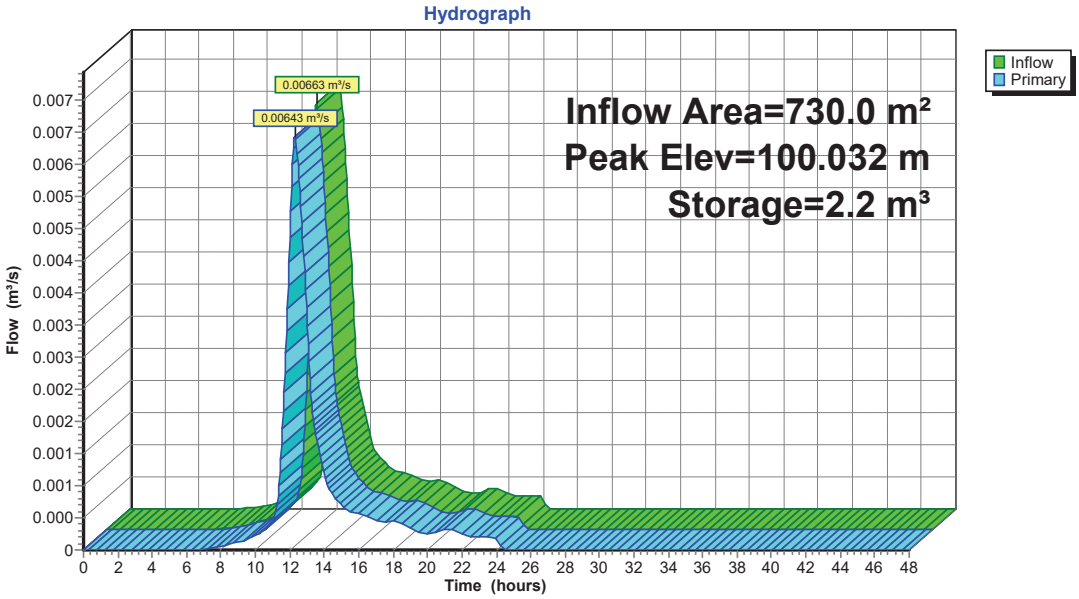
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	20.6 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.300	20.6

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00643 m³/s @ 12.30 hrs HW=100.032 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00643 m³/s)

Pond P-8: A8 Surface Ponding



Summary for Pond P-9: A9 Ponding

Inflow Area = 220.0 m², 0.00% Impervious, Inflow Depth = 56 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00161 m³/s @ 12.22 hrs, Volume= 12.4 m³
Outflow = 0.00160 m³/s @ 12.26 hrs, Volume= 12.4 m³, Atten= 0%, Lag= 2.0 min
Primary = 0.00160 m³/s @ 12.26 hrs, Volume= 12.4 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.008 m @ 12.26 hrs Surf.Area= 0.0 m² Storage= 0.2 m³

Plug-Flow detention time= 1.7 min calculated for 12.4 m³ (100% of inflow)
Center-of-Mass det. time= 1.7 min (850.9 - 849.3)

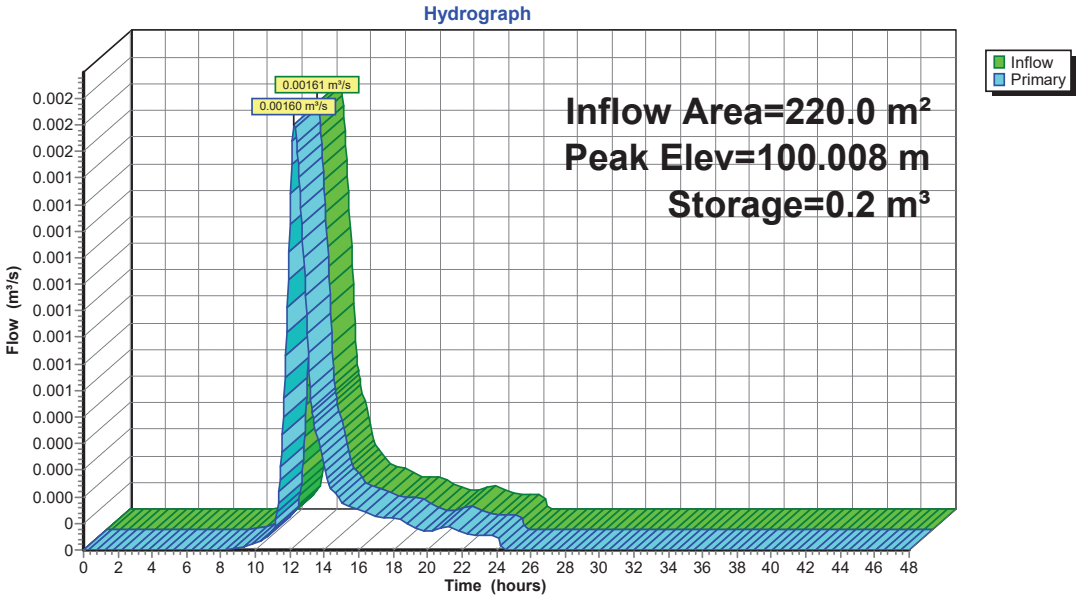
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	4.0 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.200	4.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00160 m³/s @ 12.26 hrs HW=100.008 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00160 m³/s)

Pond P-9: A9 Ponding

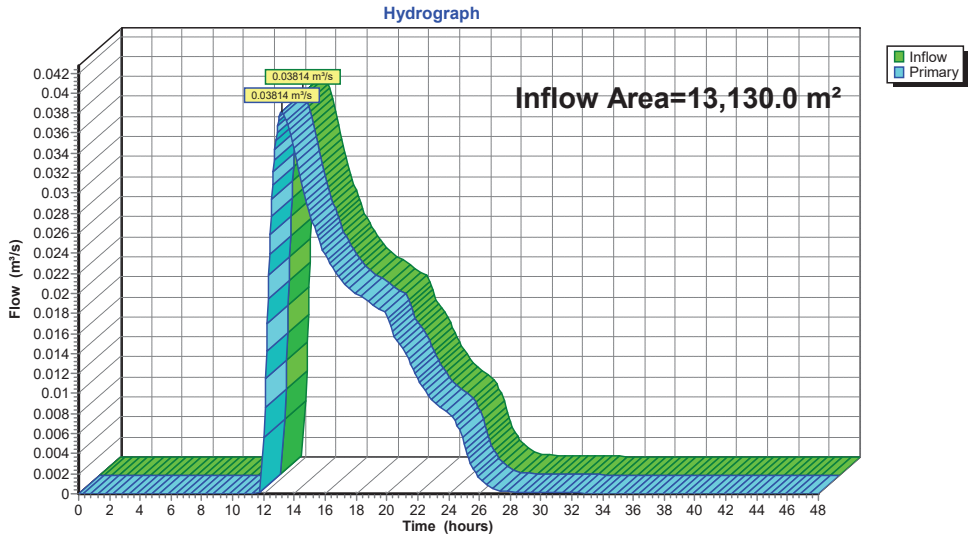


Summary for Link X-1: Chamber Outflow

Inflow Area = 13,130.0 m², 90.78% Impervious, Inflow Depth = 71 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.03814 m³/s @ 13.16 hrs, Volume= 935.3 m³
Primary = 0.03814 m³/s @ 13.16 hrs, Volume= 935.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-1: Chamber Outflow

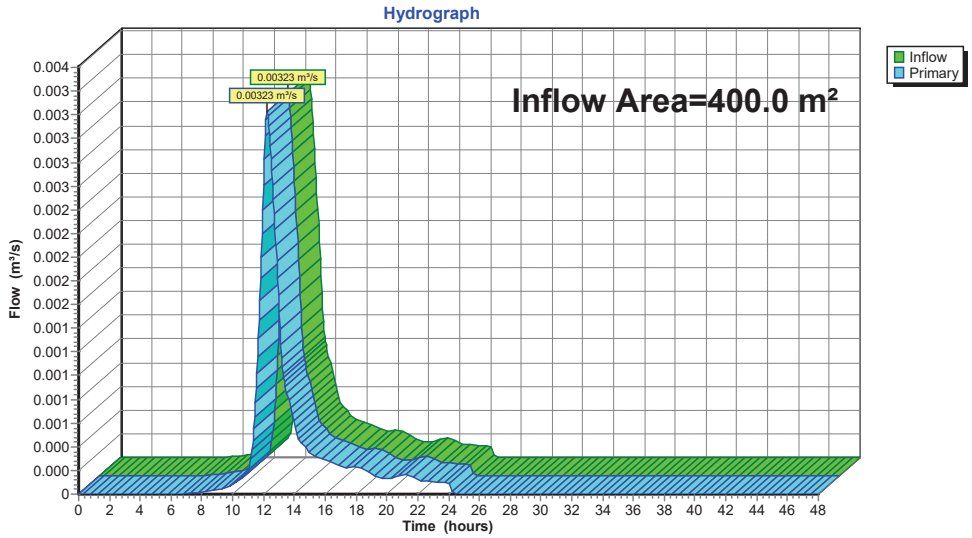


Summary for Link X-2: Internal Link A

Inflow Area = 400.0 m², 0.00% Impervious, Inflow Depth = 62 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.00323 m³/s @ 12.22 hrs, Volume= 24.9 m³
Primary = 0.00323 m³/s @ 12.22 hrs, Volume= 24.9 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-2: Internal Link A

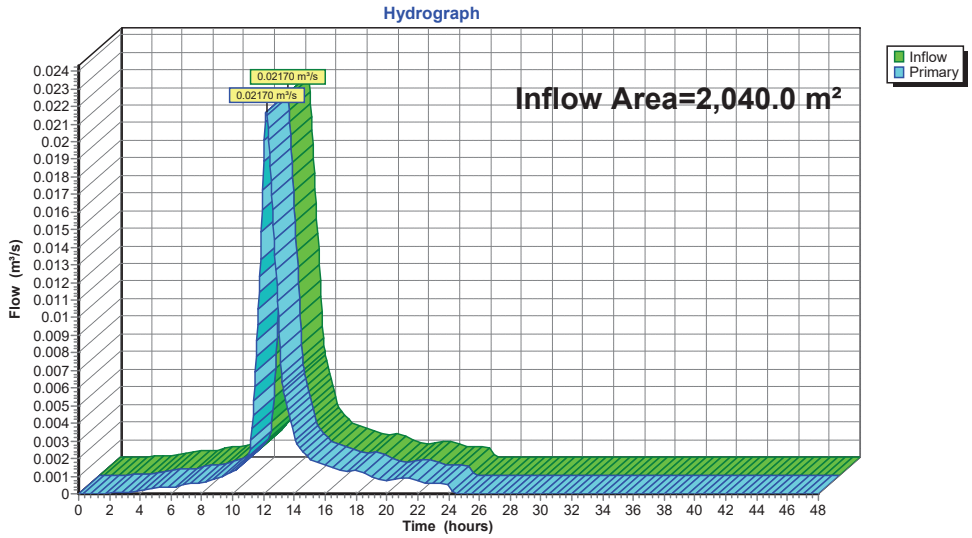


Summary for Link X-3: Internal Link B

Inflow Area = 2,040.0 m², 29.41% Impervious, Inflow Depth = 85 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.02170 m³/s @ 12.18 hrs, Volume= 172.5 m³
Primary = 0.02170 m³/s @ 12.18 hrs, Volume= 172.5 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-3: Internal Link B

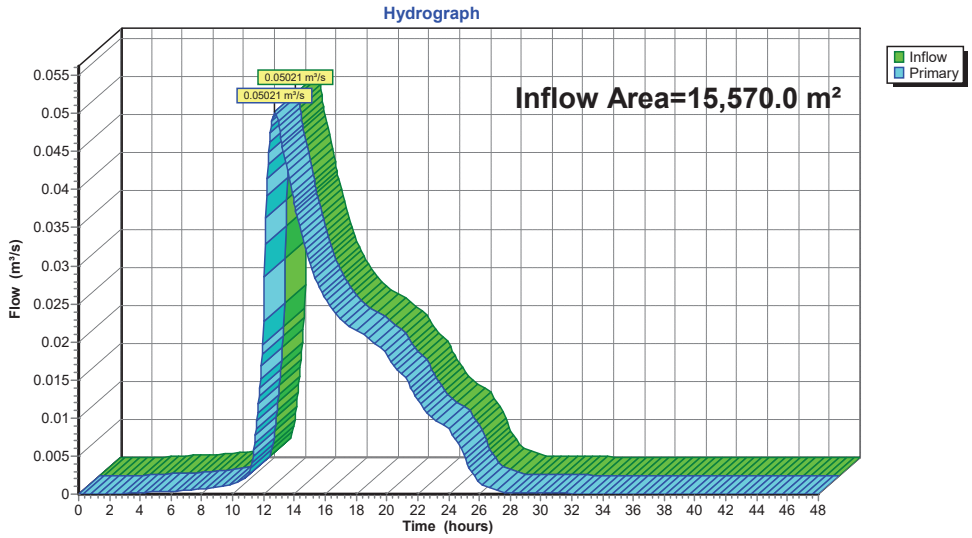


Summary for Link X-4: Net Offsite Flows

Inflow Area = 15,570.0 m², 80.41% Impervious, Inflow Depth = 73 mm for Ottawa SCS 24hr-100yr event
Inflow = 0.05021 m³/s @ 12.75 hrs, Volume= 1,132.7 m³
Primary = 0.05021 m³/s @ 12.75 hrs, Volume= 1,132.7 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-4: Net Offsite Flows



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A-1: A1 Runoff Area=0.1110 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.01011 m³/s 21.9 m³

Subcatchment A-10: A10 Runoff Area=0.0210 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00010 m³/s 0.4 m³

Subcatchment A-11: A11 Runoff Area=0.0550 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.00501 m³/s 10.8 m³

Subcatchment A-12: A12 Runoff Area=0.0110 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00005 m³/s 0.2 m³

Subcatchment A-13: A13 Runoff Area=0.0110 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00005 m³/s 0.2 m³

Subcatchment A-14: A14 Runoff Area=0.0050 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.00046 m³/s 1.0 m³

Subcatchment A-15: A15 Runoff Area=0.2210 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.02012 m³/s 43.5 m³

Subcatchment A-16: A16 Runoff Area=0.2530 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.02304 m³/s 49.8 m³

Subcatchment A-17: A17 Runoff Area=0.1980 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.01803 m³/s 39.0 m³

Subcatchment A-18: A18 Runoff Area=0.1010 ha 0.00% Impervious Runoff Depth=12 mm
Tc=10.0 min CN=94 Runoff=0.00554 m³/s 12.6 m³

Subcatchment A-19: A19 Runoff Area=0.0180 ha 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min CN=86 Runoff=0.00030 m³/s 0.9 m³

Subcatchment A-2: A2 Runoff Area=0.1480 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.01348 m³/s 29.2 m³

Subcatchment A-22: A22 Runoff Area=0.0130 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00006 m³/s 0.3 m³

Subcatchment A-3: A3 Runoff Area=0.1200 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.01093 m³/s 23.6 m³

Subcatchment A-4: A4 Runoff Area=0.0170 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00008 m³/s 0.3 m³

Subcatchment A-5: A5 Runoff Area=0.0760 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.00692 m³/s 15.0 m³

Subcatchment A-6: A6 Runoff Area=0.0180 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00008 m³/s 0.4 m³

Subcatchment A-7: A7 Runoff Area=0.0650 ha 100.00% Impervious Runoff Depth=20 mm
Tc=10.0 min CN=98 Runoff=0.00592 m³/s 12.8 m³

Subcatchment A-8: A8 Runoff Area=0.0730 ha 0.00% Impervious Runoff Depth=5 mm
Tc=10.0 min CN=86 Runoff=0.00121 m³/s 3.5 m³

Subcatchment A-9: A9 Runoff Area=0.0220 ha 0.00% Impervious Runoff Depth=2 mm
Tc=10.0 min CN=80 Runoff=0.00010 m³/s 0.4 m³

Pond P-0: Subsurface Chamber Peak Elev=83.320 m Storage=238.4 m³ Inflow=0.05927 m³/s 238.4 m³
Primary=0.00000 m³/s 0.0 m³ Secondary=0.00000 m³/s 0.0 m³ Outflow=0.00000 m³/s 0.0 m³

Pond P-1: A1 Surface Ponding Peak Elev=100.046 m Storage=2.3 m³ Inflow=0.01011 m³/s 21.9 m³
Outflow=0.00924 m³/s 21.9 m³

Pond P-10: A10 Ponding Peak Elev=100.025 m Storage=0.4 m³ Inflow=0.00502 m³/s 11.3 m³
Outflow=0.00498 m³/s 11.3 m³

Pond P-12: A12 Bioretention Peak Elev=100.037 m Storage=0.2 m³ Inflow=0.00005 m³/s 0.2 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-13: A13 Bioretention Peak Elev=100.086 m Storage=1.2 m³ Inflow=0.00046 m³/s 1.2 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-15: Rooftop Storage Peak Elev=200.085 m Storage=20.1 m³ Inflow=0.02012 m³/s 43.5 m³
Outflow=0.00378 m³/s 43.6 m³

Pond P-16: Rooftop Storage Peak Elev=200.079 m Storage=18.2 m³ Inflow=0.02304 m³/s 49.8 m³
Outflow=0.00630 m³/s 49.8 m³

Pond P-17: Rooftop Storage Peak Elev=200.083 m Storage=15.4 m³ Inflow=0.01803 m³/s 39.0 m³
Outflow=0.00441 m³/s 39.0 m³

Pond P-2: A2 Surface Ponding Peak Elev=100.053 m Storage=0.9 m³ Inflow=0.01348 m³/s 29.2 m³
Outflow=0.01333 m³/s 29.2 m³

Pond P-22: A22 Bioretention Peak Elev=100.097 m Storage=0.3 m³ Inflow=0.00006 m³/s 0.3 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-3: A3 Surface Ponding Peak Elev=100.049 m Storage=2.8 m³ Inflow=0.01093 m³/s 23.6 m³
Outflow=0.00979 m³/s 23.6 m³

Pond P-4: A4 Bioretention Peak Elev=100.036 m Storage=0.3 m³ Inflow=0.00008 m³/s 0.3 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-5: A5 Surface Ponding Peak Elev=100.034 m Storage=0.3 m³ Inflow=0.00692 m³/s 15.0 m³
Outflow=0.00684 m³/s 15.0 m³

Pond P-6: A6 Bioretention Peak Elev=100.028 m Storage=0.4 m³ Inflow=0.00008 m³/s 0.4 m³
Outflow=0.00000 m³/s 0.0 m³

Pond P-8: A8 Surface Ponding Peak Elev=100.005 m Storage=0.3 m³ Inflow=0.00121 m³/s 3.5 m³
Outflow=0.00102 m³/s 3.5 m³

Pond P-9: A9 Ponding Peak Elev=100.000 m Storage=0.0 m³ Inflow=0.00010 m³/s 0.4 m³
Outflow=0.00010 m³/s 0.4 m³

Link X-1: Chamber Outflow Inflow=0.00000 m³/s 0.0 m³
Primary=0.00000 m³/s 0.0 m³

Link X-2: Internal Link A Inflow=0.00036 m³/s 1.3 m³
Primary=0.00036 m³/s 1.3 m³

Link X-3: Internal Link B Inflow=0.01054 m³/s 23.8 m³
Primary=0.01054 m³/s 23.8 m³

Link X-4: Net Offsite Flows Inflow=0.01076 m³/s 25.2 m³
Primary=0.01076 m³/s 25.2 m³

Total Runoff Area = 15,570.0 m² Runoff Volume = 265.9 m³ Average Runoff Depth = 17 mm
19.59% Pervious = 3,050.0 m² 80.41% Impervious = 12,520.0 m²

Summary for Subcatchment A-1: A1

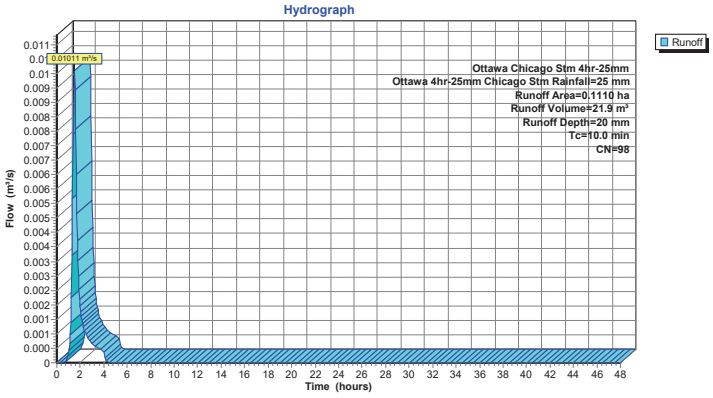
Runoff = 0.01011 m³/s @ 1.50 hrs, Volume= 21.9 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1110	98	
	0.1110		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-1: A1



Summary for Subcatchment A-10: A10

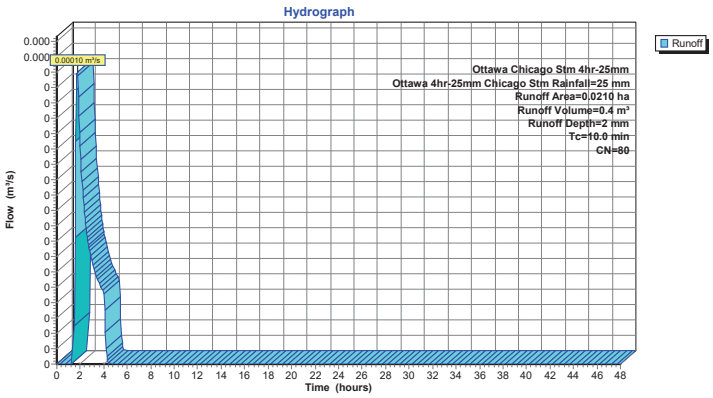
Runoff = 0.00010 m³/s @ 1.73 hrs, Volume= 0.4 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
	0.0210	80	
	0.0210		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-10: A10



Summary for Subcatchment A-11: A11

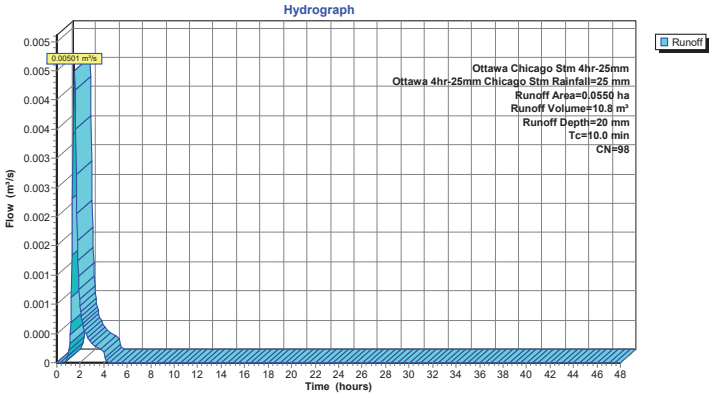
Runoff = 0.00501 m³/s @ 1.50 hrs, Volume= 10.8 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0550	98	
	0.0550		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-11: A11



Summary for Subcatchment A-12: A12

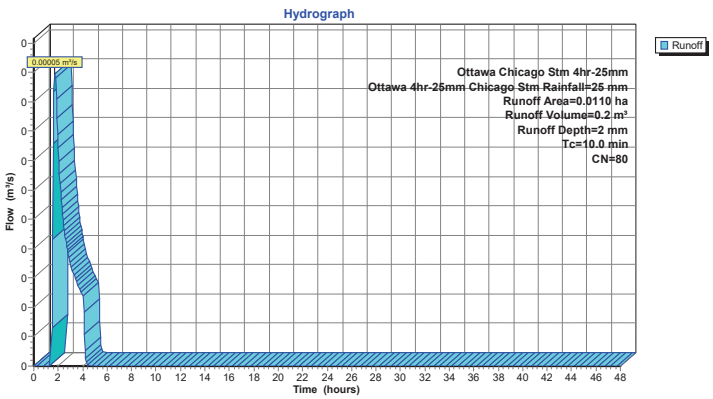
Runoff = 0.00005 m³/s @ 1.73 hrs, Volume= 0.2 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0110	80	
	0.0110		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-12: A12



Summary for Subcatchment A-13: A13

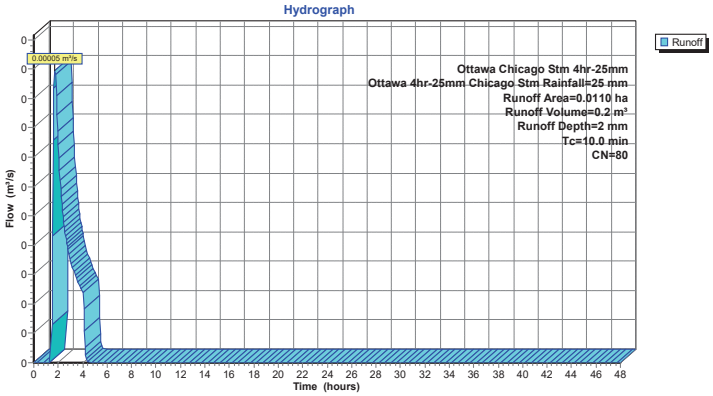
Runoff = 0.00005 m³/s @ 1.73 hrs, Volume= 0.2 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0110	80	
	0.0110		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-13: A13



Summary for Subcatchment A-14: A14

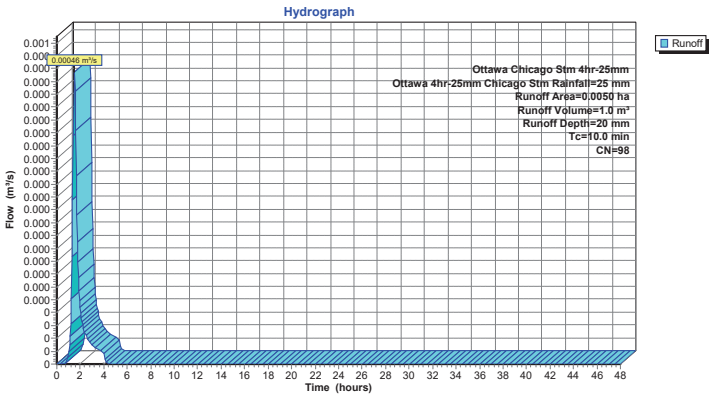
Runoff = 0.00046 m³/s @ 1.50 hrs, Volume= 1.0 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0050	98	
	0.0050		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-14: A14



Summary for Subcatchment A-15: A15

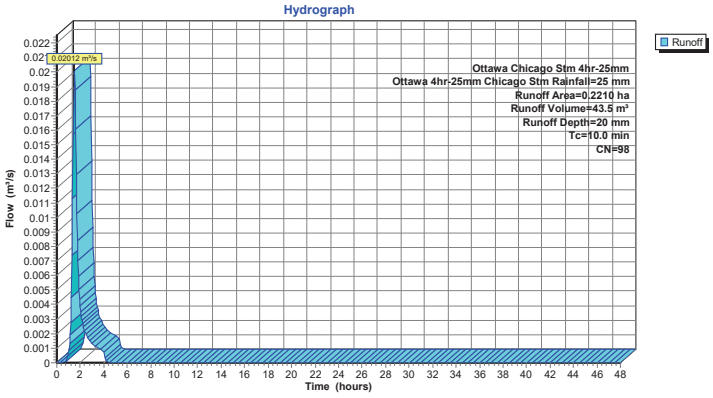
Runoff = 0.02012 m³/s @ 1.50 hrs, Volume= 43.5 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.2210	98	
	0.2210		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-15: A15



Summary for Subcatchment A-16: A16

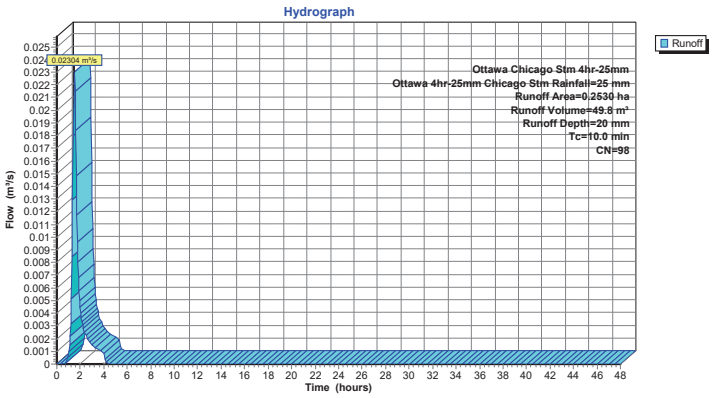
Runoff = 0.02304 m³/s @ 1.50 hrs, Volume= 49.8 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.2530	98	
	0.2530		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-16: A16



Summary for Subcatchment A-17: A17

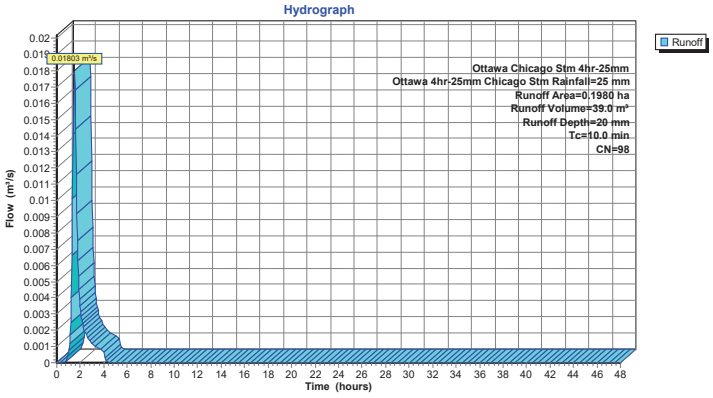
Runoff = 0.01803 m³/s @ 1.50 hrs, Volume= 39.0 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1980	98	
	0.1980		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-17: A17



Summary for Subcatchment A-18: A18

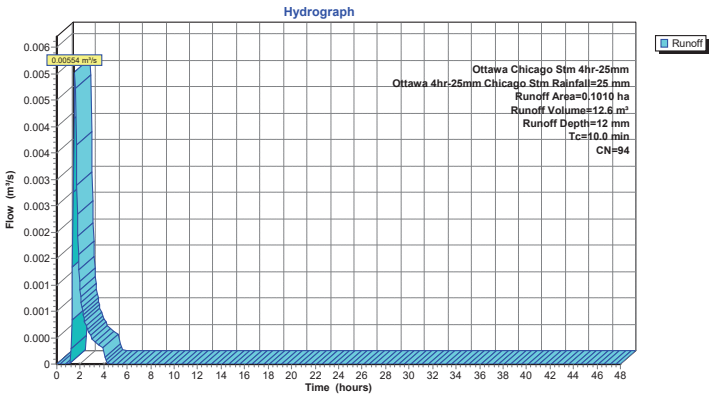
Runoff = 0.00554 m³/s @ 1.53 hrs, Volume= 12.6 m³, Depth= 12 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1010	94	
	0.1010		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-18: A18



Summary for Subcatchment A-19: A19

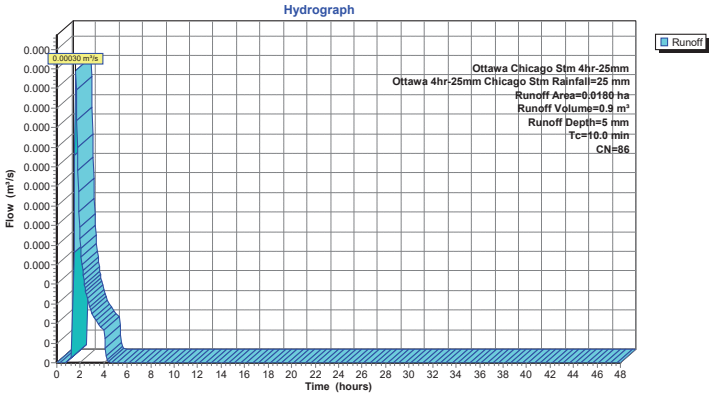
Runoff = 0.00030 m³/s @ 1.60 hrs, Volume= 0.9 m³, Depth= 5 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0180	86	
	0.0180		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-19: A19



Summary for Subcatchment A-2: A2

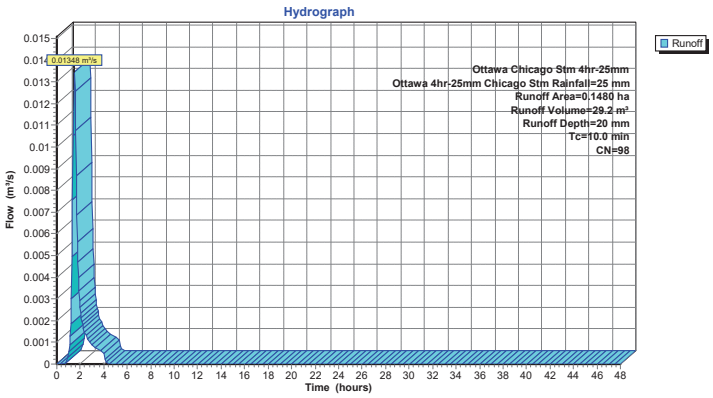
Runoff = 0.01348 m³/s @ 1.50 hrs, Volume= 29.2 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1480	98	
	0.1480		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-2: A2



Summary for Subcatchment A-22: A22

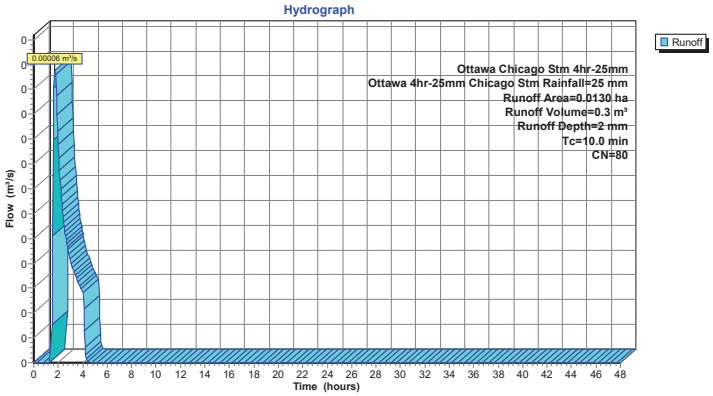
Runoff = 0.00006 m³/s @ 1.73 hrs, Volume= 0.3 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0130	80	
	0.0130		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-22: A22



Summary for Subcatchment A-3: A3

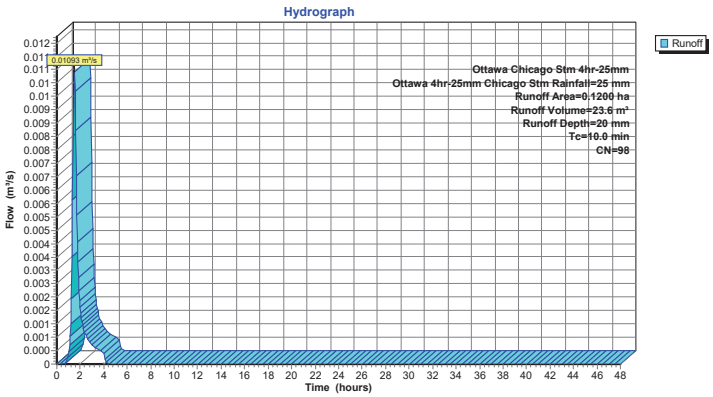
Runoff = 0.01093 m³/s @ 1.50 hrs, Volume= 23.6 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.1200	98	
	0.1200		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-3: A3



Summary for Subcatchment A-4: A4

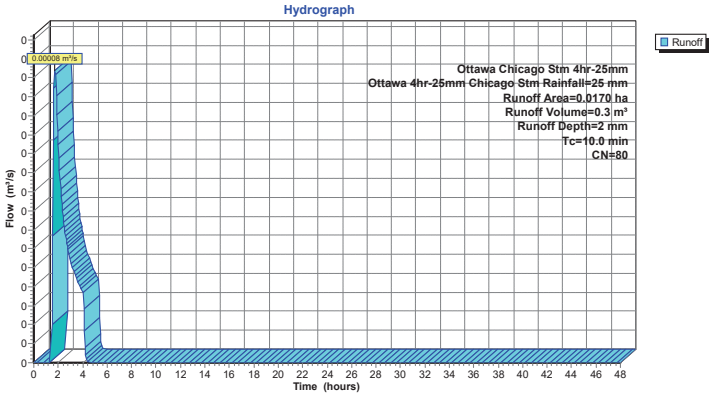
Runoff = 0.00008 m³/s @ 1.73 hrs, Volume= 0.3 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0170	80	
	0.0170		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-4: A4



Summary for Subcatchment A-5: A5

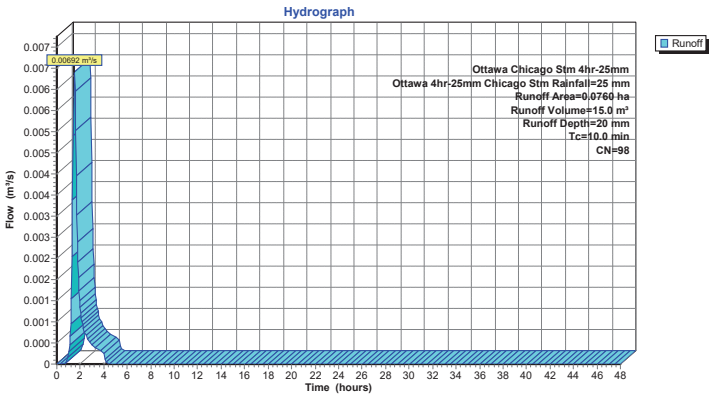
Runoff = 0.00692 m³/s @ 1.50 hrs, Volume= 15.0 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0760	98	
	0.0760		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-5: A5



Summary for Subcatchment A-6: A6

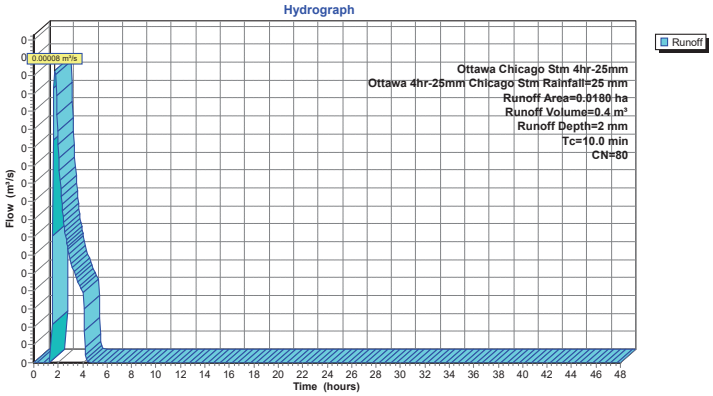
Runoff = 0.00008 m³/s @ 1.73 hrs, Volume= 0.4 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0180	80	
	0.0180		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-6: A6



Summary for Subcatchment A-7: A7

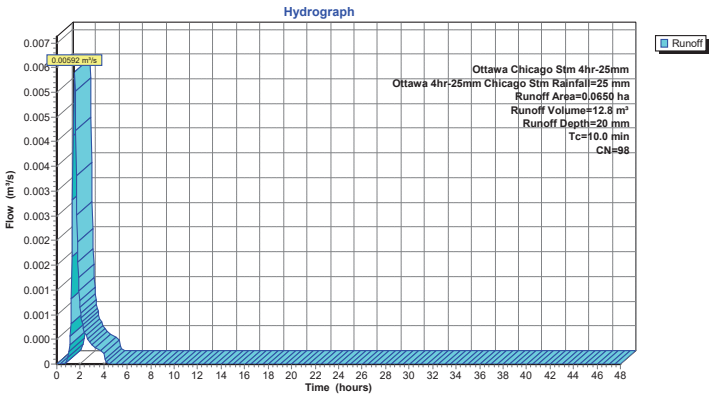
Runoff = 0.00592 m³/s @ 1.50 hrs, Volume= 12.8 m³, Depth= 20 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0650	98	
	0.0650		100.00% Impervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-7: A7



Summary for Subcatchment A-8: A8

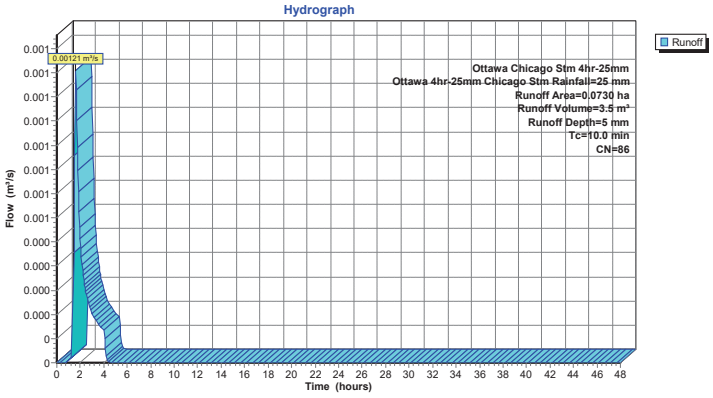
Runoff = 0.00121 m³/s @ 1.60 hrs, Volume= 3.5 m³, Depth= 5 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0730	86	
	0.0730		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-8: A8



Summary for Subcatchment A-9: A9

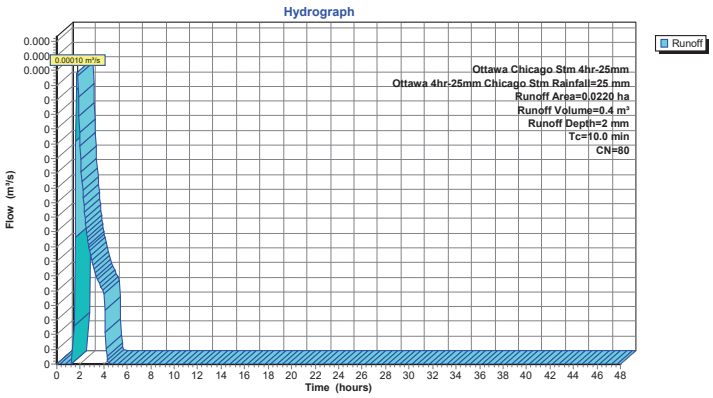
Runoff = 0.00010 m³/s @ 1.73 hrs, Volume= 0.4 m³, Depth= 2 mm

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Ottawa Chicago Stm 4hr-25mm Ottawa 4hr-25mm Chicago Stm Rainfall=25 mm

	Area (ha)	CN	Description
*	0.0220	80	
	0.0220		100.00% Pervious Area

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
10.0					**Direct Entry,**

Subcatchment A-9: A9



Summary for Pond P-0: Subsurface Chamber

Inflow Area = 13,130.0 m², 90.78% Impervious, Inflow Depth = 18 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.05927 m³/s @ 1.53 hrs, Volume= 238.4 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³
Secondary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 83.320 m @ 6.40 hrs Surf.Area= 0.0 m² Storage= 238.4 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	82.750 m	637.0 m³	**Subsurface Chamber** Listed below

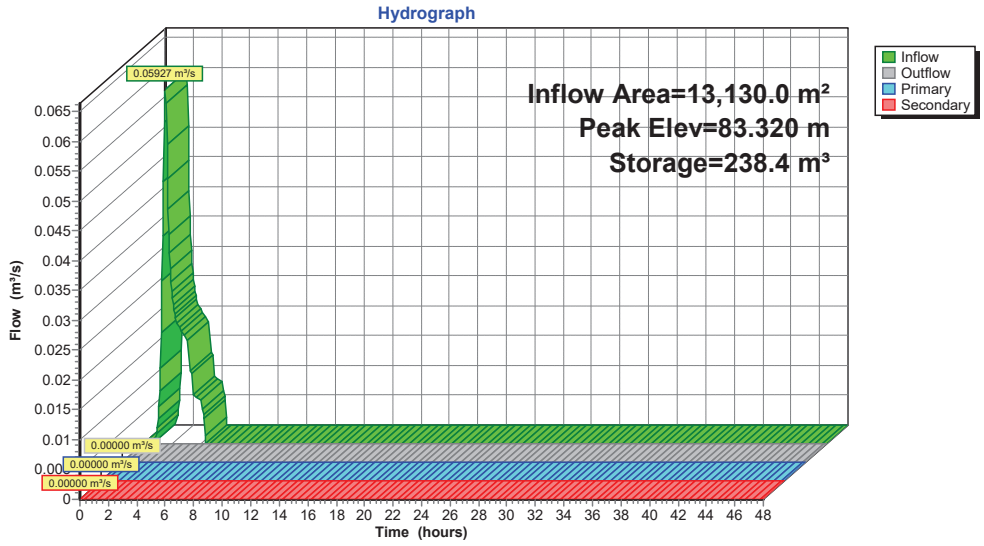
Elevation (meters)	Cum.Store (cubic-meters)
82.750	0.0
83.570	343.0
84.500	637.0

Device	Routing	Invert	Outlet Devices
#1	Device 2	83.570 m	**375 mm Vert. Manifold Outlet** C= 0.800
#2	Primary	83.140 m	**HYDROVEX 200-VHV-2 X 0.90** Head (meters) 0.000 0.200 0.500 1.000 1.500 2.000 2.500 3.000 4.000 5.000 6.000 Disch. (m³/s) 0.000000 0.000100 0.007000 0.044000 0.056000 0.065000 0.073000 0.082000 0.094000 0.112000 0.135000
#3	Secondary	84.450 m	**Overflow Check** Head (meters) 0.000 0.300 Disch. (m³/s) 0.000000 1.000000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=82.750 m (Free Discharge)
└**2=HYDROVEX 200-VHV-2** (Controls 0.00000 m³/s)
└**1=Manifold Outlet** (Controls 0.00000 m³/s)

Secondary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=82.750 m (Free Discharge)
└**3=Overflow Check** (Controls 0.00000 m³/s)

Pond P-0: Subsurface Chamber



Summary for Pond P-1: A1 Surface Ponding

Inflow Area = 1,110.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01011 m³/s @ 1.50 hrs, Volume= 21.9 m³
Outflow = 0.00924 m³/s @ 1.56 hrs, Volume= 21.9 m³, Atten= 9%, Lag= 3.9 min
Primary = 0.00924 m³/s @ 1.56 hrs, Volume= 21.9 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.046 m @ 1.56 hrs Surf.Area= 0.0 m² Storage= 2.3 m³

Plug-Flow detention time= 4.1 min calculated for 21.8 m³ (100% of inflow)
Center-of-Mass det. time= 4.1 min (116.9 - 112.8)

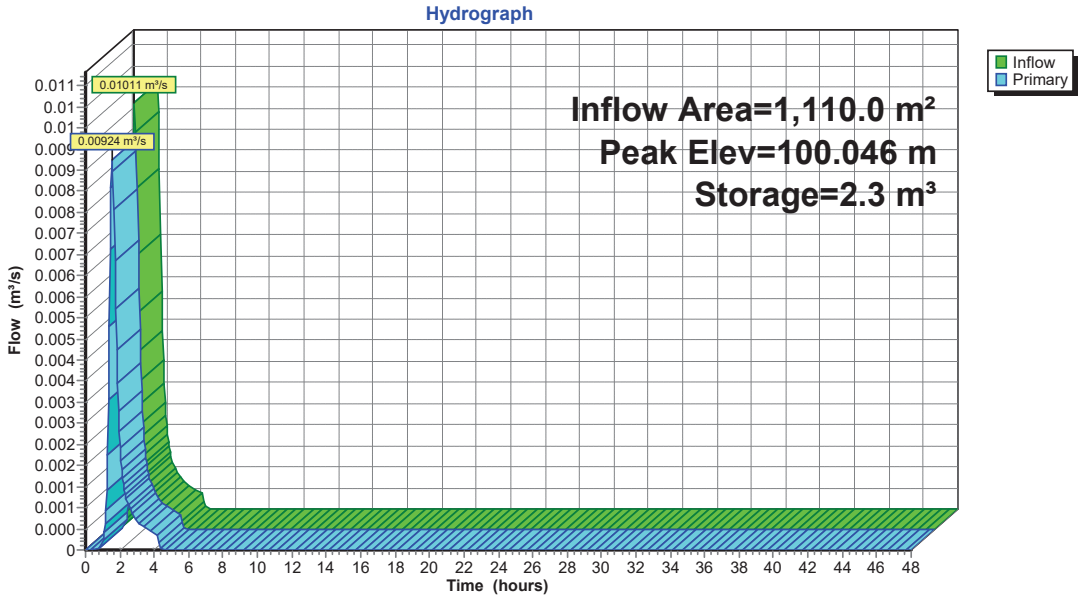
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	7.4 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	7.4

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00917 m³/s @ 1.56 hrs HW=100.046 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00917 m³/s)

Pond P-1: A1 Surface Ponding



Summary for Pond P-10: A10 Ponding

Inflow Area = 760.0 m², 72.37% Impervious, Inflow Depth = 15 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00502 m³/s @ 1.50 hrs, Volume= 11.3 m³
Outflow = 0.00498 m³/s @ 1.52 hrs, Volume= 11.3 m³, Atten= 1%, Lag= 1.2 min
Primary = 0.00498 m³/s @ 1.52 hrs, Volume= 11.3 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.025 m @ 1.52 hrs Surf.Area= 0.0 m² Storage= 0.4 m³

Plug-Flow detention time= 1.2 min calculated for 11.2 m³ (100% of inflow)
Center-of-Mass det. time= 1.2 min (115.4 - 114.2)

Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.2 m³	**Surface Ponding at CB** Listed below

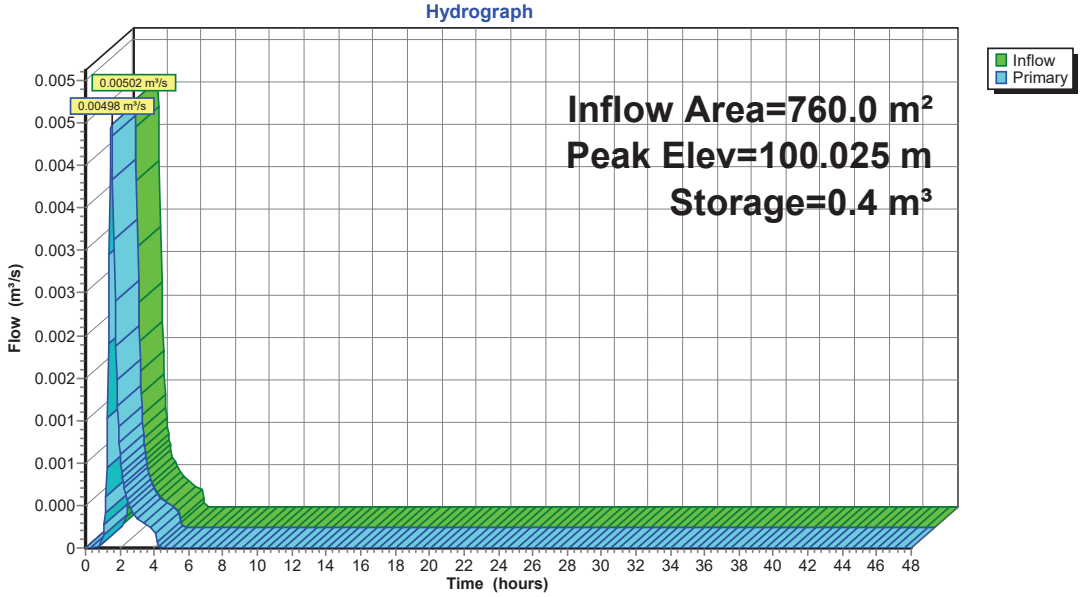
Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	2.2

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**600sq CB Inlet Sag_Single OPSD 400-01 400-03**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300 0.500
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000 0.250000

Primary OutFlow Max=0.00491 m³/s @ 1.52 hrs HW=100.025 m (Free Discharge)
1=600sq CB Inlet Sag_Single OPSD 400-01 400-03 (Custom Controls 0.00491 m³/s)

Pond P-10: A10 Ponding

Hydrograph



Summary for Pond P-12: A12 Bioretention

Inflow Area = 110.0 m², 0.00% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00005 m³/s @ 1.73 hrs, Volume= 0.2 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.037 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 0.2 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

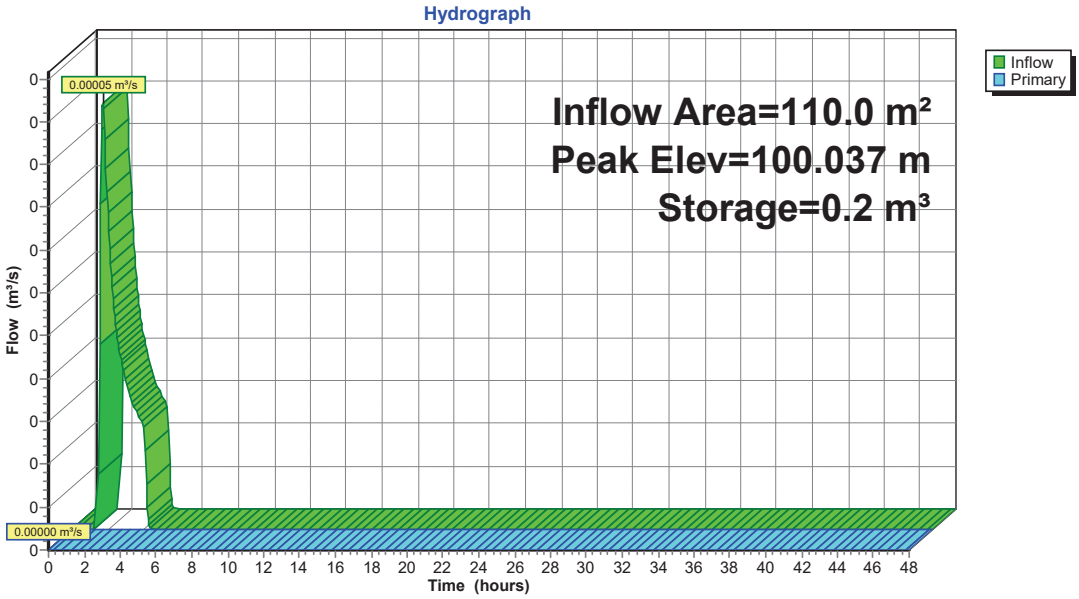
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	4.3 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	0.9
100.300	4.3

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-12: A12 Bioretention



Summary for Pond P-13: A13 Bioretention

Inflow Area = 160.0 m², 31.25% Impervious, Inflow Depth = 8 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00046 m³/s @ 1.51 hrs, Volume= 1.2 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.086 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 1.2 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

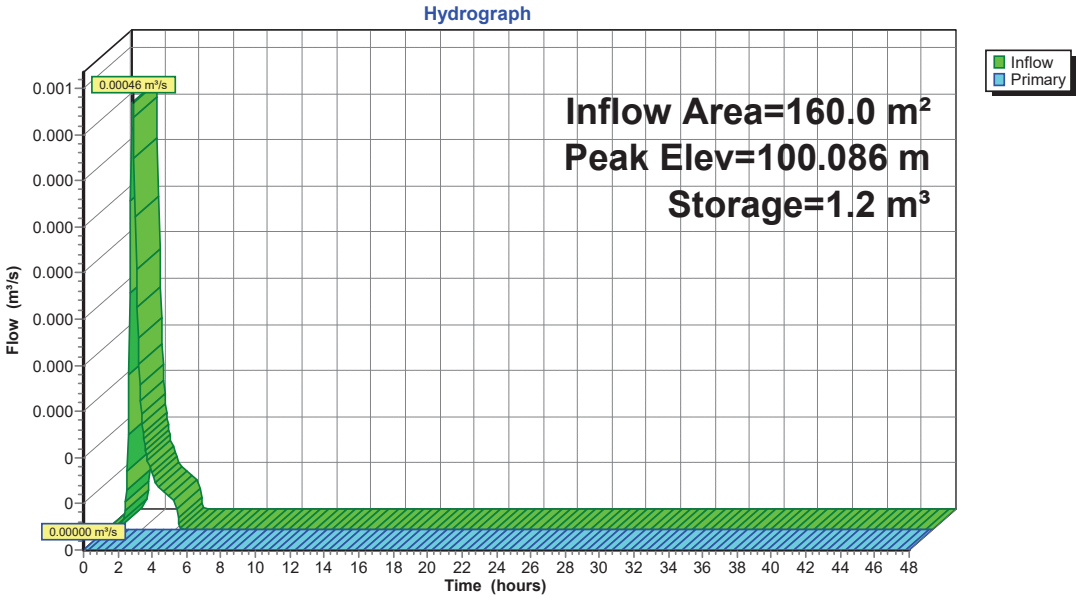
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	6.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	2.1
100.300	6.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-13: A13 Bioretention



Summary for Pond P-15: Rooftop Storage

Inflow Area = 2,210.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.02012 m³/s @ 1.50 hrs, Volume= 43.5 m³
Outflow = 0.00378 m³/s @ 1.30 hrs, Volume= 43.6 m³, Atten= 81%, Lag= 0.0 min
Primary = 0.00378 m³/s @ 1.30 hrs, Volume= 43.6 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.085 m @ 2.02 hrs Surf.Area= 710.9 m² Storage= 20.1 m³

Plug-Flow detention time= 51.2 min calculated for 43.5 m³ (100% of inflow)
Center-of-Mass det. time= 51.3 min (164.1 - 112.8)

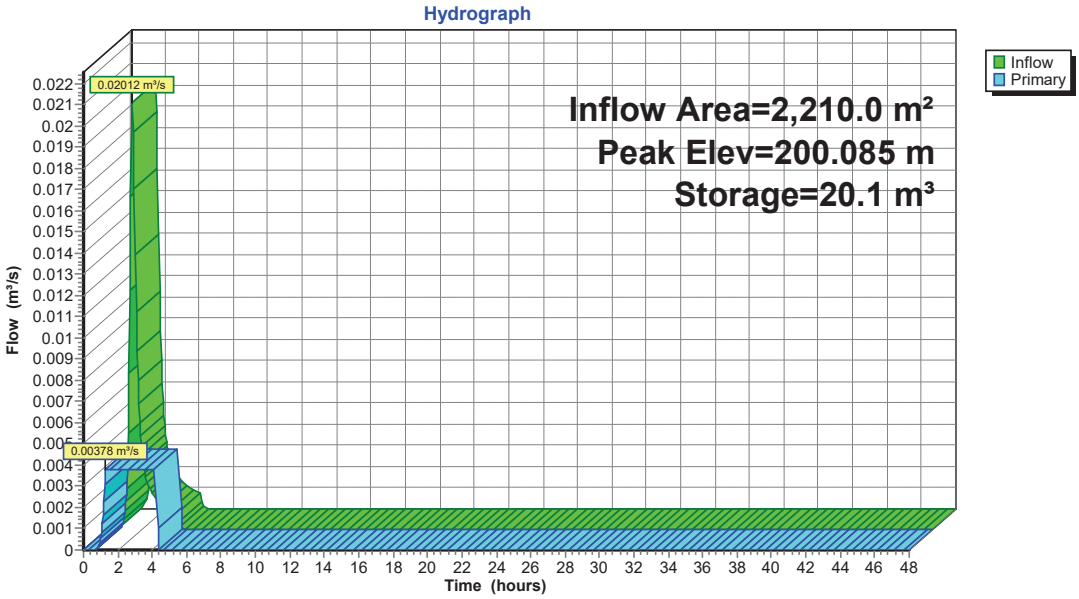
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	543.4 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 12

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	185.0	9.3	9.3	185.0
200.300	300.0	36.0	45.3	300.4

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 12.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00378 m³/s @ 1.30 hrs HW=200.028 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00378 m³/s)

Pond P-15: Rooftop Storage



Summary for Pond P-16: Rooftop Storage

Inflow Area = 2,530.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.02304 m³/s @ 1.50 hrs, Volume= 49.8 m³
Outflow = 0.00630 m³/s @ 1.35 hrs, Volume= 49.8 m³, Atten= 73%, Lag= 0.0 min
Primary = 0.00630 m³/s @ 1.35 hrs, Volume= 49.8 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.079 m @ 1.87 hrs Surf.Area= 689.0 m² Storage= 18.2 m³

Plug-Flow detention time= 25.0 min calculated for 49.8 m³ (100% of inflow)
Center-of-Mass det. time= 24.8 min (137.6 - 112.8)

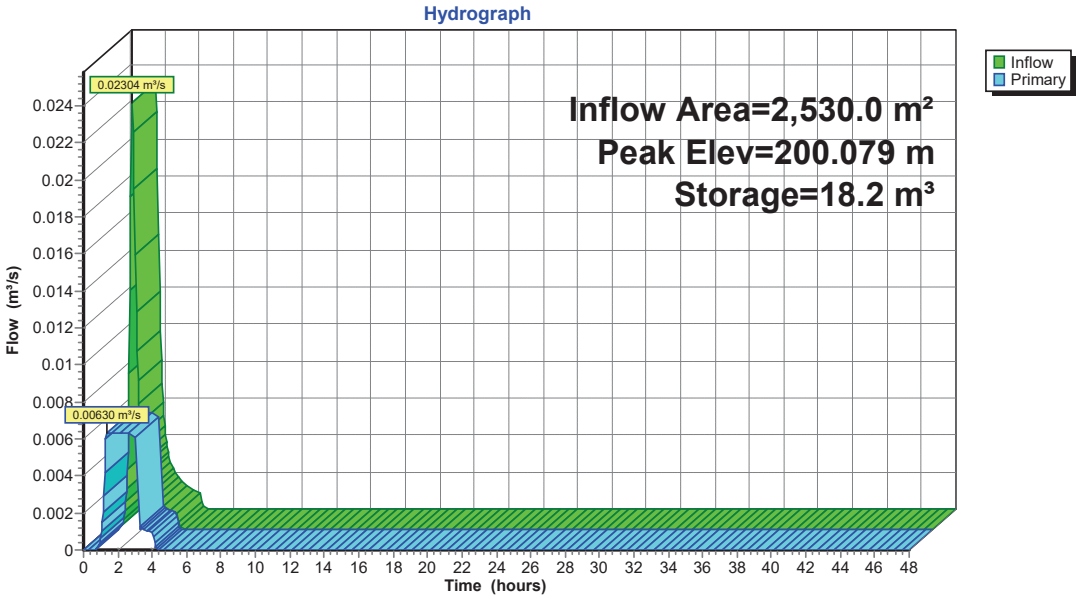
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	668.7 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 19

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	130.0	6.5	6.5	130.0
200.300	260.0	28.7	35.2	260.3

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 20.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00630 m³/s @ 1.35 hrs HW=200.033 m (Free Discharge)
↑—**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00630 m³/s)

Pond P-16: Rooftop Storage



Summary for Pond P-17: Rooftop Storage

Inflow Area = 1,980.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01803 m³/s @ 1.50 hrs, Volume= 39.0 m³
Outflow = 0.00441 m³/s @ 1.30 hrs, Volume= 39.0 m³, Atten= 76%, Lag= 0.0 min
Primary = 0.00441 m³/s @ 1.30 hrs, Volume= 39.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 200.083 m @ 1.91 hrs Surf.Area= 556.7 m² Storage= 15.4 m³

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 31.1 min (143.9 - 112.8)

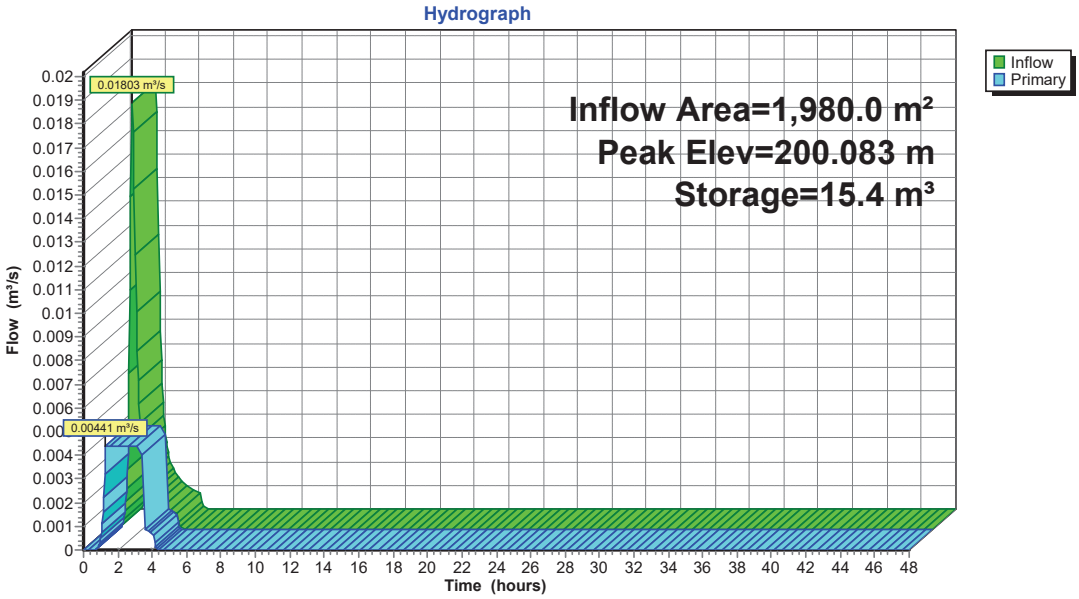
Volume	Invert	Avail.Storage	Storage Description
#1	200.000 m	492.7 m³	**Avg. Rooftop Storage (Pyramidal)** Listed below (Recalc) x 14

Elevation (meters)	Surf.Area (sq-meters)	Inc.Store (cubic-meters)	Cum.Store (cubic-meters)	Wet.Area (sq-meters)
200.000	0.0	0.0	0.0	0.0
200.150	130.0	6.5	6.5	130.0
200.300	260.0	28.7	35.2	260.3

Device	Routing	Invert	Outlet Devices
#1	Primary	200.000 m	**WATTS Accutrol_5-Closed X 14.00** Head (meters) 0.000 0.025 0.051 0.076 0.102 0.127 0.152 Disch. (m³/s) 0.000000 0.000315 0.000315 0.000315 0.000315 0.000315 0.000315

Primary OutFlow Max=0.00441 m³/s @ 1.30 hrs HW=200.025 m (Free Discharge)
↑**1=WATTS Accutrol_5-Closed** (Custom Controls 0.00441 m³/s)

Pond P-17: Rooftop Storage



Summary for Pond P-2: A2 Surface Ponding

Inflow Area = 1,480.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01348 m³/s @ 1.50 hrs, Volume= 29.2 m³
Outflow = 0.01333 m³/s @ 1.50 hrs, Volume= 29.2 m³, Atten= 1%, Lag= 0.1 min
Primary = 0.01333 m³/s @ 1.50 hrs, Volume= 29.2 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.053 m @ 1.50 hrs Surf.Area= 0.0 m² Storage= 0.9 m³

Plug-Flow detention time= 1.3 min calculated for 29.1 m³ (100% of inflow)
Center-of-Mass det. time= 1.3 min (114.1 - 112.8)

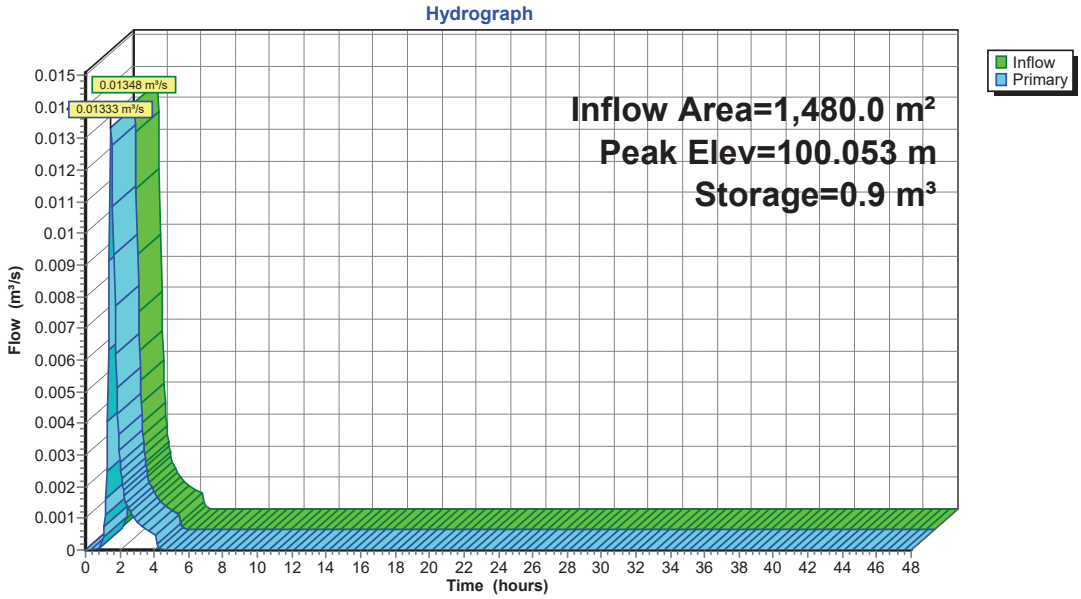
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	1.5 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.090	1.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.01331 m³/s @ 1.50 hrs HW=100.053 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.01331 m³/s)

Pond P-2: A2 Surface Ponding



Summary for Pond P-22: A22 Bioretention

Inflow Area = 130.0 m², 0.00% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00006 m³/s @ 1.73 hrs, Volume= 0.3 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.097 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 0.3 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

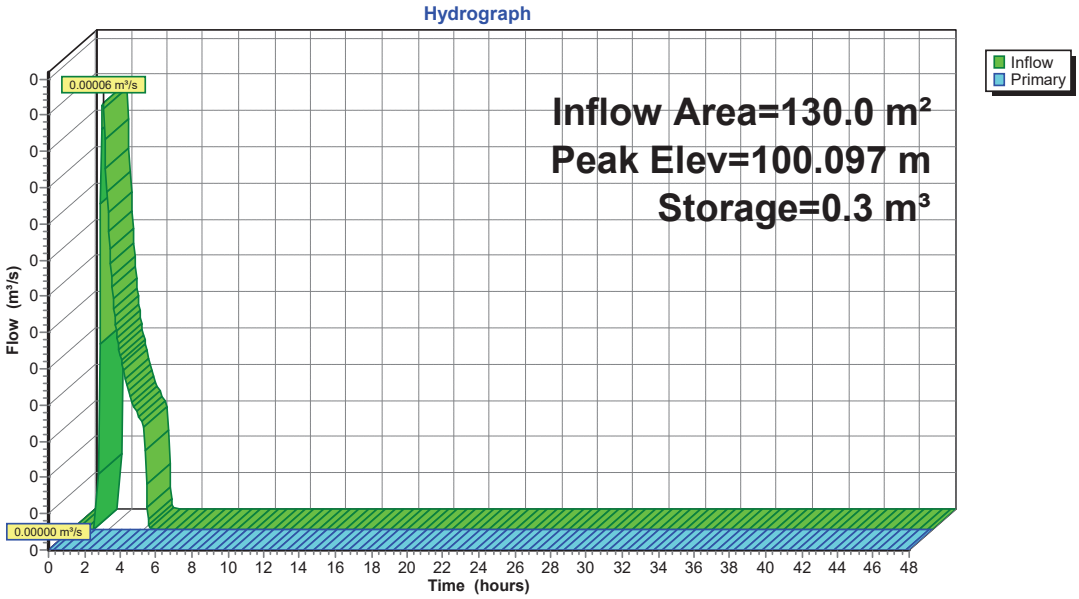
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.5 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	0.4
100.270	2.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-22: A22 Bioretention



Summary for Pond P-3: A3 Surface Ponding

Inflow Area = 1,200.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01093 m³/s @ 1.50 hrs, Volume= 23.6 m³
Outflow = 0.00979 m³/s @ 1.57 hrs, Volume= 23.6 m³, Atten= 10%, Lag= 4.3 min
Primary = 0.00979 m³/s @ 1.57 hrs, Volume= 23.6 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.049 m @ 1.57 hrs Surf.Area= 0.0 m² Storage= 2.8 m³

Plug-Flow detention time= 4.7 min calculated for 23.6 m³ (100% of inflow)
Center-of-Mass det. time= 4.7 min (117.5 - 112.8)

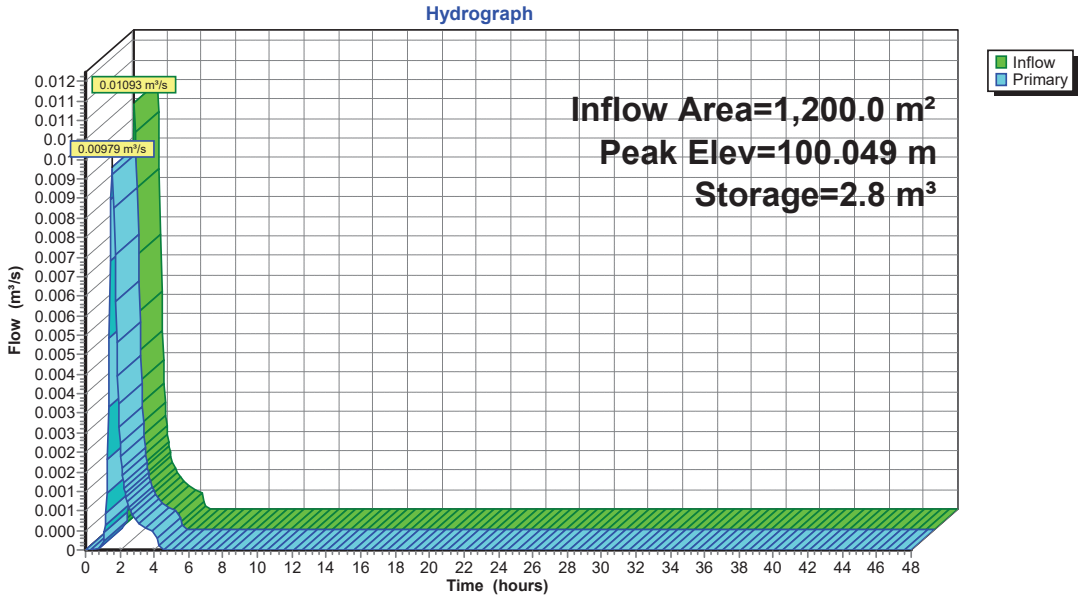
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	10.7 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.190	10.7

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00969 m³/s @ 1.57 hrs HW=100.048 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00969 m³/s)

Pond P-3: A3 Surface Ponding



Summary for Pond P-4: A4 Bioretention

Inflow Area = 170.0 m², 0.00% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00008 m³/s @ 1.73 hrs, Volume= 0.3 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.036 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 0.3 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

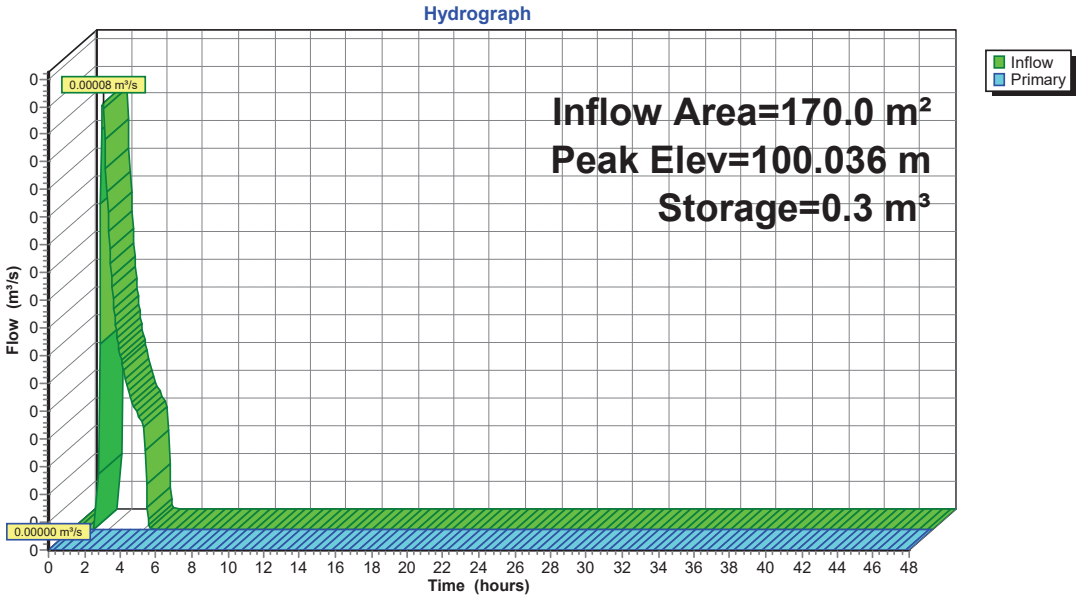
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	7.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	1.4
100.300	7.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-4: A4 Bioretention



Summary for Pond P-5: A5 Surface Ponding

Inflow Area = 760.0 m²,100.00% Impervious, Inflow Depth = 20 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00692 m³/s @ 1.50 hrs, Volume= 15.0 m³
Outflow = 0.00684 m³/s @ 1.51 hrs, Volume= 15.0 m³, Atten= 1%, Lag= 0.8 min
Primary = 0.00684 m³/s @ 1.51 hrs, Volume= 15.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 100.034 m @ 1.51 hrs Surf.Area= 0.0 m² Storage= 0.3 m³

Plug-Flow detention time= 0.8 min calculated for 15.0 m³ (100% of inflow)
Center-of-Mass det. time= 0.8 min (113.6 - 112.8)

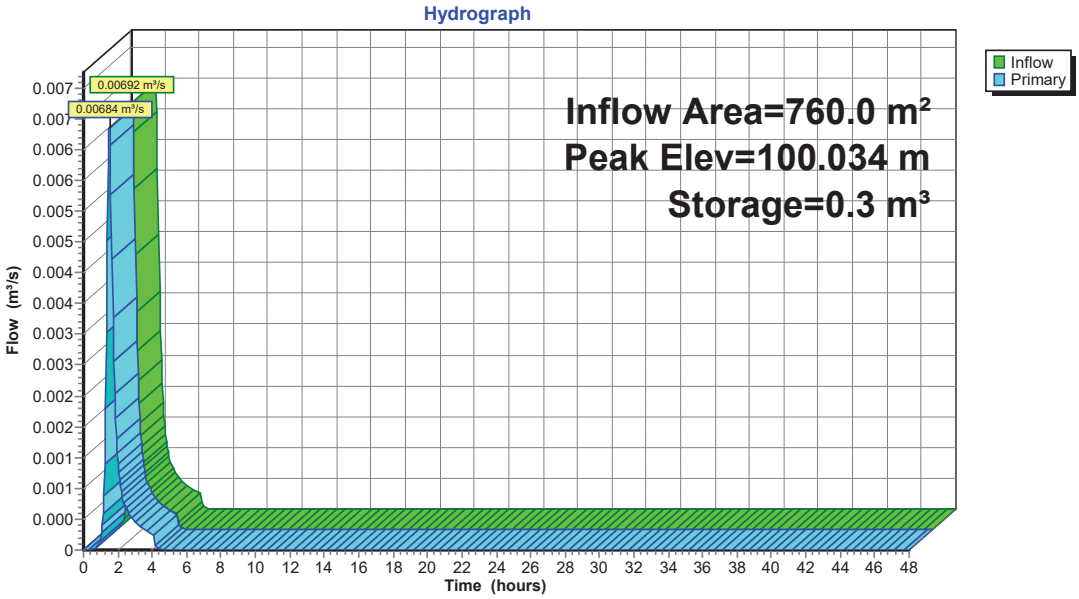
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	2.5 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.270	2.5

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00678 m³/s @ 1.51 hrs HW=100.034 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00678 m³/s)

Pond P-5: A5 Surface Ponding



Summary for Pond P-6: A6 Bioretention

Inflow Area = 180.0 m², 0.00% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00008 m³/s @ 1.73 hrs, Volume= 0.4 m³
Outflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 100%, Lag= 0.0 min
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.028 m @ 4.60 hrs Surf.Area= 0.0 m² Storage= 0.4 m³

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

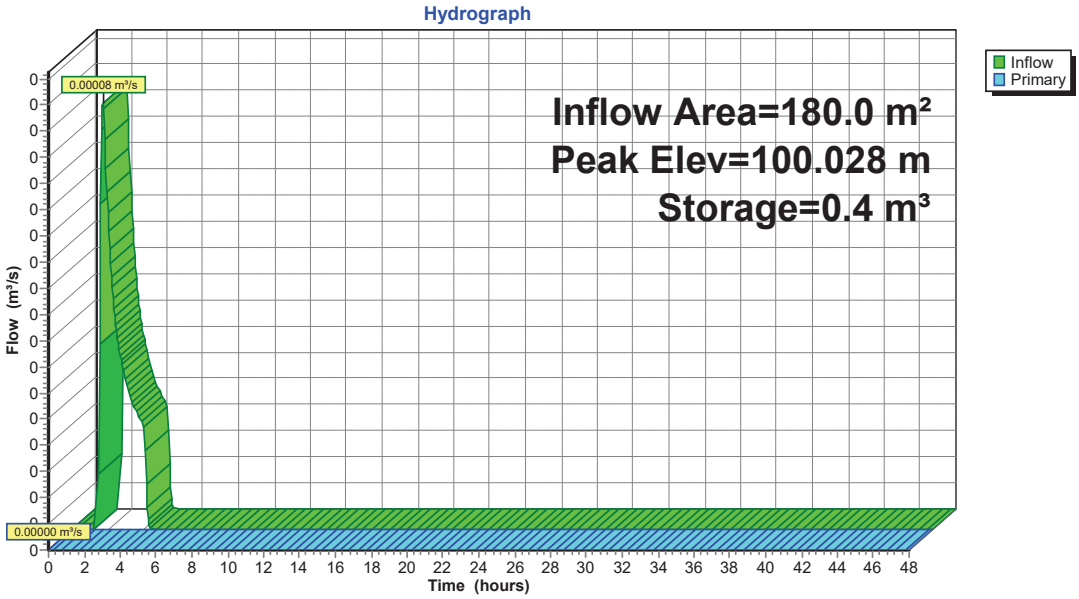
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	9.8 m³	**Bioretention** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.150	1.9
100.300	9.8

Device	Routing	Invert	Outlet Devices
#1	Primary	100.150 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00000 m³/s @ 0.00 hrs HW=100.000 m (Free Discharge)
↑—**1=CB inlet (Sag)** (Controls 0.00000 m³/s)

Pond P-6: A6 Bioretention



Summary for Pond P-8: A8 Surface Ponding

Inflow Area = 730.0 m², 0.00% Impervious, Inflow Depth = 5 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00121 m³/s @ 1.60 hrs, Volume= 3.5 m³
Outflow = 0.00102 m³/s @ 1.70 hrs, Volume= 3.5 m³, Atten= 16%, Lag= 6.2 min
Primary = 0.00102 m³/s @ 1.70 hrs, Volume= 3.5 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.005 m @ 1.70 hrs Surf.Area= 0.0 m² Storage= 0.3 m³

Plug-Flow detention time= 5.7 min calculated for 3.5 m³ (100% of inflow)
Center-of-Mass det. time= 5.7 min (141.7 - 135.9)

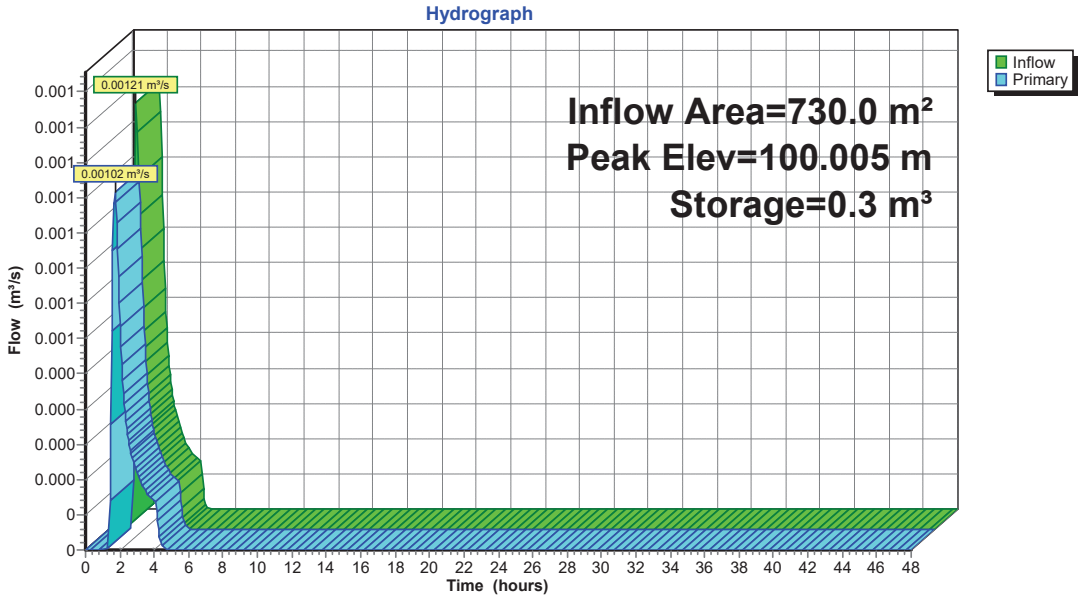
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	20.6 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.300	20.6

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00102 m³/s @ 1.70 hrs HW=100.005 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00102 m³/s)

Pond P-8: A8 Surface Ponding



Summary for Pond P-9: A9 Ponding

Inflow Area = 220.0 m², 0.00% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00010 m³/s @ 1.73 hrs, Volume= 0.4 m³
Outflow = 0.00010 m³/s @ 1.77 hrs, Volume= 0.4 m³, Atten= 0%, Lag= 1.9 min
Primary = 0.00010 m³/s @ 1.77 hrs, Volume= 0.4 m³

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 100.000 m @ 1.77 hrs Surf.Area= 0.0 m² Storage= 0.0 m³

Plug-Flow detention time= 1.7 min calculated for 0.4 m³ (100% of inflow)
Center-of-Mass det. time= 1.7 min (152.2 - 150.5)

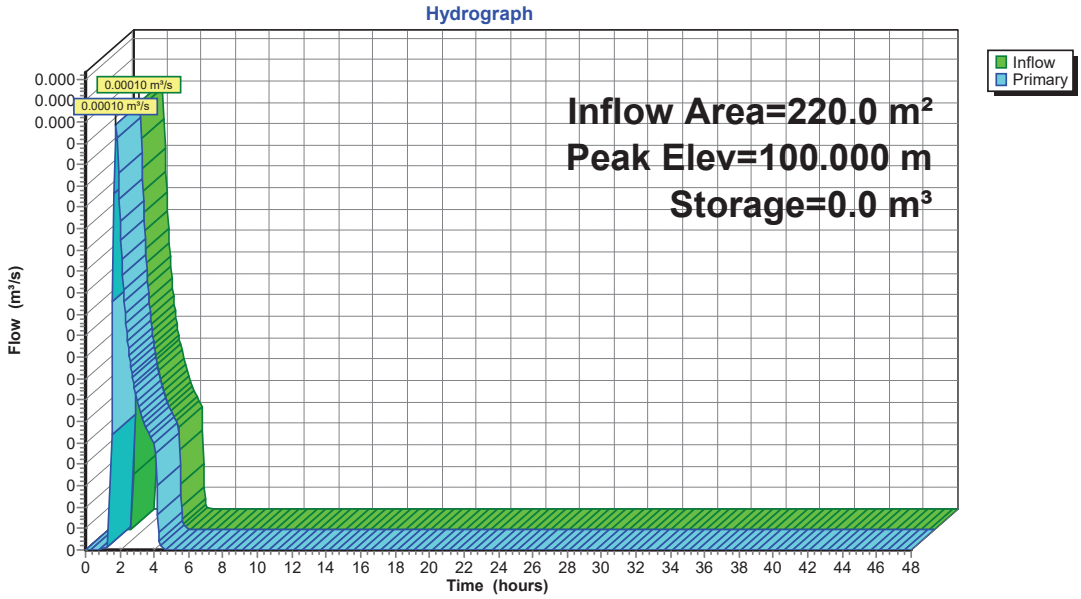
Volume	Invert	Avail.Storage	Storage Description
#1	100.000 m	4.0 m³	**Surface Ponding at CB** Listed below

Elevation (meters)	Cum.Store (cubic-meters)
100.000	0.0
100.200	4.0

Device	Routing	Invert	Outlet Devices
#1	Primary	100.000 m	**CB inlet (Sag)**
			Head (meters) 0.000 0.050 0.100 0.150 0.200 0.250 0.300
			Disch. (m³/s) 0.000000 0.010000 0.060000 0.120000 0.155000 0.180000 0.200000

Primary OutFlow Max=0.00010 m³/s @ 1.77 hrs HW=100.000 m (Free Discharge)
1=CB inlet (Sag) (Custom Controls 0.00010 m³/s)

Pond P-9: A9 Ponding

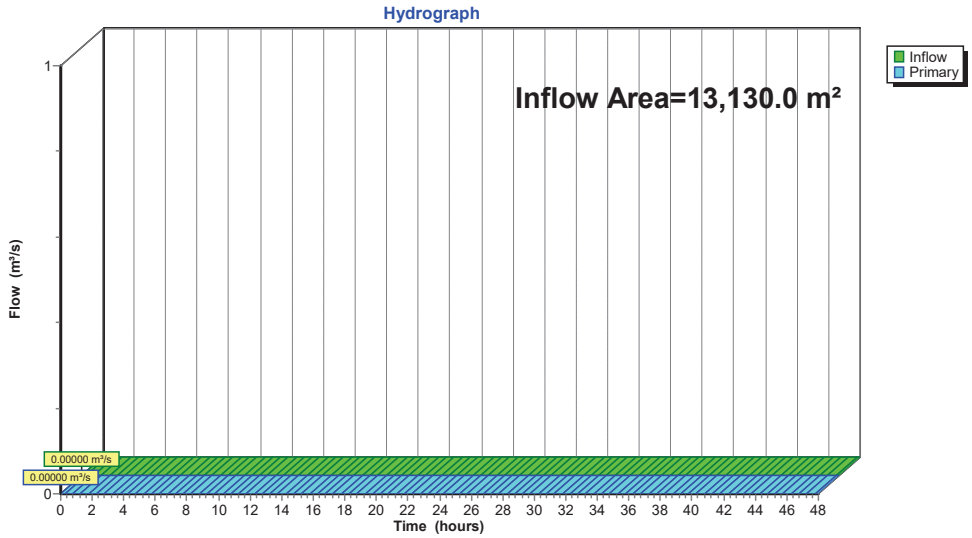


Summary for Link X-1: Chamber Outflow

Inflow Area = 13,130.0 m², 90.78% Impervious, Inflow Depth = 0 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³
Primary = 0.00000 m³/s @ 0.00 hrs, Volume= 0.0 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-1: Chamber Outflow

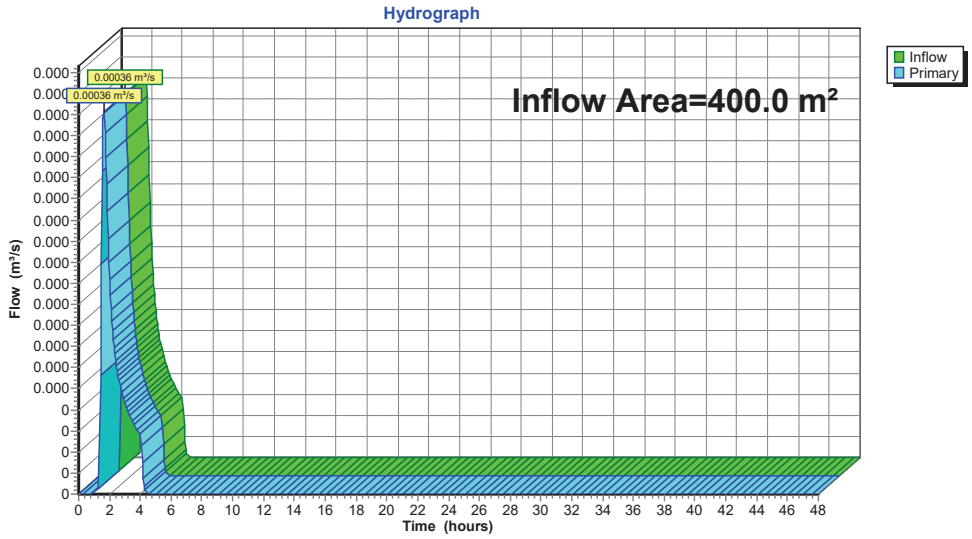


Summary for Link X-2: Internal Link A

Inflow Area = 400.0 m², 0.00% Impervious, Inflow Depth = 3 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.00036 m³/s @ 1.64 hrs, Volume= 1.3 m³
Primary = 0.00036 m³/s @ 1.64 hrs, Volume= 1.3 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-2: Internal Link A

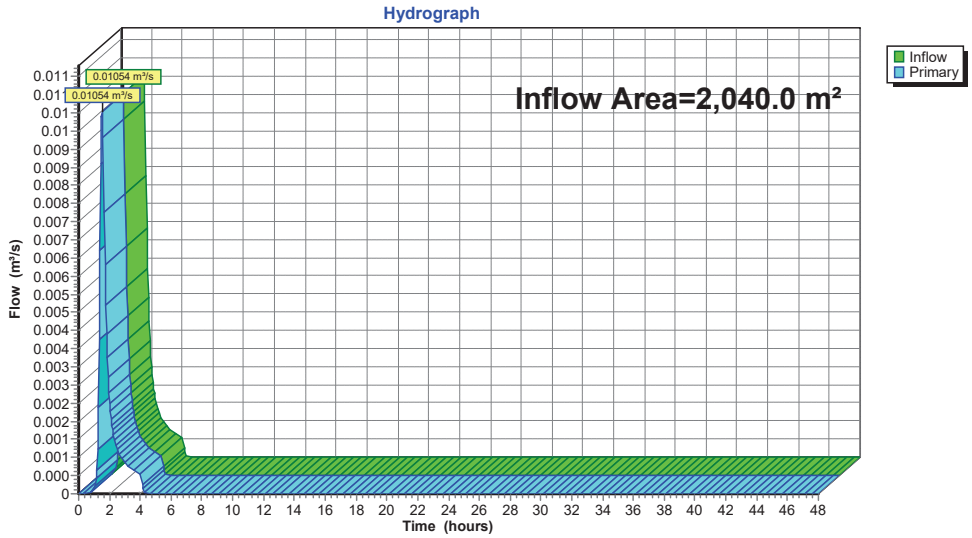


Summary for Link X-3: Internal Link B

Inflow Area = 2,040.0 m², 29.41% Impervious, Inflow Depth = 12 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01054 m³/s @ 1.52 hrs, Volume= 23.8 m³
Primary = 0.01054 m³/s @ 1.52 hrs, Volume= 23.8 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-3: Internal Link B

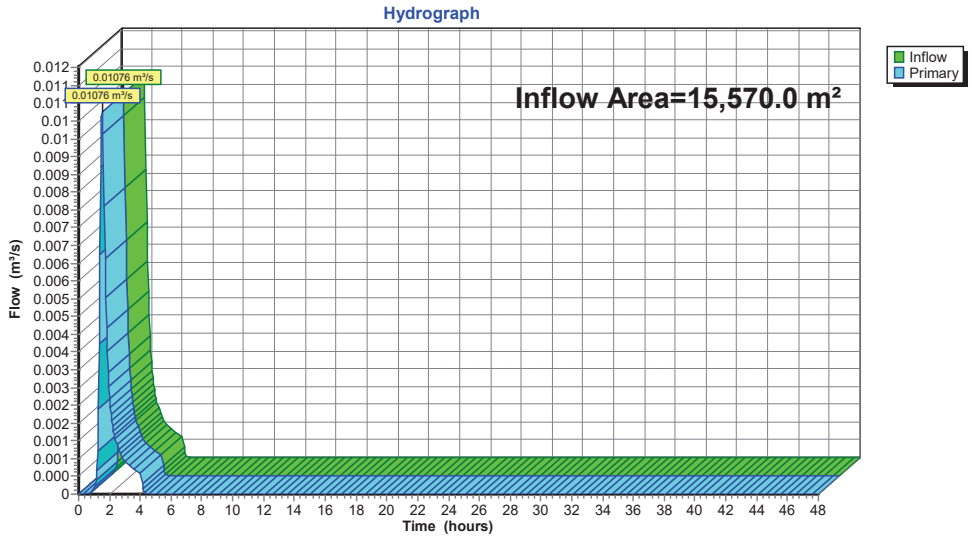


Summary for Link X-4: Net Offsite Flows

Inflow Area = 15,570.0 m², 80.41% Impervious, Inflow Depth = 2 mm for Ottawa 4hr-25mm Chicago Stm event
Inflow = 0.01076 m³/s @ 1.53 hrs, Volume= 25.2 m³
Primary = 0.01076 m³/s @ 1.53 hrs, Volume= 25.2 m³, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link X-4: Net Offsite Flows



STORM SEWER DESIGN SHEET

Athletics and Recreation Centre (ARC)
Algonquin College, Ottawa, ON
Project: 191-01517-00
Date: December, 2019

LOCATION				AREA (Ha)						RATIONAL DESIGN FLOW													PROPSOED SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.25	C= 0.35	C= 0.50	C= 0.60	C= 0.75	C= 0.90	IND 2.78AC	CUM 2.78 AC	INLET (min)	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	BLDG FLOW (L/s)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	RESTRICTED FLOW (L/s)	MATERIAL PIPE	SIZE (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME IN PIPE	AVAIL CAP (2yr) (L/s)	(%)
POST-DEVELOPMENT																															
To Access Road																															
Parking Lot	A-7	CB9	STMH1						0.065	0.163	0.163	10.00	10.14	76.81	104.19	178.56		12.49				12.49		PVC DR-35	200.0	1.00	8.55	32.83	1.04	0.14	20.34	61.95%
Parking Lot	A-22	CB5	STMH1	0.013						0.009	0.009	10.00	10.29	76.81	104.19	178.56		0.69				0.69		PVC DR-35	200.0	1.00	18.15	32.83	1.04	0.29	32.14	97.89%
Parking Lot		STMH1	STMH2							0.000	0.172	10.29	10.45	75.71	102.69	175.95		13.00				13.00		PVC DR-35	300.0	0.70	10.90	80.99	1.14	0.16	67.99	83.95%
Parking Lot		STMH2	DETENTION CHAMBER							0.000	0.172	10.45	10.45	75.12	101.88	174.56		12.90				12.90			600.0	BY STORMTECH						
ARC	A-17	Building Roof	DETENTION CHAMBER						0.198	0.495	0.495	10.00	10.20	76.81	104.19	178.56		38.05				38.05		PVC DR-35	300.0	1.00	16.10	96.80	1.37	0.20	58.75	60.69%
Parking Lot	A-6	CB13	DETENTION CHAMBER	0.018						0.013	0.013	10.00	10.22	76.81	104.19	178.56		0.96				0.96		PVC DR-35	200.0	1.00	14.00	32.83	1.04	0.22	31.87	97.07%
Parking Lot	A-5	CB4	DETENTION CHAMBER						0.076	0.190	0.190	10.00	10.02	76.81	104.19	178.56		14.60				14.60		PVC DR-35	200.0	1.00	1.30	32.83	1.04	0.02	18.23	55.52%
Parking Lot	A-4	CB12	DETENTION CHAMBER	0.017						0.012	0.012	10.00	10.22	76.81	104.19	178.56		0.91				0.91		PVC DR-35	200.0	1.00	14.00	32.83	1.04	0.22	31.92	97.24%
Parking Lot	A-3	CB3	DETENTION CHAMBER						0.120	0.300	0.300	10.00	10.02	76.81	104.19	178.56		23.06				23.06		PVC DR-35	200.0	1.00	1.30	32.83	1.04	0.02	9.77	29.76%
ARC	A-16	Building Roof	DETENTION CHAMBER						0.253	0.633	0.633	10.00	10.20	76.81	104.19	178.56		48.62				48.62		PVC DR-35	300.0	1.00	16.10	96.80	1.37	0.20	48.18	49.77%
Parking Lot		DETENTION CHAMBER	STMH13							0.000	1.815	10.45	10.45	75.12	101.88	174.56		136.34				136.34			600.0	BY STORMTECH						
ARC	A-15	Building Roof	STMH13						0.221	0.553	0.553	10.00	10.15	76.81	104.19	178.56		42.47				42.47		PVC DR-35	300.0	2.00	16.85	136.89	1.93	0.15	94.42	68.98%
Parking Lot		STMH13	DETENTION CHAMBER							0.000	2.368	10.45	10.45	75.12	101.88	174.56		177.87				177.87			600.0	BY STORMTECH						
Parking Lot	A-2	CB2	DETENTION CHAMBER						0.148	0.370	0.370	10.00	10.02	76.81	104.19	178.56		28.44				28.44		PVC DR-35	200.0	1.00	1.30	32.83	1.04	0.02	4.39	13.37%
Parking Lot	A-8	CB11	DETENTION CHAMBER	0.058					0.015	0.078	0.078	10.00	10.38	76.81	104.19	178.56		5.98				5.98		PVC DR-35	200.0	1.00	23.50	32.83	1.04	0.38	26.85	81.79%
Parking Lot	A-1	CB1	DETENTION CHAMBER	0.004					0.107	0.270	0.270	10.00	10.02	76.81	104.19	178.56		20.78				20.78		PVC DR-35	200.0	1.00	1.30	32.83	1.04	0.02	12.06	36.72%
Parking Lot		DETENTION CHAMBER	CBMH3							0.000	3.086	10.45	10.45	75.12	101.88	174.56		231.86				231.86			375.0	BY STORMTECH						
Parking Lot		CBMH3	STMH4							0.000	3.086	10.45	10.47	75.12	101.88	174.56		231.86				231.86	35.00	PVC DR-35	375.0	2.00	3.00	248.20	2.25	0.02	213.20	85.90%
Parking Lot		STMH4	STMH5							0.000	3.086	10.47	10.51	75.04	101.77	174.37		231.61				231.61	35.00	PVC DR-35	375.0	2.00	5.30	248.20	2.25	0.04	213.20	85.90%
Access Road	EXT2	*Ex.CB107*	STMH5	0.073					0.502	1.307	1.307	10.00	10.20	76.81	104.19	178.56		100.36				100.36		PVC DR-35	*375.0*	*0.68*	*15.81*	144.73	1.31	0.20	44.36	30.65%
Access Road		STMH5	CBMH6							0.000	4.393	10.51	10.91	74.90	101.57	174.03		329.04				329.04	135.36	PVC DR-35	450.0	1.20	47.10	312.63	1.96	0.40	177.27	56.70%
Access Road	A-9	CB6	*CBMH6-Ex.MHSTM45*	0.022						0.015	0.015	10.00	10.07	76.81	104.19	178.56		1.17				1.17		PVC DR-35	200.0	1.00	4.30	32.83	1.04	0.07	31.66	96.42%
Access Road	EXT3	CBMH6	*Ex.MHSTM45*	0.125					0.060	0.237	4.645	10.91	11.18	73.48	99.62	170.65		341.34				341.34	153.80	PVC DR-35	450.0	1.20	31.90	312.63	1.96	0.27	158.83	50.81%

Definition:
Q=2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall Intensity in millimeters per hour (mm/hr)
i = 732.951/(TC+6.199)^0.810 — 2 Year
i = 1174.184/(TC+6.014)^0.816 — 5 Year
i = 1735.688/(TC+6.014)^0.820 — 100 Year

Notes:
1. Mannings coefficient (n) = 0.013

Time-of-Concentration in the Swale
FAA Equation: t (min) = 3.258 [(1.1 - C) L^0.5 / S^.33]
Where: Longest Watercourse Length, L (m). S (%)
Runoff Coef.C = Impervious

No.	L (m)	S %
1		

Tc= #DIV/0! min

Designed: D.B.Y.
Checked: D.B.Y./J.J.
Dwg. Reference: C05

No.	Revision	Date
1.	City Submission No. 1	24/06/2019
2.	City Submission No. 2	24/09/2019
3.	City Submission No. 3	21/11/2019
4.	City Submission No. 4	19/12/2019

File Reference: 191-01517-00 | **Date:** 19/12/2019 | **Sheet No:** 1 of 2

STORM SEWER DESIGN SHEET

Athletics and Recreation Centre (ARC)
Algonquin College, Ottawa, ON
Project: 191-01517-00
Date: December, 2019

LOCATION				AREA (Ha)						RATIONAL DESIGN FLOW												PROPSOED SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.25	C= 0.35	C= 0.50	C= 0.60	C= 0.75	C= 0.90	IND 2.78AC	CUM 2.78 AC	INLET (min)	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	BLDG FLOW (L/s)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	RESTRICTED FLOW (L/s)	MATERIAL PIPE	SIZE (mm)	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME IN PIPE	AVAIL CAP (2yr) (L/s)	(%)
To North Service Road																															
North Service Road		Building Foundation	CBMH8							0.000	0.000	10.00	11.08	76.81	104.19	178.56		0.00			0.02	0.02		PVC DR-35	150.0	1.00	55.60	15.24	0.86	1.08	15.22	99.85%
North Service Road	EXT1	CBMH8	*Ex.MHST27*	0.126					0.059	0.235	0.235	11.08	11.73	72.91	98.84	169.29		17.15			0.02	17.17		PVC DR-35	200.0	1.00	41.05	32.83	1.04	0.66	15.66	47.70%
North Service Road		Building Foundation	*Ex.MHST27-Ex.MHST42*							0.000	0.000	10.00	10.07	76.81	104.19	178.56		0.00			0.02	0.02		PVC DR-35	150.0	1.00	3.50	15.24	0.86	0.07	15.22	99.85%
North Service Road	External	*Ex.MHST27*	CBMH9					2.000		4.170	4.405	11.73	11.92	70.74	95.86	164.15		311.64			0.05	311.68		CONC 100-D	*600.0*	*0.80*	*22.55*	549.74	1.94	0.19	238.06	43.30%
North Service Road	A-13	CBMH9	STMH10	0.011						0.008	4.413	11.92	11.99	70.13	95.02	162.70		309.47			0.05	309.52		CONC 100-D	600.0	0.46	5.90	416.86	1.47	0.07	107.34	25.75%
North Service Road		STMH10	STMH11							0.000	4.413	11.99	12.17	69.92	94.73	162.20		308.55			0.05	308.60		CONC 100-D	600.0	0.46	16.10	416.86	1.47	0.18	108.26	25.97%
North Service Road		STMH11	STMH12							0.000	4.413	12.17	12.24	69.36	93.96	160.87		306.07			0.05	306.12		CONC 100-D	600.0	0.46	5.90	416.86	1.47	0.07	110.74	26.57%
North Service Road	A-12	CB8	*Ex.MHST27-Ex.MHST42*	0.011						0.008	0.008	10.00	10.01	76.81	104.19	178.56		0.59				0.59		PVC DR-35	200.0	1.00	0.80	32.83	1.04	0.01	32.24	98.21%
North Service Road		STMH12	*Ex.MHST42*							0.000	4.420	12.24	12.61	69.16	93.68	160.38		305.70			0.05	305.75		CONC 100-D	*600.0*	*0.80*	*43.71*	549.74	1.94	0.38	243.99	44.38%
North Service Road	A-11	CB7	CBMH7						0.055	0.138	0.138	10.00	10.37	76.81	104.19	178.56		10.57				10.57		PVC DR-35	200.0	1.00	23.05	32.83	1.04	0.37	22.26	67.81%
North Service Road		CBMH7	*Ex.MHST25-Ex.MHST45*	0.017					0.004	0.022	0.159	10.37	10.41	75.42	102.29	175.26		12.02				12.02		PVC DR-35	200.0	1.00	2.50	32.83	1.04	0.04	20.81	63.38%
PRE-DEVELOPMENT CAPACITY CHECK																															
	PA-1	*Ex.CB110*	*Ex.CB109*	0.020					0.159	0.412	0.412	10.00	10.76	76.81	104.19	178.56		31.62				31.62		PVC DR-35	*375.0*	*0.76*	*63.02*	153.00	1.38	0.76	121.38	79.33%
	PA-2	*Ex.CB109*	*Ex.CB108*	0.064					0.450	1.170	1.582	10.76	11.57	74.01	100.35	171.91		117.09				117.09		PVC DR-35	*375.0*	*1.02*	*78.26*	177.25	1.60	0.81	60.16	33.94%
	PA-3	*Ex.CB107*	*Ex.CB108*	0.073					0.535	1.389	1.389	10.00	10.80	76.81	104.19	178.56		106.71				106.71		PVC DR-35	*375.0*	*0.68*	*62.94*	144.73	1.31	0.80	38.02	26.27%
	PA-4	*Ex.CB108*	*Ex.MHSTM45*	0.168					0.644	1.728	4.699	11.57	11.73	71.25	96.56	165.36		334.85				334.85		PVC DR-35	*450.0*	*3.76*	*31.91*	553.40	3.48	0.15	218.55	39.49%

Definition:
Q=2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall Intensity in millimeters per hour (mm/hr)
i = 732.951/(TC+6.199)^0.810 — 2 Year
i = 1174.184/(TC+6.014)^0.816 — 5 Year
i = 1735.688/(TC+6.014)^0.820 — 100 Year

Notes:
1. Mannings coefficient (n) = 0.013

Time-of-Concentration in the Swale
FAA Equation: t (min) = 3.258 [(1.1 - C) L^0.5 / S^.33]
Where: Longest Watercourse Length, L (m). S (%)
Runoff Coef.C = Impervious

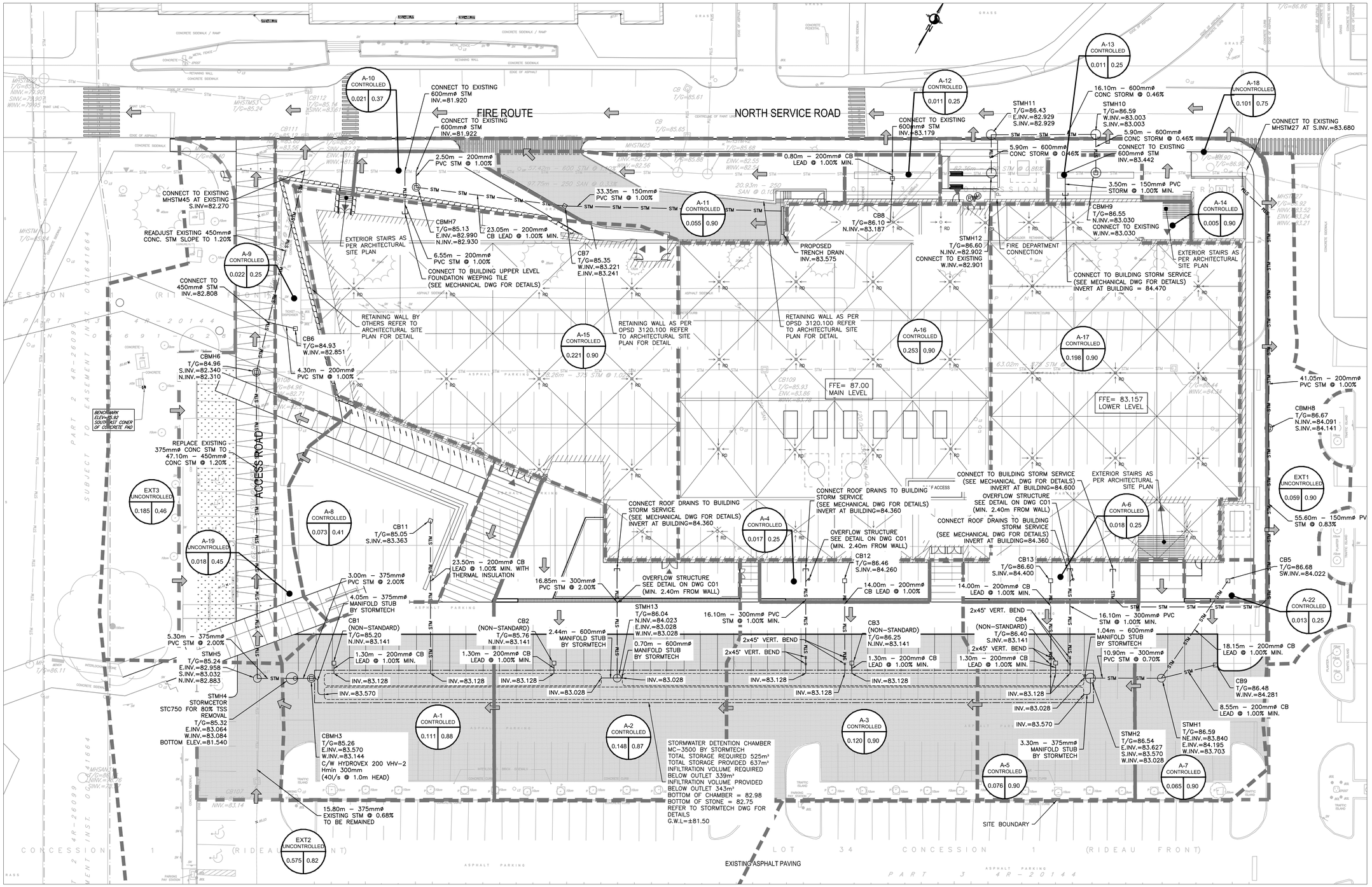
No.	L (m)	S %
1		

Tc= #DIV/0! min

Designed: D.B.Y.
Checked: D.B.Y./J.J.
Dwg. Reference: C05

No.	Revision	Date
1.	City Submission No. 1	24/06/2019
2.	City Submission No. 2	24/09/2019
3.	City Submission No. 3	21/11/2019
4.	City Submission No. 4	19/12/2019

File Reference: 191-01517-00
Date: 19/12/2019
Sheet No: 2 of 2



LEGEND:

- EXISTING FIRE HYDRANT
- EXISTING V&VB
- EXISTING VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- PROPOSED V&B
- PROPOSED REMOTE METER
- PROPOSED METER
- PROPOSED CATCHBASIN MANHOLE
- PROPOSE CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- STORM DRAINAGE BOUNDARY
- ID CONTROLLED (A | C) — ID DENOTES WATERSHED NAME; A DENOTES AREA IN HECTARES; C DEONOTES RUNOFF COEFFICIENT
- OVERLAND MAJOR FLOW ROUTE

0 5m 10m 20m 30m

SCALE: 1: 300

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\3 Working Drawings\Sheets\191-01517-00_CN1L.dwg
PLOTDATE: Dec 19, 2019 - 11:28am, casey06741

ALGONQUIN COLLEGE

Algonquin Students' ASSOCIATION

Project
ATHLETICS AND RECREATION CENTRE (ARC)

Prepared For
ALGONQUIN STUDENTS' ASSOCIATION

HOK Architects Corporation
205 Catherine Street, Suite 101
Ottawa, Ontario K2P 1C3 Canada
t +1 613 226 9650 f +1 613 226 9656

All reproduction & intellectual property rights reserved © 2019

In Association with

WSP
STRUCTURAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
MECHANICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

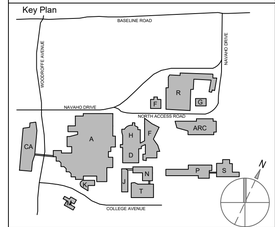
WSP
ELECTRICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
CIVIL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

CSW Landscape Architects
LANDSCAPE
319 McRae Avenue, Suite 502
Ottawa, ON, K1Z 0B9

WSP
SUSTAINABILITY
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

Key Plan



Professional Seals

REGISTERED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2019–12–19
PROVINCE OF ONTARIO

No.	Description	Date
1	SITE PLAN APPROVAL	2019-06-24
2	ISSUED FOR PERMIT/TENDER	2019-08-20
3	RESPONSE TO SPA COMMENTS	2019-09-24
4	RESPONSE TO SPA COMMENTS	2019-11-21
5	REVISED AS PER STORMTECH DESIGN	2019-11-28
6	ISSUED FOR CLASS B	2019-12-06
7	RESPONSE TO SPA COMMENTS	2019-12-19

Drawn by: D.B.Y. Reviewed by: J.J.

Project No: 191-01517-00

Sheet Title

POST-DEVELOPMENT STORM DRAINAGE AREA PLAN

Original drawing is A1. Do not scale contents of this drawing.

Sheet Number

C05

D07-12-19-0114

#17981

PA-1
UNCONTROLLED
0.179 0.83

PA-2
UNCONTROLLED
0.514 0.82

PA-3
UNCONTROLLED
0.608 0.82

PA-4
UNCONTROLLED
0.812 0.77

wsp

300-2611 QUEENSVIEW DRIVE
OTTAWA ONTARIO CANADA K2B 8K2
TEL.: 1-613-829-2800 | FAX: 1-613-829-8299 | WWW.WSPGROUP.COM

PROJECT:
ATHLETICS AND RECREATION CENTRE (ARC)

ADDRESS:
ALGONQUIN COLLEGE
OTTAWA, ONTARIO

PROJECT NO.: 191-01517-00

DRAWING NAME:
PRE-DEVELOPMENT STORM DRAINAGE AREA PLAN

DATE: 2019-06-24

SCALE: 1 : 750

REVIEWED BY: J.J

LEGEND

I.D. DENOTES STORM DRAINAGE AREA ID
A DENOTES DRAINAGE AREA
C DENOTES RUNOFF COEFFICIENT

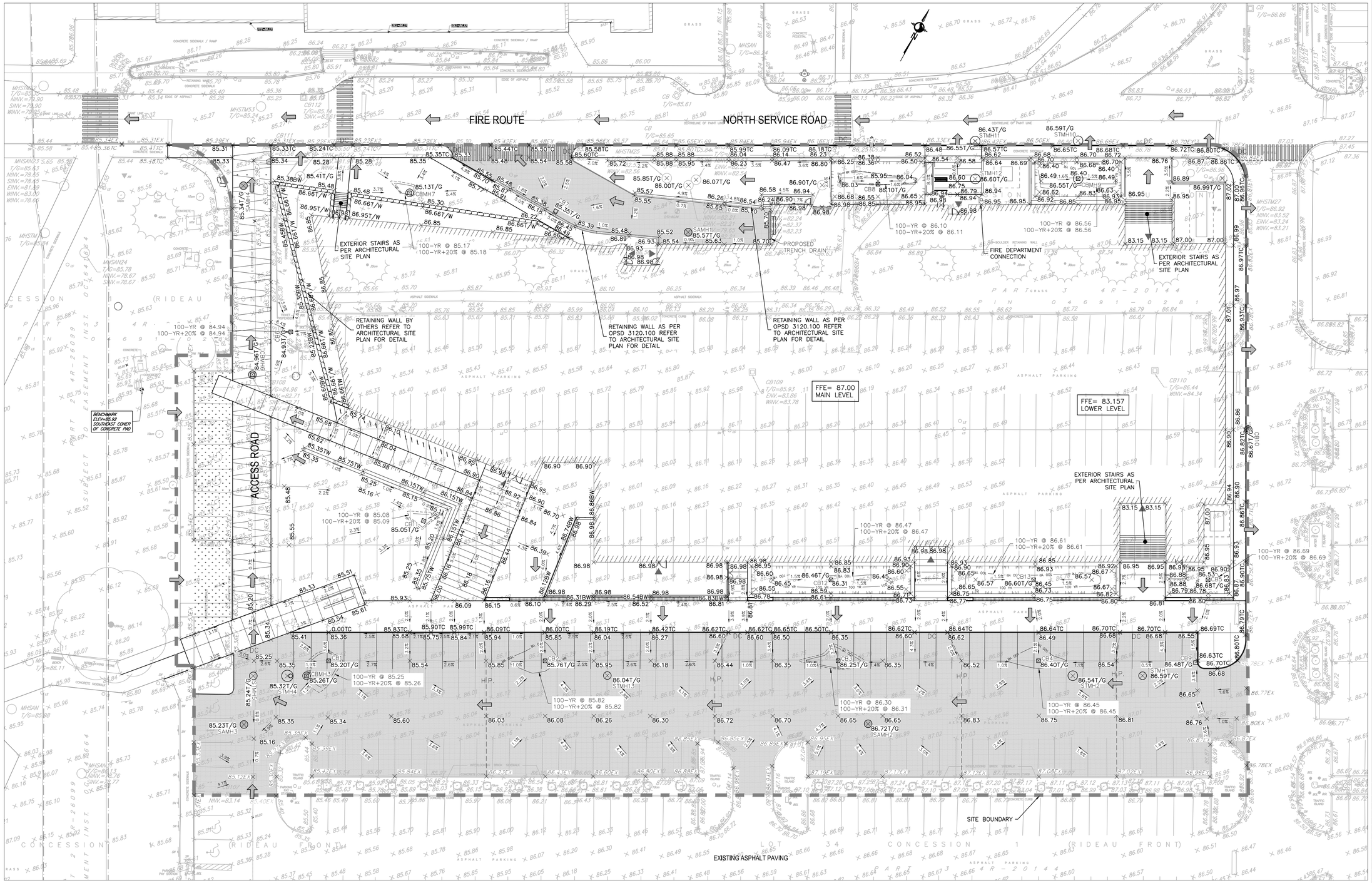
PRE-DEVELOPMENT STORM DRAINAGE BOUNDARY

DESIGNED BY: D.Y.

DRAWN BY: D.Y.

SHEET: FIG2

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\2 Working Drawings\Sheets\191-01517-00_CIVIL.dwg
PLOTDATE: Jun 21, 2019 - 3:45pm, cawy069741



LEGEND:

	EXISTING FIRE HYDRANT		PROPOSED METER	×86.15TC	PROPOSED TOP OF CURB		PROPOSED CONCRETE CURB
	EXISTING V&VB		PROPOSED CATCHBASIN MANHOLE	×86.15(s)	PROPOSED SWALE ELEVATION		EXISTING BUILDING OR STRUCTURE
	EXISTING VALVE CHAMBER		PROPOSE CATCHBASIN	2.0%	PROPOSED SLOPE		LIMIT OF CONSTRUCTION
	PROPOSED FIRE HYDRANT		EXISTING CATCHBASIN MANHOLE	100 YR	100 YEAR + 20% PONDING LIMIT 100 YEAR PONDING LIMIT		PROPOSED CENTERLINE OF SWALE
	PROPOSED V&B	×86.43EX	EXISTING GRADE		SIAMESE CONNECTION		PROPOSED TERRACING (3:1 MAX)
	PROPOSED REMOTE METER	×86.10	PROPOSED GRADE		OVERLAND MAJOR FLOW ROUTE		EXISTING CONCRETE CURB

0 5m 10m 20m 30m

SCALE: 1:300

ALGONQUIN COLLEGE

Algonquin Students' ASSOCIATION

Project

ATHLETICS AND RECREATION CENTRE (ARC)

Prepared For

ALGONQUIN STUDENTS' ASSOCIATION

HOK Architects Corporation
205 Catherine Street, Suite 101
Ottawa, Ontario K2P 1C3 Canada
t +1 613 226 9650 f +1 613 226 9656

All reproduction & intellectual property rights reserved © 2019

In Association with

WSP
STRUCTURAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
MECHANICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

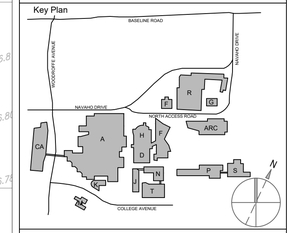
WSP
ELECTRICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
CIVIL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

CSW Landscape Architects
LANDSCAPE
319 McRae Avenue, Suite 502
Ottawa, ON, K1Z 0B9

WSP
SUSTAINABILITY
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

Key Plan



Professional Seals

REGISTERED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2019-12-19
PROVINCE OF ONTARIO

No.	Description	Date
1	SITE PLAN APPROVAL	2019-06-24
2	ISSUED FOR PERMIT/TENDER	2019-08-20
3	RESPONSE TO SPA COMMENTS	2019-08-24
4	RESPONSE TO SPA COMMENTS	2019-11-21
5	REVISED AS PER STORMTECH DESIGN	2019-11-28
6	ISSUED FOR CLASS B	2019-12-06
7	RESPONSE TO SPA COMMENTS	2019-12-19

Drawn by: D.B.Y. Reviewed by: J.J.

Project No: 191-01517-00

Sheet Title

GRADING PLAN

Original drawing is A1. Do not scale contents of this drawing.

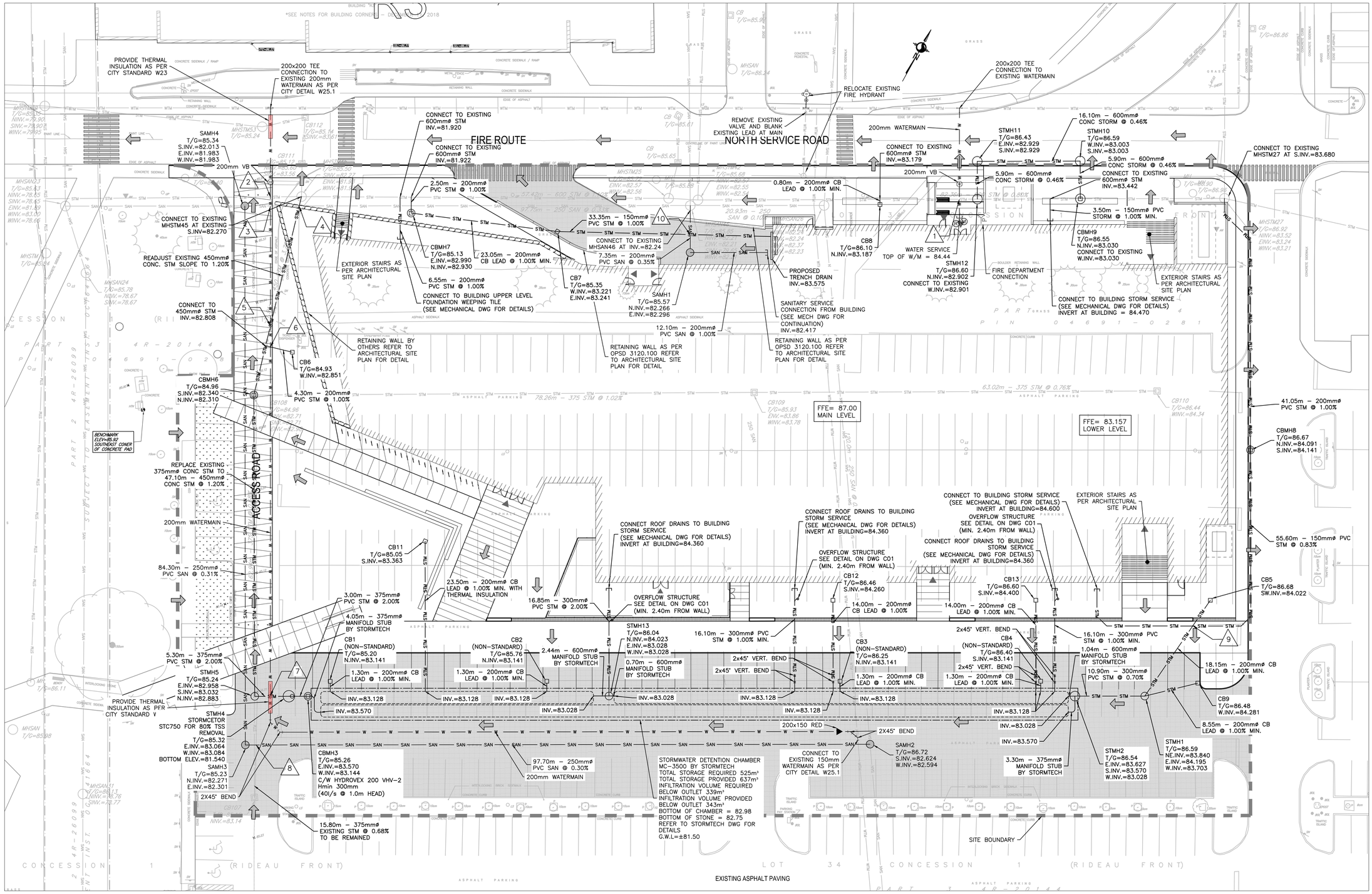
Sheet Number

C03

D07-12-19-0114

#17981

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\2 Working Drawings\Sheets\191-01517-00_CIVIL.dwg
PLOTDATE: Dec 19, 2019 - 11:27am, cawy069741



LEGEND:

- EXISTING FIRE HYDRANT
- EXISTING V&VB
- EXISTING VALVE CHAMBER
- PROPOSED FIRE HYDRANT
- PROPOSED V&B
- PROPOSED REMOTE METER
- PROPOSED METER
- PROPOSED CATCHBASIN MANHOLE
- PROPOSE CATCHBASIN
- EXISTING CATCHBASIN MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- PROPOSED SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED FIRE HYDRANT
- PROPOSED V&B
- PROPOSED CENTERLINE OF SWALE
- PROPOSED TERRACING (3:1 MAX)
- PROPOSED CONCRETE CURB
- EXISTING BUILDING OR STRUCTURE
- LIMIT OF CONSTRUCTION
- EXISTING CONCRETE CURB

SCALE: 1:300

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\2 Working Drawings\Sheets\191-01517-00_C01L.dwg
PLOTDATE: Dec 18, 2019 - 11:28am, clavy269741

ALGONQUIN COLLEGE

Algonquin Students' ASSOCIATION

Project
ATHLETICS AND RECREATION CENTRE (ARC)

Prepared For
ALGONQUIN STUDENTS' ASSOCIATION

HOK Architects Corporation
205 Catherine Street, Suite 101
Ottawa, Ontario K2P 1C3 Canada
t +1 613 226 9650 f +1 613 226 9656

All reproduction & intellectual property rights reserved © 2019

In Association with

WSP
STRUCTURAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
MECHANICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

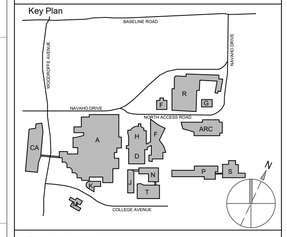
WSP
ELECTRICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
CIVIL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

CSW Landscape Architects
LANDSCAPE
319 McRae Avenue, Suite 502
Ottawa, ON, K1Z 0B9

WSP
SUSTAINABILITY
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

Key Plan



Professional Seals

REGISTERED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2019–12–19
PROVINCE OF ONTARIO

No.	Description	Date
1	SITE PLAN APPROVAL	2019-06-24
2	ISSUED FOR PERMIT/TENDER	2019-08-20
3	RESPONSE TO SPA COMMENTS	2019-09-24
4	ISSUED FOR WATER PERMIT	2019-10-30
5	RESPONSE TO SPA COMMENTS	2019-11-21
6	REVISED AS PER STORMTECH DESIGN	2019-11-28
7	ISSUED FOR CLASS B	2019-12-06
8	RESPONSE TO SPA COMMENTS	2019-12-19

Drawn by: D.B.Y. Reviewed by: J.J.
Project No: 191-01517-00

Sheet Title
SERVICING PLAN

Original drawing is A1. Do not scale contents of this drawing.

Sheet Number
C04

D07-12-19-0114

#17981

Project: **Algonquin College Rec Centre Rev1**

Chamber Model -	MC-3500	
Units -	**Metric**	Click Here for Imperial
Number of Chambers -	104	
Number of End Caps -	6	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	82.63	m
Amount of Stone Above Chambers -	381	mm
Amount of Stone Below Chambers -	229	mm
Area of system -	630	sq.meters

Include Perimeter Stone in Calculations

Min. Area - 506.846 sq.meters

Height of System *(mm)*	Incremental Single Chamber *(cubic meters)*	Incremental Single End Cap *(cubic meters)*	Incremental Chambers *(cubic meters)*	Incremental End Cap *(cubic meters)*	Incremental Stone *(cubic meters)*	Incremental Chamber, End Cap and Stone *(cubic meters)*	Cumulative System *(cubic meters)*	Elevation *(meters)*
1753	0.00	0.00	0.00	0.00	6.398	6.40	637.23	84.38
1727	0.00	0.00	0.00	0.00	6.398	6.40	630.84	84.36
1702	0.00	0.00	0.00	0.00	6.398	6.40	624.44	84.33
1676	0.00	0.00	0.00	0.00	6.398	6.40	618.04	84.31
1651	0.00	0.00	0.00	0.00	6.398	6.40	611.64	84.28
1626	0.00	0.00	0.00	0.00	6.398	6.40	605.25	84.26
1600	0.00	0.00	0.00	0.00	6.398	6.40	598.85	84.23
1575	0.00	0.00	0.00	0.00	6.398	6.40	592.45	84.20
1549	0.00	0.00	0.00	0.00	6.398	6.40	586.05	84.18
1524	0.00	0.00	0.00	0.00	6.398	6.40	579.65	84.15
1499	0.00	0.00	0.00	0.00	6.398	6.40	573.26	84.13
1473	0.00	0.00	0.00	0.00	6.398	6.40	566.86	84.10
1448	0.00	0.00	0.00	0.00	6.398	6.40	560.46	84.08
1422	0.00	0.00	0.00	0.00	6.398	6.40	554.06	84.05
1397	0.00	0.00	0.00	0.00	6.398	6.40	547.67	84.03
1372	0.00	0.00	0.17	0.00	6.329	6.50	541.27	84.00
1346	0.01	0.00	0.57	0.00	6.167	6.74	534.77	83.98
1321	0.01	0.00	0.87	0.01	6.049	6.92	528.03	83.95
1295	0.01	0.00	1.19	0.01	5.919	7.12	521.11	83.93
1270	0.02	0.00	2.02	0.01	5.583	7.62	513.99	83.90
1245	0.03	0.00	3.03	0.01	5.180	8.22	506.37	83.87
1219	0.04	0.00	3.68	0.02	4.918	8.62	498.15	83.85
1194	0.04	0.00	4.19	0.02	4.714	8.92	489.53	83.82
1168	0.04	0.00	4.63	0.02	4.535	9.19	480.61	83.80
1143	0.05	0.00	5.03	0.03	4.376	9.43	471.41	83.77
1118	0.05	0.01	5.38	0.03	4.231	9.65	461.98	83.75
1092	0.05	0.01	5.71	0.03	4.101	9.84	452.34	83.72
1067	0.06	0.01	6.01	0.04	3.979	10.03	442.50	83.70
1041	0.06	0.01	6.29	0.04	3.867	10.19	432.47	83.67
1016	0.06	0.01	6.55	0.04	3.760	10.35	422.28	83.65
991	0.07	0.01	6.79	0.05	3.662	10.50	411.92	83.62
965	0.07	0.01	7.02	0.05	3.569	10.64	401.42	83.60
940	0.07	0.01	7.24	0.05	3.481	10.77	390.78	83.57
914	0.07	0.01	7.45	0.05	3.398	10.90	380.01	83.54
889	0.07	0.01	7.64	0.05	3.320	11.01	369.11	83.52
864	0.08	0.01	7.82	0.06	3.246	11.12	358.10	83.49
838	0.08	0.01	8.00	0.06	3.176	11.23	346.97	83.47
813	0.08	0.01	8.16	0.06	3.109	11.33	335.74	83.44
787	0.08	0.01	8.32	0.06	3.045	11.43	324.41	83.42
762	0.08	0.01	8.47	0.07	2.984	11.52	312.99	83.39
737	0.08	0.01	8.61	0.07	2.926	11.60	301.47	83.37
711	0.08	0.01	8.75	0.07	2.871	11.69	289.86	83.34
686	0.09	0.01	8.87	0.07	2.820	11.76	278.18	83.32
660	0.09	0.01	8.99	0.07	2.772	11.84	266.41	83.29
635	0.09	0.01	9.11	0.07	2.723	11.91	254.58	83.27
610	0.09	0.01	9.22	0.08	2.679	11.98	242.67	83.24
584	0.09	0.01	9.32	0.08	2.637	12.04	230.69	83.21
559	0.09	0.01	9.42	0.08	2.597	12.10	218.65	83.19
533	0.09	0.01	9.52	0.08	2.559	12.16	206.55	83.16
508	0.09	0.01	9.60	0.08	2.522	12.21	194.40	83.14
483	0.09	0.01	9.69	0.08	2.488	12.26	182.19	83.11
457	0.09	0.01	9.77	0.09	2.455	12.31	169.93	83.09
432	0.09	0.01	9.85	0.09	2.423	12.36	157.61	83.06
406	0.10	0.01	9.92	0.09	2.394	12.40	145.26	83.04
381	0.10	0.01	9.99	0.09	2.365	12.45	132.85	83.01
356	0.10	0.02	10.06	0.09	2.339	12.49	120.41	82.99
330	0.10	0.02	10.12	0.09	2.312	12.53	107.92	82.96
305	0.10	0.02	10.18	0.09	2.287	12.56	95.39	82.93
279	0.10	0.02	10.24	0.09	2.262	12.60	82.83	82.91
254	0.10	0.02	10.32	0.10	2.228	12.65	70.23	82.88
229	0.00	0.00	0.00	0.00	6.398	6.40	57.58	82.86
203	0.00	0.00	0.00	0.00	6.398	6.40	51.18	82.83
178	0.00	0.00	0.00	0.00	6.398	6.40	44.78	82.81
152	0.00	0.00	0.00	0.00	6.398	6.40	38.39	82.78
127	0.00	0.00	0.00	0.00	6.398	6.40	31.99	82.76
102	0.00	0.00	0.00	0.00	6.398	6.40	25.59	82.73
76	0.00	0.00	0.00	0.00	6.398	6.40	19.19	82.71
51	0.00	0.00	0.00	0.00	6.398	6.40	12.80	82.68
25	0.00	0.00	0.00	0.00	6.398	6.40	6.40	82.66

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	CODY NEATH 519-465-9958 CODY.NEATH@ADS-PIPE.COM
ADS SALES REP:	MICHAEL REID 613-822-4186 MICHAEL.REID@ADS-PIPE.COM
PROJECT NO:	S147917

ADVANCED DRAINAGE SYSTEMS, INC.

SiteASSIST™ by StormTech

FOR STORMTECH INSTRUCTIONS, DOWNLOAD THE INSTALLATION APP

ALGONQUIN COLLEGE

OTTAWA, ON.

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH MC-3500.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 75 mm (3").
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
   - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
   - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
   - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

1. STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
   - STONESHOOTER LOCATED OFF THE CHAMBER BED.
   - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
   - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 300 mm (12") INTO CHAMBER END CAPS.
8. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
11. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
2. THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
   - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
   - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
   - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

©2013 ADS, INC.

PROPOSED LAYOUT

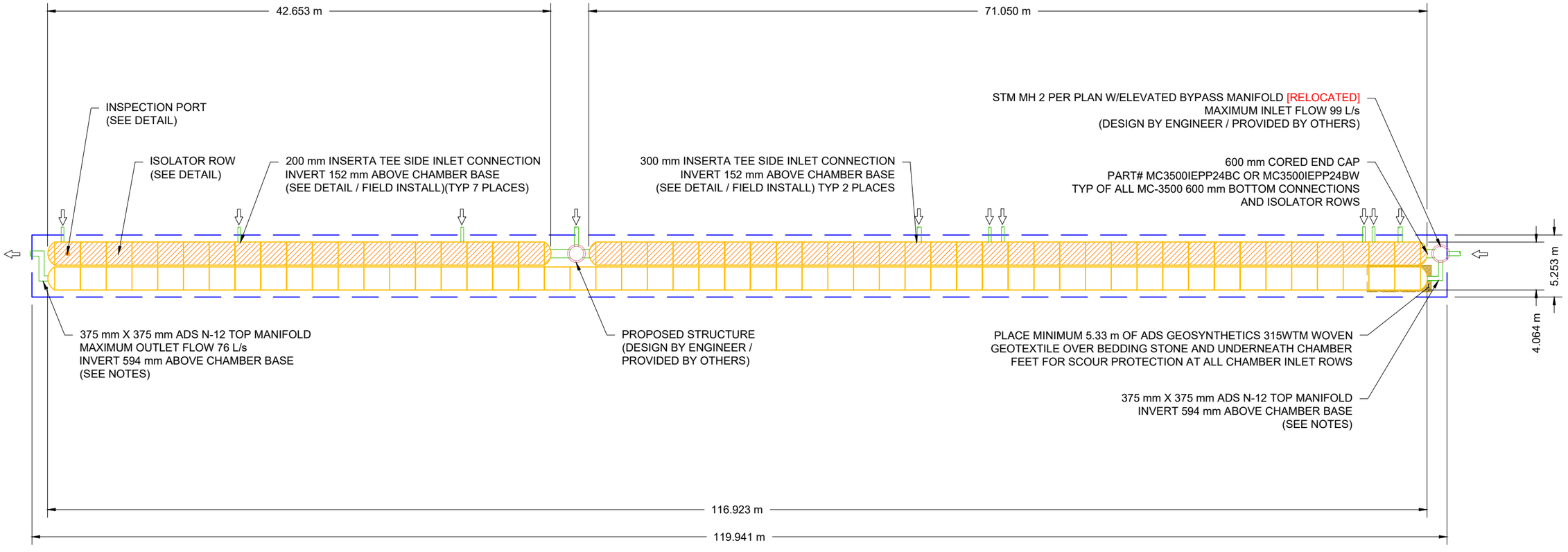
104	STORMTECH MC-3500 CHAMBERS
6	STORMTECH MC-3500 END CAPS
381	STONE ABOVE (mm)
229	STONE BELOW (mm)
40	% STONE VOID
637.2	**INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)**
339.4	**INSTALLED SYSTEM VOLUME (m³) BELOW ELEVATION 83.453 (PERIMETER STONE INCLUDED)**
630.0	SYSTEM AREA (m²)
250.3	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

86.557	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
84.729	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
84.576	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
84.576	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
84.576	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
84.500	TOP OF STONE:
84.119	TOP OF MC-3500 CHAMBER:
83.570	375 mm TOP MANIFOLD INVERT:
83.128	INSERTA TEE SIDE INLET CONNECTION INVERT:
83.028	600 mm ISOLATOR ROW INVERT:
82.976	BOTTOM OF MC-3500 CHAMBER:
82.747	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.



ALGONQUIN COLLEGE
OTTAWA, ON.

DATE: 09/27/19 | DRAWN: RCT | CHECKED: KLJ
PROJECT #: S147917

DATE	DRWN	CHKD	DESCRIPTION
11/28/19	RCT	JMQ	REVISED PER ENGINEER MARKUP
11/21/19	RCT	JMQ	REVISED PER ENGINEER MARKUP

StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

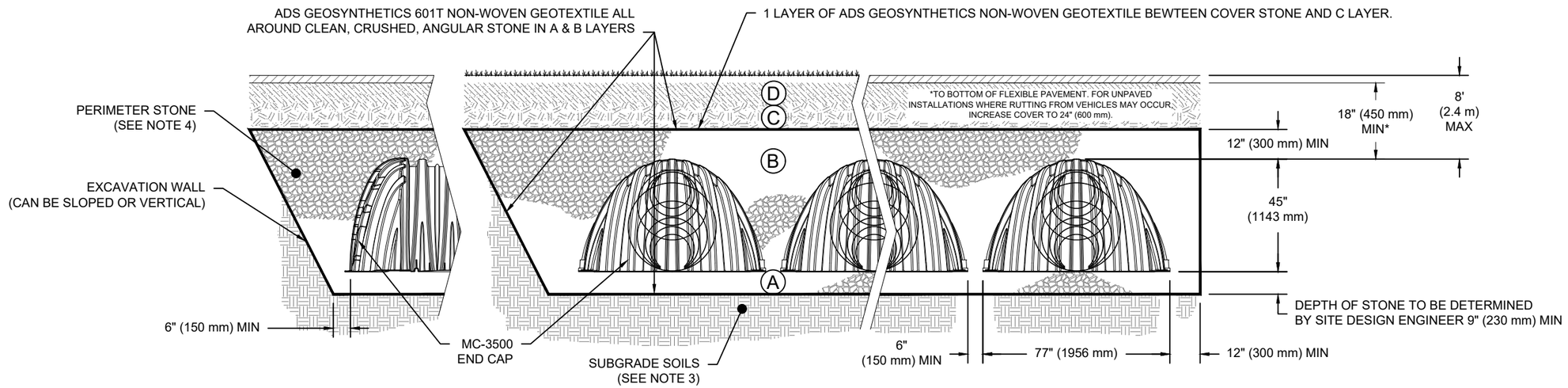
SCALE = 1 : 350

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
2. MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

ALGONQUIN COLLEGE
OTTAWA, ON.

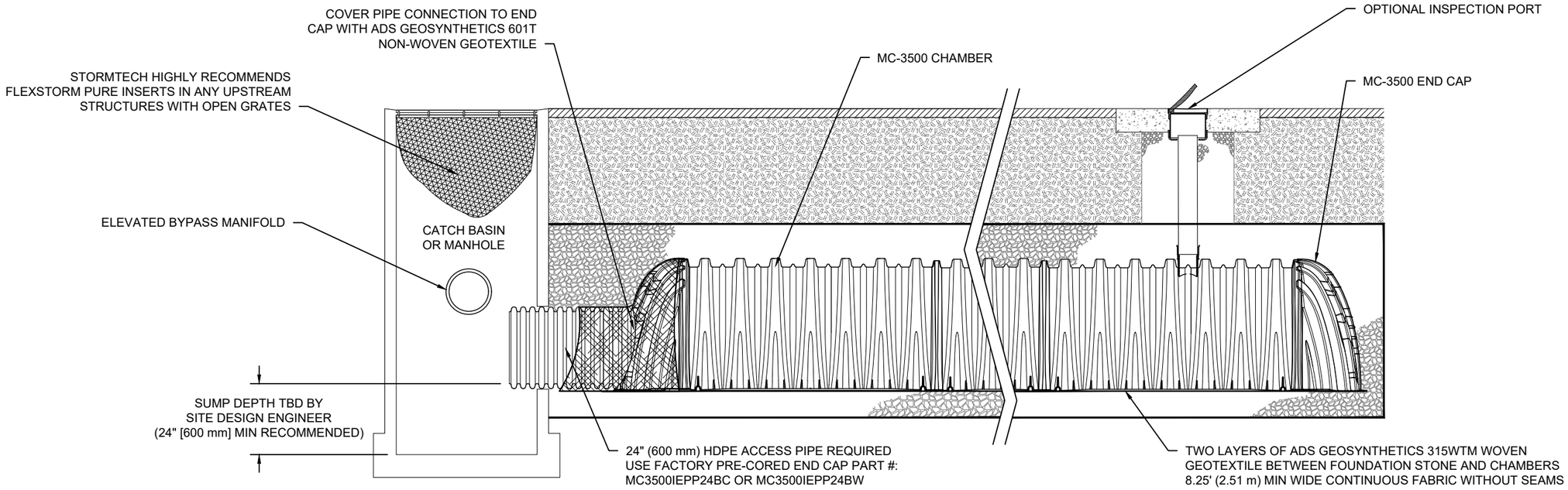
DATE: 09/27/19 | DRAWN: RCT | PROJECT #: S147917 | CHECKED: KLJ

DATE	DRWN	DESCRIPTION	CHKD
11/28/19	RCT	REVISED PER ENGINEER MARKUP	JMQ
11/21/19	RCT	REVISED PER ENGINEER MARKUP	JMQ

StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.



MC-3500 ISOLATOR ROW DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

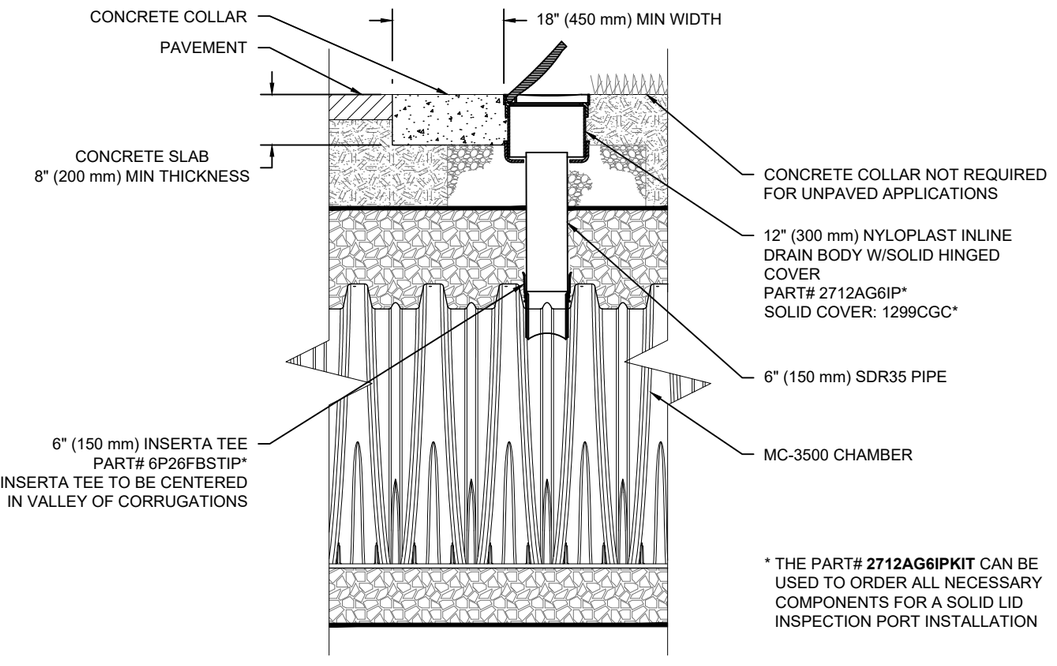
STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

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

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.

2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



* THE PART# **2712AG6IPKIT** CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

MC-3500 6" (150 mm) INSPECTION PORT DETAIL
NTS

ALGONQUIN COLLEGE
OTTAWA, ON.

DATE: 09/27/19 | DRAWN: RCT | PROJECT #: S147917 | CHECKED: KLJ

DATE	DRWN	CHKD	DESCRIPTION
11/28/19	RCT	JMQ	REVISED PER ENGINEER MARKUP
11/21/19	RCT	JMQ	REVISED PER ENGINEER MARKUP

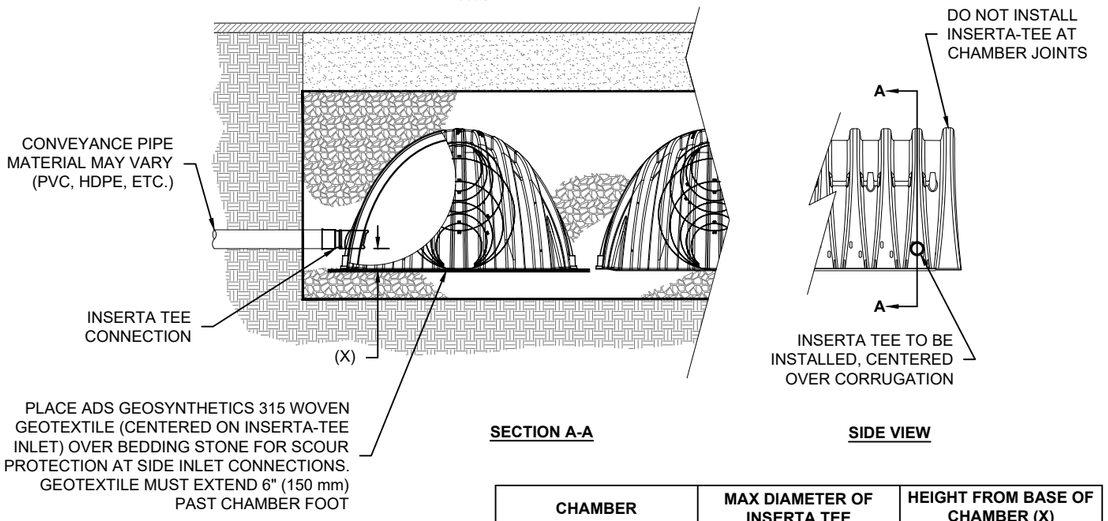
StormTech
Detention•Retention•Water Quality
70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

INSERTA TEE DETAIL

NTS



SECTION A-A

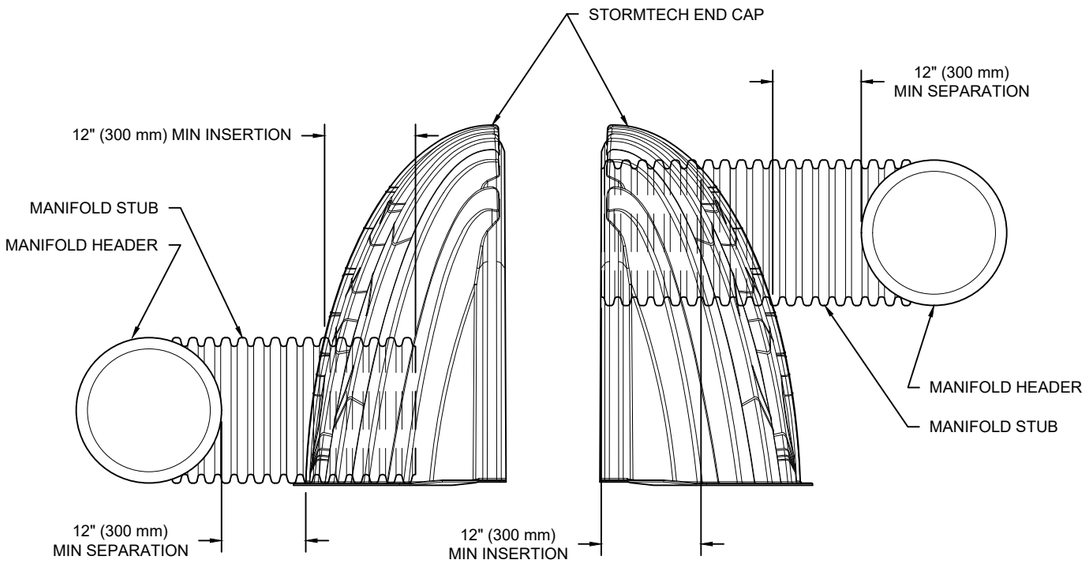
SIDE VIEW

CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

MC-SERIES END CAP INSERTION DETAIL

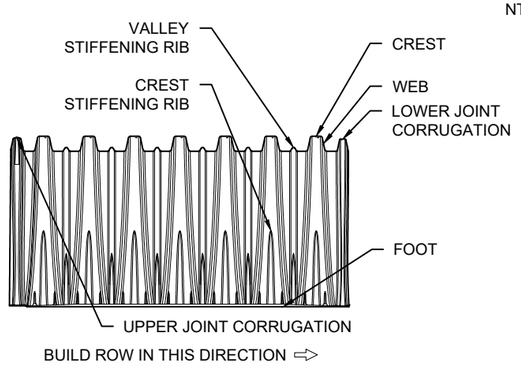
NTS

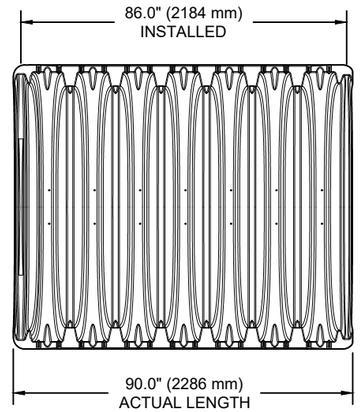


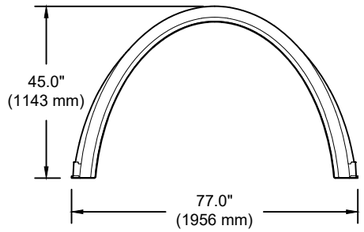
NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

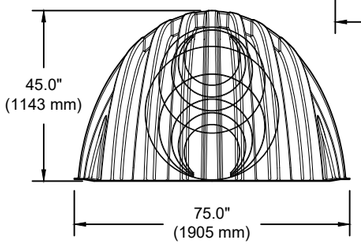
MC-3500 TECHNICAL SPECIFICATION

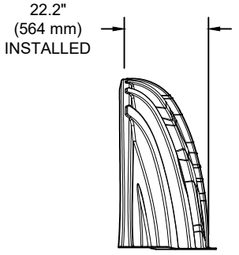
NTS











NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0" X 45.0" X 86.0"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET	(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET	(4.96 m³)
WEIGHT	134 lbs.	(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

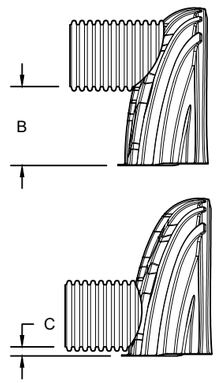
SIZE (W X H X INSTALLED LENGTH)	75.0" X 45.0" X 22.2"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET	(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET	(1.28 m³)
WEIGHT	49 lbs.	(22.2 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION, 6" (152 mm) STONE BETWEEN CHAMBERS, 6" (152 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6" (150 mm)	33.21" (844 mm)	---
MC3500IEPP06B		---	0.66" (17 mm)
MC3500IEPP08T	8" (200 mm)	31.16" (791 mm)	---
MC3500IEPP08B		---	0.81" (21 mm)
MC3500IEPP10T	10" (250 mm)	29.04" (738 mm)	---
MC3500IEPP10B		---	0.93" (24 mm)
MC3500IEPP12T	12" (300 mm)	26.36" (670 mm)	---
MC3500IEPP12B		---	1.35" (34 mm)
MC3500IEPP15T	15" (375 mm)	23.39" (594 mm)	---
MC3500IEPP15B		---	1.50" (38 mm)
MC3500IEPP18TC	18" (450 mm)	20.03" (509 mm)	---
MC3500IEPP18TW			
MC3500IEPP18BC		---	1.77" (45 mm)
MC3500IEPP18BW			
MC3500IEPP24TC	24" (600 mm)	14.48" (368 mm)	---
MC3500IEPP24TW			
MC3500IEPP24BC		---	2.06" (52 mm)
MC3500IEPP24BW			
MC3500IEPP30BC	30" (750 mm)	---	2.75" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

ALGONQUIN COLLEGE
OTTAWA, ON.

DATE: 09/27/19 | DRAWN: RCT | PROJECT #: S147917 | CHECKED: KLJ

DATE	DRWN	CHKD	DESCRIPTION
11/28/19	RCT	JMQ	REVISED PER ENGINEER MARKUP
11/21/19	RCT	JMQ	REVISED PER ENGINEER MARKUP

INSERTA TEE
INSERTA TEE | PO BOX 714
CORNELIUS, OR 97116
PH:(503) 357-2110 FAX:(503) 359-5417
SALES@INSERTATEE.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

ACCESS RO

REPLACE EXISTING
ø CONC STM TO
10m – 450mmø
NC STM @ 1.70%

mm WATERMAIN

m – 250mmø
SAN @ 1.00%

60m – 375mmø
C STM @ 2.00%

STMH5
T/G=85.21
E.INV.=82.958
S.INV.=83.032
N.INV.=82.883

STMH4
STORMCETOR
C4000 FOR 80%
TSS REMOVAL
T/G=85.24
E.INV.=83.070
W.INV.=83.050

SAMH3
T/G=85.23
N.INV.=81.527
E.INV.=81.587

2X45° BEND

CB107
T/G=85.12
NNV.=83.14

CB11
T/G=85.05
S.INV.=83.795

23.50m – 200mmø CB
LEAD @ 1.00% MIN.

3.30m – 375mmø
PVC STM @ 2.00%

2.25m – 375mmø
PVC STM @ 2.00%

CB1
T/G=85.13
N.INV.=83.600

1.20m – 200mmø CB
LEAD @ 1.00% MIN.

CBMH3
T/G=85.19
E.INV.=83.455
W.INV.=83.136
C/W HYDROVEX 150 VHV–2
Hmin 300mm
(35l/s @ 1.8m HEAD)

CONNECT ROOF DRAINS TO BUILDING
STORM SERVICE
(SEE MECHANICAL DWG FOR DETAILS)
INVERT AT BUILDING=86.000

16.10m – 300mmø
PVC STM @ 1.00% MIN.

CB14
T/G=85.91
S.INV.=83.706

10.55m – 200mmø CB
LEAD @ 1.00% MIN.

1.25m – 200mmø CB
LEAD @ 1.00% MIN.

CB2
T/G=85.76
N.INV.=83.600

97.70m – 250mmø
PVC SAN @ 1.00%

150mm WATERMAIN

CB15
T/G=85.91
S.INV.=83.706

10.55m – 200mmø
CB LEAD @ 1.00% MIN.

STORMWATER DETENTION CHAMBER
MC–3500
TOTAL STORAGE REQUIRED 525m³
TOTAL STORAGE PROVIDED 530m³
BOTTOM OF TANK AT 82.73m
TOP OF TANK AT 83.88m
REFER TO DWG C01 FOR DETAILS

CONNECT ROOF DRAINS TO BUILDING
STORM SERVICE
(SEE MECHANICAL DWG FOR DETAILS)
INVERT AT BUILDING=84.360

16.10m – 300mmø PVC
STM @ 1.00% MIN.

CB12
T/G=86.33
S.INV.=84.130

11.05m – 200mmø
CB LEAD @ 1.00%

CB3
T/G=86.25
N.INV.=84.050

1.25m – 200mmø CB
LEAD @ 1.00% MIN.

CONNECT TO
EXISTING 150mm
WATERMAIN

SAMH2
T/G=86.72
S.INV.=82.624
W.INV.=82.564

2X45° BEND

EXTERIOR STAIRS AS
PER ARCHITECTURAL
SITE PLAN

CONNECT ROOF
STORM SERVICE
(SEE MECHANIC
INVERT AT BUIL

CB13
T/G=86.50
S.INV.=84.300

16.85m – 30
STM @ 1.00%

11.80m – 200mmø CB
LEAD @ 1.00% MIN.

CB4
T/G=86.40
S.INV.=84.200

21.60m –
PVC STM

2.00m – 200mm
LEAD @ 1.00% MI

STMH2
T/G=86.54
W.INV.=83.629
E.INV.=83.609

1.30m – 300mmø
PVC STM @ 0.70%

T/G
NE.INV.=
E.INV.=
W.INV.=

INV.=83.500

INV.=83.600

(RIDEAU FRONT)

LOT 34 CONCESSION 1 (RIDEA

PART 3 4R–20144

ASPHALT PARKING

CONCRETE CURB

INTERLOCKING BRICK SIDEWALK

TRAFFIC ISLAND

PARKING PAY STATION

PROPOSED METER	EXISTING STORM SEWER AND MANHOLE
PROPOSED CATCHBASIN MANHOLE	PROPOSED STORM SEWER AND MANHOLE
PROPOSE CATCHBASIN	PROPOSED WATERMAIN
EXISTING CATCHBASIN MANHOLE	EXISTING WATERMAIN
EXISTING SANITARY SEWER AND MANHOLE	PROPOSED FIRE HYDRANT

PROPOSED CENTERLINE OF SWALE	
PROPOSED TERRACING (3:1 MAX)	
PROPOSED CONCRETE CURB	
EXISTING BUILDING OR STRUCTURE	
LIMIT OF CONSTRUCTION	

FORTERRA Pipe & Precast

CONTRACTOR: SITE PREPARATION - ALGONQUIN COLLEGE ARC BUILDING

DATE: 13-Nov-19 TAKE-OFF BY: P Palombo STRUCTURE: STC750 S.O.# 10988890

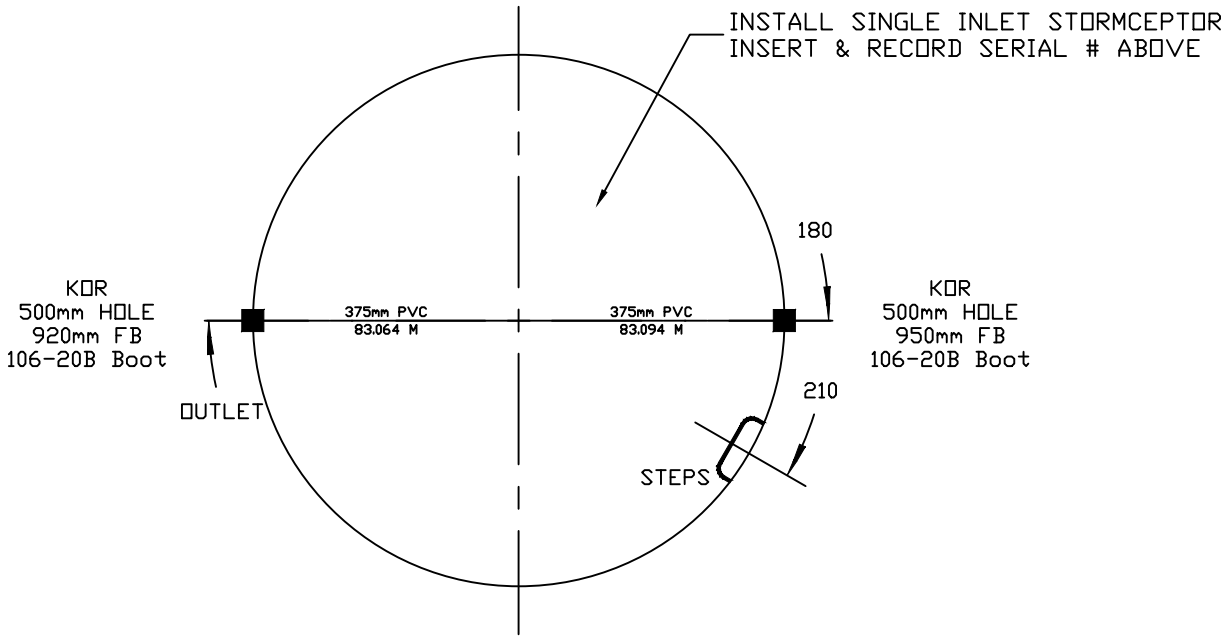
CALCULATIONS	(m)
Top of Grate	85.23
Grade - Invert	2.166
Sump	1.524
Total	3.690
B & C	0.337
Precast	3.353

BILL OF MATERIALS						
1	72BSL	4	72GNS			
1	72R3NS	2	S10620B			
1	72R5LS					
1	72R2L					
1	72FCTIS					
1	MHFCSC					

TASK PERFORMED	PERFORMED BY:	CHECKED BY:
CORING		
BOOTING		
INSERT INSTALLATION		
TEE		
ORIFICE		
VENT		
GRATE		
RISER		
SERIAL NUMBER		

STC-750

OIL PORT =



THERE MUST BE A 30mm FALL FROM INLET TO OUTLET

SHEET1

1800mm X 1.524m RISER - STC
PC 2

SITE PR
10988890/STC750

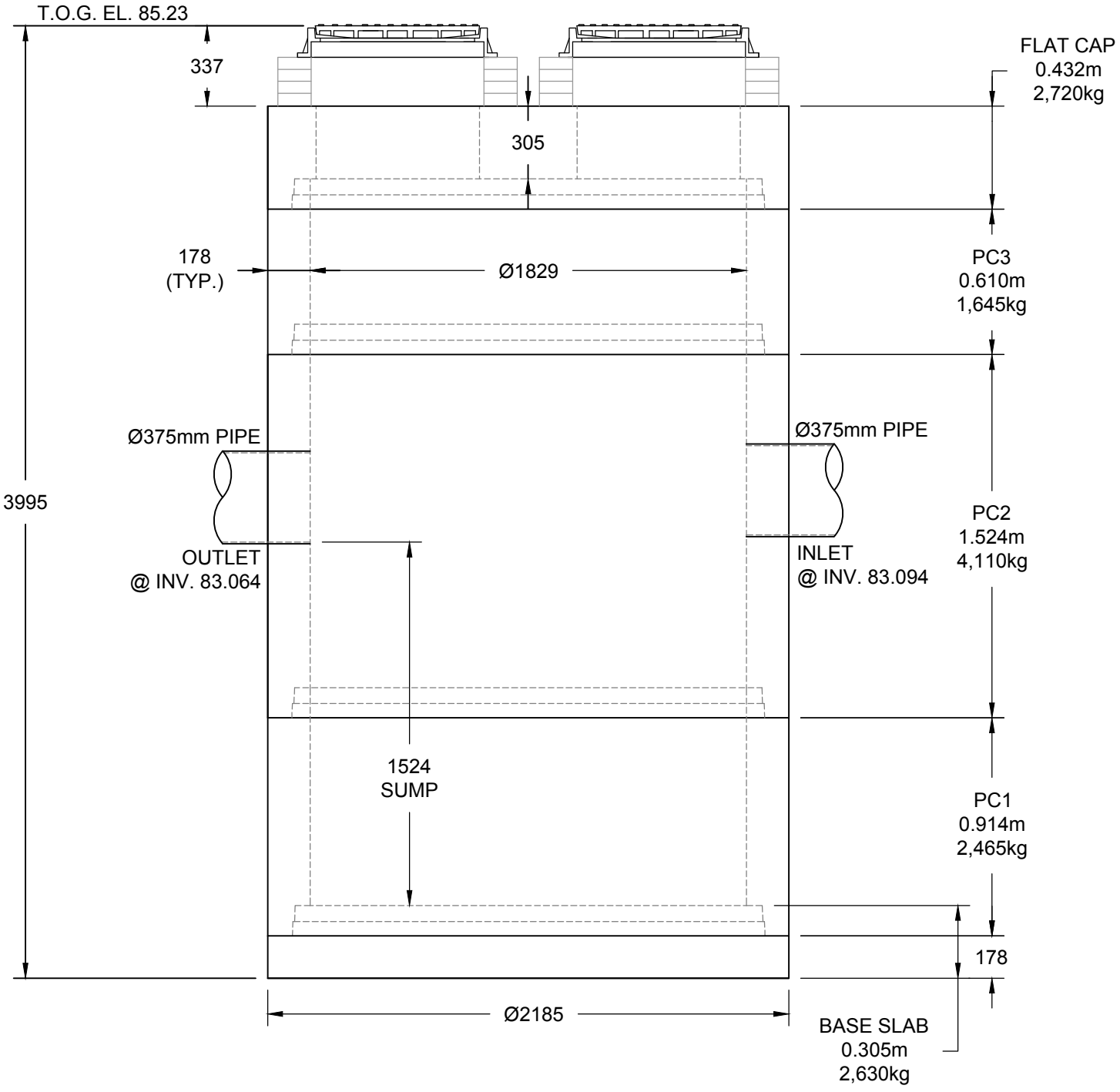
FORTERRA | PIPE & PRECAST

2099 Roseville Rd.
Cambridge, Ontario
N1R 5S3

Phone: 888-888-3222
Fax: 519-621-8233

Notes:

- Backfill and compaction to owner's requirements
- All dimensions are in mm unless otherwise stated
- Tank must be filled with water after installation
- All internal piping must be installed at time of unit installation



NO	REVISION	DATE	BY	DATE: 13-NOV-19	STRUCTURE NAME: STC-750
4				SCALE: NTS	SALES ORDER NUMBER: 10988890
3				DRAWN: PP	PROJECT NAME: ALGONQUIN COLLEGE ARC BUILDING
2				CHECKED:	PROJECT LOCATION: OTTAWA
1	STACK DRAWING	13-NOV-19	PP	DWG NO: 1OF1	CONTRACTOR: SITE PREPARATION

Detailed Stormceptor Sizing Report – Algonquin College Athletics and Recreation Centre

Project Information & Location			
Project Name	Algonquin College Athletics and Recreation Centre	**Project Number**	191-01517-00
City	Ottawa	**State/ Province**	Ontario
Country	Canada	**Date**	10/29/2019
Designer Information		**EOR Information (optional)**	
Name	Brandon O'Leary	**Name**	Winston Yang
Company	Forterra	**Company**	WSP Canada Group Ltd.
Phone #	905-630-0359	**Phone #**	613-690-0538
Email	brandon.oleary@forterrabp.com	**Email**	Winston.Yang@wsp.com

Stormwater Treatment Recommendation

The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Algonquin College Athletics and Recreation Centre
Recommended Stormceptor Model	STC 750
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	81
PSD	Fine Distribution
Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A

The recommended Stormceptor model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary		
Stormceptor Model	**% TSS Removal Provided**	**% Runoff Volume Captured Provided**
STC 300	73	89
STC 750	81	97
STC 1000	82	97
STC 1500	82	97
STC 2000	84	99
STC 3000	85	99
STC 4000	87	99
STC 5000	88	99
STC 6000	89	99
STC 9000	92	100
STC 10000	92	100
STC 14000	94	100
StormceptorMAX	Custom	Custom

Stormceptor
The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for each rainfall event, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.
Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Design Methodology
Stormceptor is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology using local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective. The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. The Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing:
• Site parameters
• Continuous historical rainfall data, including duration, distribution, peaks & inter-event dry periods
• Particle size distribution, and associated settling velocities (Stokes Law, corrected for drag)
• TSS load
• Detention time of the system

Hydrology Analysis
PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of Stormceptor are based on the average annual removal of TSS for the selected site parameters. The Stormceptor is engineered to capture sediment particles by treating the required average annual runoff volume, ensuring positive removal efficiency is maintained during each rainfall event, and preventing negative removal efficiency (scour). Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station			
State/Province	Ontario	**Total Number of Rainfall Events**	4093
Rainfall Station Name	OTTAWA MACDONALD-CARTIER INT'L A	**Total Rainfall (mm)**	20978.1
Station ID #	6000	**Average Annual Rainfall (mm)**	567.0
Coordinates	45°19'N, 75°40'W	**Total Evaporation (mm)**	1642.2
Elevation (ft)	370	**Total Infiltration (mm)**	3866.2
Years of Rainfall Data	37	**Total Rainfall that is Runoff (mm)**	15469.7

Notes
• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules. • Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed. • For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

Drainage Area	
Total Area (ha)	1.338
Imperviousness %	81.5

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000
0.003	0.005
0.006	0.010
0.009	0.015
0.011	0.020
0.014	0.025
0.017	0.030
0.020	0.035

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	90.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	35
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	83.07
Stormceptor Outlet Invert Elev (m)	83.04
Stormceptor Rim Elev (m)	85.24
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	375
Pipe Material	PVC - plastic
Multiple Inlets (Y/N)	No
Grate Inlet (Y/N)	No

Particle Size Distribution (PSD)

Removing the smallest fraction of particulates from runoff ensures the majority of pollutants, such as metals, hydrocarbons and nutrients are captured. The table below identifies the Particle Size Distribution (PSD) that was selected to define TSS removal for the Stormceptor design.

Fine Distribution		
Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Site Name	Algonquin College Athletics and Recreation Centre

Site Details

Drainage Area

Total Area (ha)	1.338
Imperviousness %	81.5

Surface Characteristics

Width (m)	231.00
Slope %	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Maintenance Frequency (months) >	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/hr)	61.98
Min. Infiltration Rate (mm/hr)	10.16
Decay Rate (1/sec)	0.00055
Regeneration Rate (1/sec)	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (lps)	0

Winter Months

Winter Infiltration	0

TSS Loading Parameters

TSS Loading Function	Build Up/ Wash-off

Buildup/Wash-off Parameters

Target Event Mean Conc. (EMC) mg/L	125
Exponential Buildup Power	0.40
Exponential Washoff Exponent	0.20

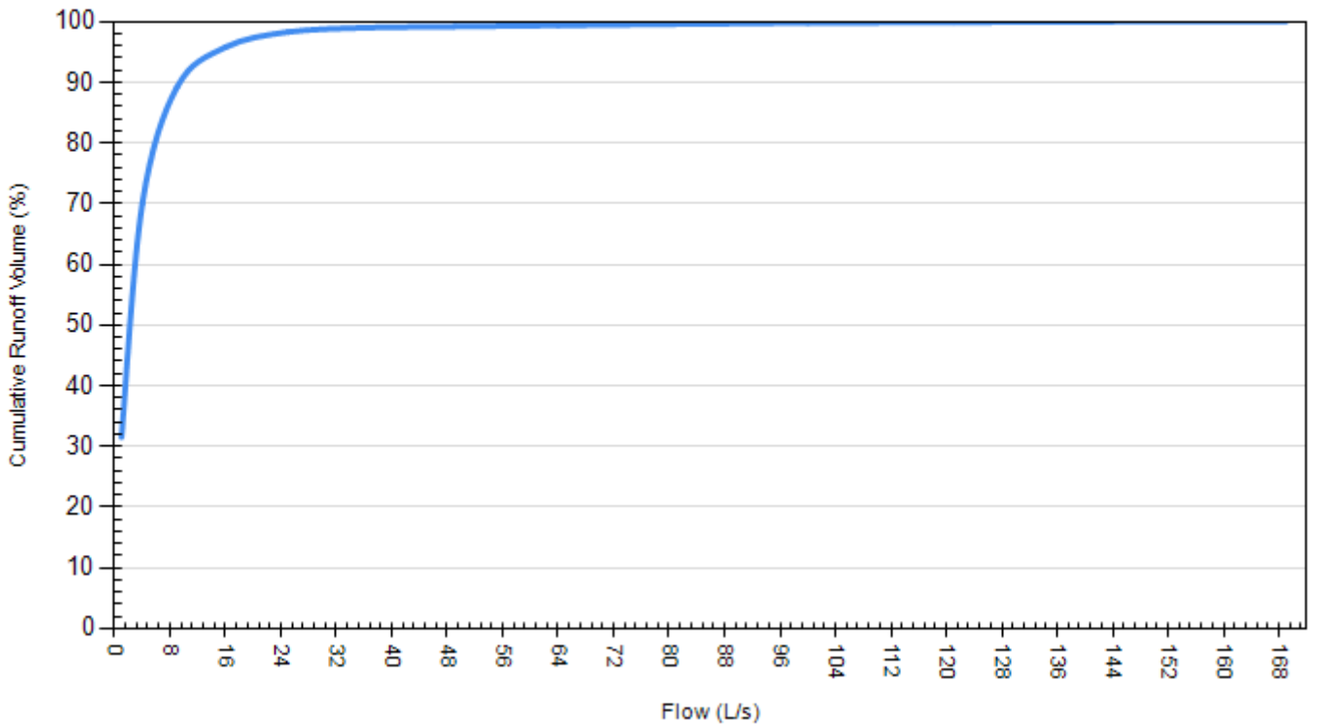
TSS Availability Parameters

Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.10
Min. Particle Size Affected by Availability (micron)	400

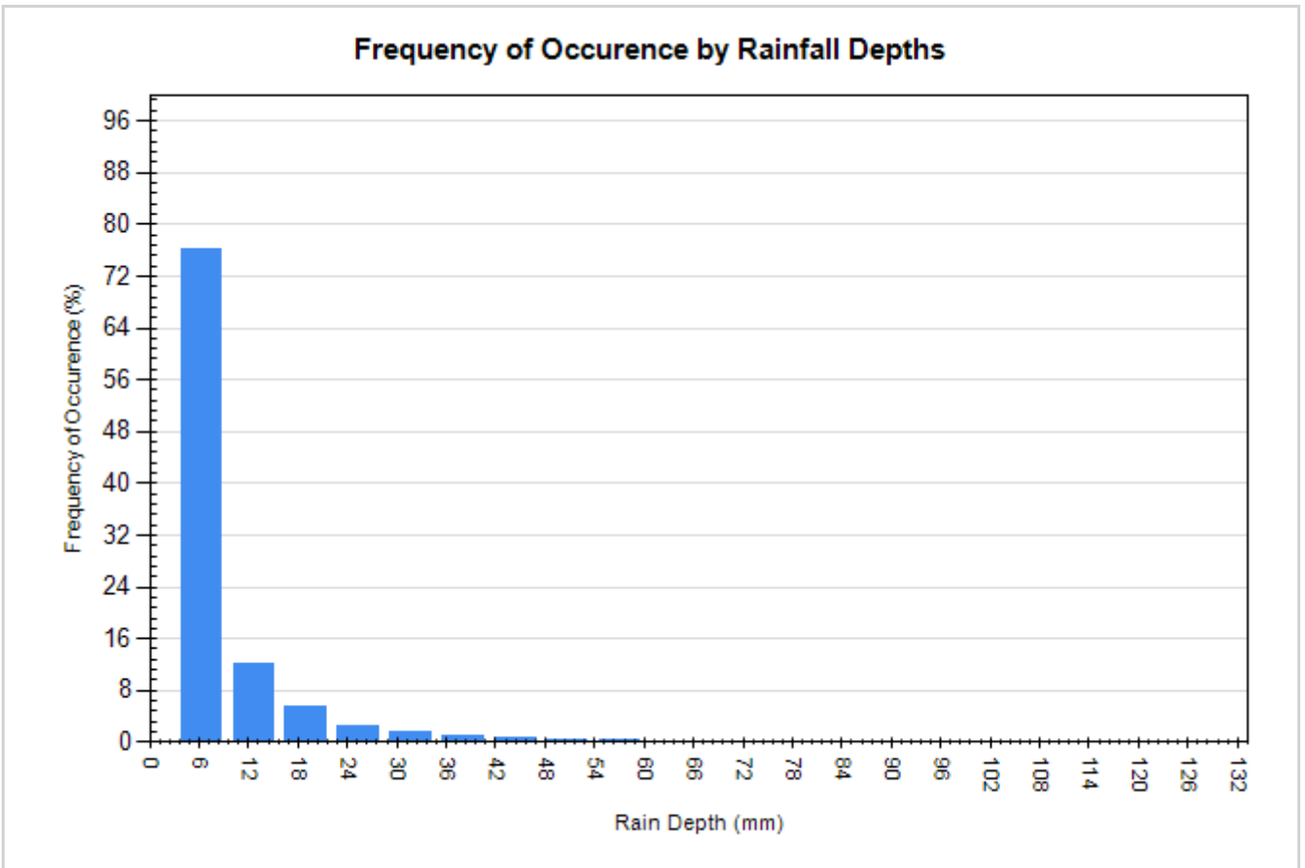
Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	**Runoff Volume (m^3)**	**Volume Over (m^3)**	**Cumulative Runoff Volume (%)**
1	65527	142620	31.5
4	145573	62516	70.0
9	185499	22583	89.2
16	199293	8745	95.8
25	204450	3584	98.3
36	205968	2063	99.0
49	206362	1669	99.2
64	206765	1265	99.4
81	207145	885	99.6
100	207517	512	99.8
121	207823	206	99.9
144	207964	65	100.0
169	208015	14	100.0

Cumulative Runoff Volume by Runoff Rate

For area: 1.338(ha), imperviousness: 81.50%, rainfall station: OTTAWA MACDONALD-CARTIER INT'L A



Rainfall Event Analysis				
Rainfall Depth (mm)	No. of Events	Percentage of Total Events (%)	Total Volume (mm)	Percentage of Annual Volume (%)
6.35	3113	76.1	5230	24.9
12.70	501	12.2	4497	21.4
19.05	225	5.5	3469	16.5
25.40	105	2.6	2317	11.0
31.75	62	1.5	1765	8.4
38.10	35	0.9	1206	5.8
44.45	28	0.7	1163	5.5
50.80	12	0.3	557	2.7
57.15	7	0.2	378	1.8
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0



For Stormceptor Specifications and Drawings Please Visit:
http://www.imbriumsystems.com/technical-specifications

2019-12-18

Richard Smith
HOK
205 Catherine Street, Suite 201
Ottawa, ON K2P 1C3

Subject: Algonquin College ARC – Water Suppression System and Foundation Drainage

Richard:

This letter is in regards to the design of the water suppression system and foundation drainage at the Algonquin College ARC building. WSP has designed the basement sump pump to have a capacity of 200,000 L/day as stipulated in the report prepared by Paterson Group Inc. titled "Geotechnical Investigation Proposed Athletic Recreation Complex (ARC) Algonquin College Woodroffe Campus – Ottawa" #PG4624-1 Revision 1 dated June 3, 2019. There will be two sump pumps on the basement level. The north sump pump system will discharge foundation water to the City storm service to the north of the building. The south sump pump system will discharge foundation water to the City storm service to the south of the building. The design of the underslab weeping tile system upstream of the sump pumps is by others.

Kind regards,

Tom LeRoy, P.Eng.
Mechanical Engineer



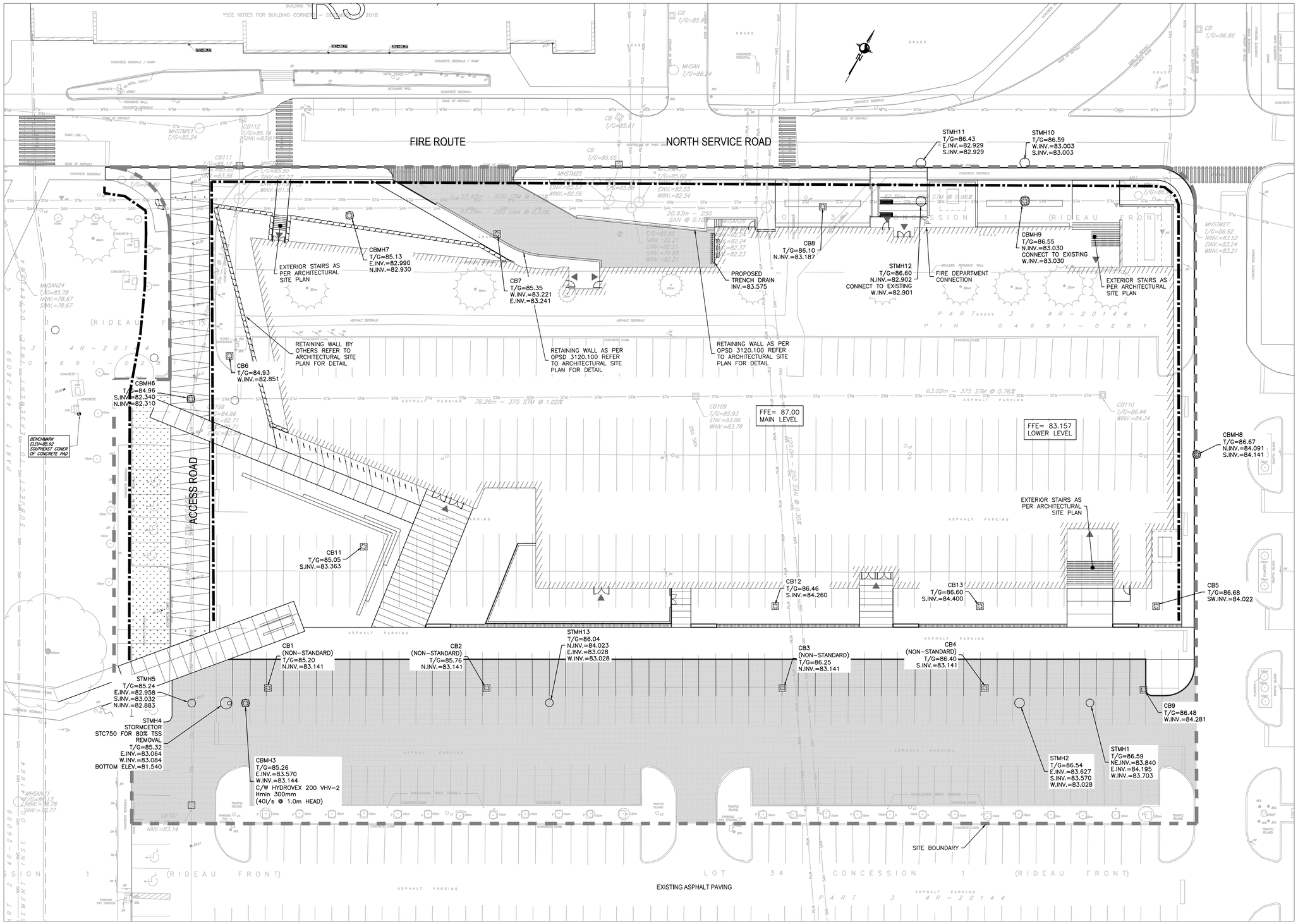
WSP ref.: 191-01517-00

APPENDIX

APPENDIX

D

- EROSION AND SEDIMENTATION CONTROL PLAN C06



LEGEND

- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
- SNOW FENCE
- ROCK CHECK DAM AS PER OPSD-219.211
- STRAW BALE CHECK DAM AS PER OPSD-219.180
- FILTER CLOTH PLACED UNDER CB AND CBMH COVER

FILENAME: P:\2019 Projects\191-01517-00_Algonquin College - ARC\Civil\Drawings\2 Working Drawings\Sheets\191-01517-00_CV1.dwg
PLOTDATE: Dec 19, 2019 - 11:31am, cawy06741

ALGONQUIN COLLEGE

Algonquin Students' ASSOCIATION

Project
ATHLETICS AND RECREATION CENTRE (ARC)

Prepared For
ALGONQUIN STUDENTS' ASSOCIATION

HOK Architects Corporation
205 Catherine Street, Suite 101
Ottawa, Ontario K2P 1C3 Canada
t +1 613 226 9650 f +1 613 226 9656

All reproduction & intellectual property rights reserved © 2019

In Association with

WSP
STRUCTURAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
MECHANICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

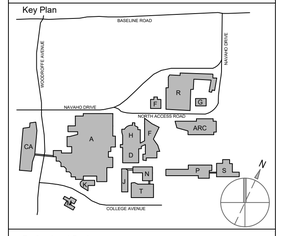
WSP
ELECTRICAL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

WSP
CIVIL
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

CSW Landscape Architects
LANDSCAPE
319 McRae Avenue, Suite 502
Ottawa, ON, K1Z 0B9

WSP
SUSTAINABILITY
2611 Queensview Drive, Suite 300
Ottawa, ON, K2B 8K2

Key Plan



Professional Seals

REGISTERED PROFESSIONAL ENGINEER
D. B. YANG
100230568
2019-12-19
PROVINCE OF ONTARIO

No.	Description	Date
1	SITE PLAN APPROVAL	2019-06-24
2	ISSUED FOR PERMIT/TENDER	2019-08-20
3	RESPONSE TO SPA COMMENTS	2019-09-24
4	RESPONSE TO SPA COMMENTS	2019-11-21
5	REVISED AS PER STORMTECH DESIGN	2019-11-28
6	ISSUED FOR CLASS B	2019-12-06
7	RESPONSE TO SPA COMMENTS	2019-12-19

Drawn by: D.B.Y. Reviewed by: J.J.

Project No: 191-01517-00

Sheet Title

EROSION AND SEDMENTATION CONTROL PLAN

Original drawing is A1. Do not scale contents of this drawing.

Sheet Number

C06

D07-12-19-0114

#17981

APPENDIX

APPENDIX

E

- SUBMISSION CHECK LIST

4.1 General Content

☒ Executive Summary (for larger reports only).

Comments: Refer to Servicing Report Section 1.1

☒ Date and revision number of the report.

Comments: *Refer to front page of the Report*

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

Comments: *Refer to Figure 1.1 Site Location for Location Map and Plan*

☒ Plan showing the site and location of all existing services.

Comments: *Refer to drawing C04*

☒ 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.

Comments: *Refer to Architectural Site Plan for development statistics and Servicing Report for technical references.*

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

Comments: Refer to Appendix A for Pre-Consultation Meeting Notes

☒ 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.

Comments: *Reference is provided to Pinecrest Creek Watershed SWM criteria, and conformance is confirmed in the Stormwater Management Report (Appendix C).*

☒ Statement of objectives and servicing criteria.

Comments: Refer to Servicing Report Section 1.7

☒ Identification of existing and proposed infrastructure available in the immediate area.

Comments: *Refer to drawing C04*

☒ 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).

Comments: *N/A*

☒ 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.

Comments: *Refer to drawing C03*

☒ 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.

Comments: *N/A*

☒ Proposed phasing of the development, if applicable.

Comments: *N/A*

☒ Reference to geotechnical studies and recommendations concerning servicing.

Comments: Reference provided to Paterson Group report.

☒ 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

Comments: *Refer to drawing C03 and C04*

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

Comments: *Refer to Servicing Report Section 2.1*

☒ Availability of public infrastructure to service proposed development

Comments: Refer to Servicing Report Section 2.1

☒ Identification of system constraints

Comments: N/A

☒ Identify boundary conditions

Comments: *Refer to Servicing Report Section 2.2*

☒ Confirmation of adequate domestic supply and pressure

Comments: *Refer to Servicing Report Section 2.3*

☒ 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.

Comments: *Refer to Servicing Report Section 2.4*

☒ 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.

Comments: *Refer to Servicing Report Section 2.5*

☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

Comments: *Refer to Servicing Report Section 2.6*

☒ Address reliability requirements such as appropriate location of shut-off valves

Comments: *Refer to Servicing Report Section 2.7*

☒ Check on the necessity of a pressure zone boundary modification.

Comments: *Refer to Servicing Report Section 2.8*

☒ 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

Comments: *Refer to Servicing Report Section 2.9*

☒ 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.

Comments: *Refer to Servicing Report Section 2.10*

☒ 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.

Comments: *Refer to Servicing Report Section 2.11*

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

Comments: *Refer to Servicing Report Section 2.12*

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

Comments: Model schematic is not required. Refer to Servicing Report Section 2.13

4.3 Development Servicing Report: Wastewater

☒ 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).

Comments: *Refer to Servicing Report Section 3.1*

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

Comments: Refer to Servicing Report Section 3.2. Design based on Ottawa Sewer Design Guidelines.

☒ 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.

Comments: *Refer to Servicing Report Section 3.3*

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

Comments: *Refer to Servicing Report Section 3.4*

☒ 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)

Comments: *Refer to Servicing Report Section 3.5*

☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

Comments: Refer to Servicing Report Section 3.9 and 3.11

☒ Special considerations such as contamination, corrosive environment etc.

Comments: *Refer to Servicing Report Section 3.8*

4.4 Development Servicing Report: Stormwater

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

Comments: *Refer to Servicing Report Section 4.1*

☒ Analysis of available capacity in existing public infrastructure.

Comments: *Refer to Servicing Report Section 4.2*

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

Comments: *Refer to drawing C04*

☒ 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.

Comments: *Refer to Stormwater Management Report*

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

Comments: Refer to Stormwater Management Report

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

Comments: *Refer to Stormwater Management Report*

☒ Set-back from private sewage disposal systems.

Comments: *N/A*

☒ Watercourse and hazard lands setbacks.

Comments: N/A

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

Comments: Refer to Appendix A

☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

Comments: *Consistency confirmed with requirements for Pinecrest Creek watershed.*

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

Comments: *Refer to Stormwater Management Report in Appendix C for storage requirements and major events. Refer to Section 4 for existing minor system capacity and*

☒ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

Comments: N/A

☒ 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.

Comments: *Refer to Stormwater Management Report*

☒ Any proposed diversion of drainage catchment areas from one outlet to another.

Comments: *Refer to Servicing Report Section 4.13*

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

Comments: Refer to Servicing Report Section 4.6-4.10, Appendix D and drawing C04

☒ 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.

Comments: N/A

☒ Identification of potential impacts to receiving watercourses

Comments: *Refer to Servicing Report Section 4.15*

☒ Identification of municipal drains and related approval requirements.

Comments: N/A

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

Comments: *Refer to Servicing Report Section 4.17*

☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

Comments: Refer to drawings C03 and C04.

☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.

Comments: *Refer to Servicing Report Section 4.18*

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

Comments: *Refer to Servicing Report Section 5.0*

☒ 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.

Comments: *N/A*

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

Comments: *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:

☐ 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.

Comments: *No approval anticipated. RVCA will be circulated.*

☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

Comments: No ECA required based on information provided from previous inquiry made by City of Ottawa with MECP.

☐ Changes to Municipal Drains.

Comments: *Not applicable.*

☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

Comments: *Not applicable.*

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

Comments:

☐ 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.

Comments: *Further comments to be added following site plan application review.*

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

Comments: