Site Servicing and Stormwater Management Report 2140 Baseline Road

Type of Document
Site Plan Submission

Project Name
Ottawa Student Residence
2140 Baseline Road

Project Number
OTT-00245012-A0

Site Plan Control File Number
D07-12-18-0084

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Date Submitted
December 18, 2018

Baseline Constellation Limited Partnership

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1 Introduction

1.1 Site Description and Proposed Development

Baseline Constellation Partnership Inc. retained EXP Services Inc. (EXP) to prepare a site servicing and stormwater management report for a proposed 14-storey student residence.

The 0.305-hectare development site is situated at 2140 Baseline Road, at the corner of Baseline Road and Constellation Crescent in the City of Ottawa (City), Ontario as shown on Figure A1 in Appendix A. The site is within Ward 8 or College Ward.

The property consists of the following parcels, all located in Lot 35, Concession 2 (Rideau Front), Geographic Township of Nepean, City of Ottawa.

- PIN 04692-1308, Parts 2, 3, 4 on Registered Plan 4R-26884
- PIN 04692-1310, Parts 6, 7 on Registered Plan 4R-26884
- PIN 04692-1312, Part 8 to Part 15 on Registered Plan 4R-26884
- PIN 04692-1315, Parts 16, 17 on Registered Plan 4R-26884
- PIN 04692-1317, Part 23 to Part 35 on Registered Plan 4R-26884

The development is comprised of 140 suites, that contain 1 to 4 bedrooms.

This report will discuss the adequacy of the adjacent municipal storm sewers, sanitary sewers and watermains to convey the storm runoff, sewage flows and provide the water demands that will result from the proposed development. This report provides a design brief for submission, along with the engineering drawings, for City approval.

1.2 Background Documents

Various design guidelines were referred to in preparing the current report including:

- 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, 2016)
  - 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 Guidelines for the Pinecrest Creek / Westboro Area, JFSA, June 2012.
- Stormwater Management Planning and Design Manual, Ontario Ministry of the Environment and Climate Change, March 2003 (SMPDM).
- 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.
- Ontario Building Code 2012, Ministry of Municipal Affairs and Housing.
- Ontario Ministry of Transportation (MTO) Drainage Manual, 1995-1997.

1.3 Existing Infrastructure

The current 0.3-hectare site is vacant and consists of grassed areas containing approximately eleven (11) mature trees. Prior to 2009, the site contained a one-way roadway connection from Constellation Crescent to Baseline Road. This roadway connection was removed, and Constellation Crescent / Gemini Way was re-configured into its current configuration as a tee-intersection. A two-way connection with a signalized intersection at Baseline Road and Constellation Crescent was created.

Within the 0.30-hectare site previously abandoned utilities exist. From review of the as-built drawings and Central Registry (UCC) plans, the sewer and water structures (manholes and catchbasin, etc.) were removed by 2009, however the sewer and water infrastructure piping were abandoned in place. The following summarizes the onsite and adjacent offsite existing utilities:

Within property

- Abandoned 525mm, 750mm, and 900mm storm sewers
- Abandoned 250mm and 300mm sanitary sewers
- Abandoned 200mm watermains
- Bell / Hydro / Telecom Ottawa. Status to be confirmed with the utility providers

On Gemini Way

- 525mm, 675mm, and 900mm storm sewers
- 250mm and 300mm sanitary sewers
- 200mm watermains
- Bell / Streetlighting

On Constellation Crescent

- 900mm storm sewers
- 250mm sanitary sewers
- Bell / Telecom Ottawa / Traffic / Streetlighting

On Baseline Road

- 525mm storm sewers
- 406mm, 1220mm watermains
- Bell / Traffic / Streetlighting

The as-built drawings for both Gemini Way and Constellation Crescent were obtained and are included in Appendix H.

1.4 Consultation and Permits

A pre-consultation meeting was held between Baseline Constellation Partnership and the City prior to design commencement. This meeting outlined the submission requirements and provided information to assist with the development proposal.

The storm and sanitary sewers will require Environmental Compliance Approvals (ECA's), filed through a direct submission with the MECP. The following summarizes the anticipated Environment Compliance Approvals (ECA's) required by the Ministry of Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC):

- Municipal and Private Sewage Works for the establishment of the **Stormwater Management Works** (SWM) which will include the onsite flow control methods and associated stormwater detention.

Prior to completion of the ECA application, City signoff on the infrastructure design will be obtained and a pre-consultation meeting will be held with the local MECP.

The proposed site is located within the Rideau Valley Conservation Authority (RVCA) jurisdiction, therefore signoff from the RVCA will be required prior to Site Plan and ECA approval. The RVCA has been contacted to confirm the stormwater management quality control requirements.

2 Geotechnical Considerations

A geotechnical investigation was completed by the Paterson Group Inc. dated July 17, 2018 and was prepared to establish the subsurface and groundwater conditions and to provide recommendations related to excavation, foundation design, backfilling requirements, site grading, pipe bedding, pavement structure.

In general, the site consists of topsoil underlain by fill followed by silty sand and silty clay. Three (3) boreholes were drilled to a maximum depth of 11.8 metres. The groundwater table is expected at between 4 and 5 metres below existing grade.

A maximum grade raise requirement of 1.5m was established for the site. The recommended pavement structure for access and fire lanes was established at: 40mm + 50mm of asphalt, 150mm granular "A" and 450mm depth of Granular "B".

3 Deviations

There are no noted deviations from the City Design Standards (SDG002). It should be noted that the stormwater management requirements, as dictated by the “Stormwater Management Guidelines for the Pinecrest Creek / Westboro Area, JFSA, June 2012”, far exceed the standard infill development stormwater guidelines as noted in Section 8.3.7 of the SDG002.

Due to these master servicing requirements of the JFSA report, additional runoff volume, flood and erosion control requirements are necessary due to the sensitivity of the receiving Pinecrest Creek and Ottawa River, and lack of existing downstream stormwater management facilities.

4 Watermain Servicing

4.1 Methodology

The water service for the proposed building is designed in accordance with the City Design Guidelines (July 2010). The following steps indicate the basic methodology that was used in the hydraulic analysis:

- Estimated water demands under average day, maximum day and peak hour conditions. As the total population estimate of 474 persons was below 500, residential peaking factors were interpolated based on MOE Table 3-3. For ground floor commercial areas, average demands were taken from the SDG002, Appendix 4-A for similar uses.
- Estimated the required fire flow (RFF) based on the Fire Underwriters Survey (FUS).
- Obtained hydraulic boundary conditions (HGL) from the City, based on the above water demands and required fire flows.
- Boundary condition data and water demands were used to estimate the pressure at the proposed building, and this was compared to the City’s of Ottawa’s design criteria.

4.2 Design Criteria

We estimated the domestic water demands as shown below, using parameters from the WDG001 as follows:

Pressure Zone

Proposed site located in zone	=	2W

Number of Units

2-bedroom units	=	44
3-bedroom units	=	12
4-bedroom units	=	84

Densities

2-bedroom units (persons per unit)	=	2.1
3-bedroom units (persons per unit)	=	3.1
4-bedroom units (persons per unit)	=	4.1
Restaurant/Dining occupancies (persons/m^2)	=	1.1

Residential Populations

44, 2-bedroom units (@ 2.1 persons per unit)	=	92.4
12, 3-bedroom units (@ 3.1 persons per unit)	=	37.2
84, 4-bedroom units (@ 4.1 persons per unit)	=	344.4
	=	474.0

Commercial Areas

Ground Floor Restaurant/Dining Areas (m^2)	=	350
Ground Floor Retail Areas (m^2)	=	625

Demand Rates

Average Residential Demands (L/person/day)	=	350
Average Restaurant/Dining Demands (L/person/day)	=	125
Average Retail Demands (L/m^2/day)	=	5

Peaking Factors

Max Day Residential Peaking Factor (as per MOE Table 3-3)	=	2.95 x avg. day
Peak Hour Residential Peaking Factor (as per MOE Table 3-3)	=	4.40 x avg. day
Max Day Commercial Peaking Factor	=	1.5 x avg. day
Peak Hour Commercial Peaking Factor	=	1.8 x max. day

Watermain Design

C factor (200 mm – 300 mm)	=	110
Minimum Allowable Pressure	=	275 kPa (40 psi)
Maximum Allowable Pressure	=	690 kPa (100 psi)
Minimum Static Pressure (Under Fire Flow Conditions)	=	140 kPa (20 psi)

Residential Water Demands

Average Residential Demands
474 persons x 350 L/person/day x (1/86,400 sec/day) = 1.92 L/sec

Commercial Water Demands

Average Demands (Restaurant/Dining Areas)
350 m^2 / 1.1 persons/m^2 x 125 L/person/day x (1/86,400 sec/day) = 0.46 L/sec

Average Demands (Retail Areas)
625 m^2 x 5 Litres/m^2/day x (1/86,400 sec/day) = 0.04 L/sec

Total Water Demands

Total Average Day Demands = 1.92 + 0.46 + 0.04 = 2.42 L/sec

Total Maximum Day Demands = 1.92 x 2.95 + (0.46+0.04) x 1.5 = 6.41 L/sec

Total Peak Hour Demands = 1.92 x 4.4 + (0.46+0.04) x 1.5 x 1.8 = 9.80 L/sec

The average day, maximum day, and peak hourly demands for the proposed building at 2140 Baseline Road are 2.4 L/sec, 6.4 L/sec, 9.8 L/sec, respectively. Please note that the maximum day and peak hour factors, noted above, were determined based on MOECC GDWS Table 3-3 as the population of the proposed development is less than 500 persons. This requirement is noted in Section 4.2.8 of the City's WDG001. Detailed calculations of the domestic water demands are provided in Table C1.

4.3 Fire Flow Requirements

Water for fire protection will be available utilizing the proposed fire hydrants located along the adjacent roadways: Gemini Way, Baseline Road, and Constellation Crescent. The required fire flows for the proposed building were calculated based on typical values as established by the Fire Underwriters Survey 1999 (FUS).

The following equation from the Fire Underwriters document "Water Supply for Public Fire Protection", 1991, was used for calculation of the on-site supply rates required to be supplied by the hydrants:

$F = 200 * C * \sqrt{(A)}$

where

- F = Required Fire flow in Litres per minute
- C = Coefficient related to type of Construction
- A = Total Floor Area in square metres

A reduction for low hazard occupancy of -15% for residential dwellings, and an increase for fire area exposure of +11% was used. Below are the fire flow requirements.

Type of Construction	=	Non-combustible
Coeff Related to Construction	=	0.8
Ground Floor Area	=	1510 m^2
2nd to 5th Floor Area	=	1510 m^2
6th to 13th Floor Area	=	1,179 m^2
14th Floor Area	=	1049 m^2
Number of Floors	=	14
Fire Flow Requirement, FF	=	$200 * 1.5 * \sqrt{(A)}$
	=	$200 * 1.5 * \sqrt{(8,165)}$
	=	15,903 L/min or 16,000 L/min (rounded up)
Occupancy Class	=	Limited Combustible
Occupancy Charge	=	-15%
Fire Flow Requirement, FF	=	16,000 *-15%
(with reduction due to occupancy)	=	-2,400 L/min
	=	13,600 L/min
Sprinkler Protection Credit		
	=	-30% (Sprinkler Conforming to NFPA 13)
	=	-10% (standard water supply for FD hose line)

Fire Flow Requirement, FF	=	13,600 *-40%
(with Reduction due to sprinkler)	=	7,920 L/min
Charges Due to Exposures	=	sum for all sides
	=	0% + 5% + 0% + 6%
	=	11%
Required Fire Flow (RFF)	=	7,920 L/min + 1,496 L/min
	=	9,416 L/min
	=	9,000 L/min (rounded to closest 1,000)
	=	150 L/sec

4.4 Review of Hydrant Spacing

A review of the hydrant spacing was completed to ensure compliance with Appendix I of Technical Bulletin ISTB-2018-02. As per Section 3 of Appendix I all hydrants within 150 metres were reviewed to assess the total possible contribution of flow from these contributing hydrants. For each hydrant the distance to the proposed building was determined to arrive at the contribution of fire flow from each. All hydrants are expected to be of Class AA as per Section 5.1 of Appendix I.

Table C4 in Appendix C summarizes all fire hydrants within a 150m distance from the proposed building. For each hydrant the straight-line distance, distance measured along a fire route or roadway, whether its location is accessible, and its contribution to the required fire flow. Figure A5 in Appendix A illustrates the hydrant locations in proximity to the site.

The total available contribution of flow from hydrants was estimated as 32,300 L/min, which exceeds the required fire flow of 9,000 L/min as identified in Appendix I of Technical Bulletin ISTB-2018-02.

4.5 Boundary Conditions

Hydraulic Grade Line (HGL) boundary conditions were obtained from the City for design purposes. A copy of the correspondence received from the City is provided in Appendix F.

The following hydraulic grade line (HGL) boundary conditions were provided:

- Minimum HGL = 127.5 m
- Max Day + Fire Flow = 112.0 m (Assuming 150 L/sec fire flow)
- Maximum HGL = 134.6 m

Based on a ground elevation of approximately 85.75m at the boundary condition location this results in a system water pressure of 41.75 m or 59.4 psi during peak hour conditions.

4.6 Watermain Design

Since the average day demands of 165.9 m^3 per day exceed 50 m^3 per day, two watermain feeds to the building will be necessary as per Section 4.31 of the WDG001.

A review of the estimated watermain pressures at the building connection, based on the boundary conditions provided and the use of two watermains was completed.

Table C3 in Appendix C provides a comparison of anticipate pressures at the building connecting based on using a single watermain or two watermains. A single watermain analysis was completed to determined if the water pressure still met the City requirement during either the maximum day plus fire flow or peak hour condition.

Based on results, the use of two 150mm watermains would result in a pressure of 27 psi at the building, while the use of two 200mm watermains would improve the pressure to more than 35 psi under maximum day plus fire flow conditions. Therefore, two 200mm watermains with a shut-off valve between them is proposed.

There no pressure reducing measures required as operating pressures are within 50 psi and 80 psi during maximum day conditions.

5 Sanitary Sewer Design

The sanitary sewer system is designed based on a population flow, an allowance for ground floor commercial/retail areas within the buildings and an area-based infiltration allowance. The flows were calculated using City sewer design guidelines (SDG002) as follows:

Area

Gross site area	=	0.305 ha

Number of Units

2-bedroom units	=	44
3-bedroom units	=	12
4-bedroom units	=	84

Population

44, 2-bedroom units (@ 2.1 persons per unit)	=	92.4
12, 3-bedroom units (@ 3.1 persons per unit)	=	37.2
84, 4-bedroom units (@ 4.1 persons per unit)	=	344.4
		474.0

Residential Peaking Factor

Peak Factor = $1 + 14 / (4 + (P/1000)^{0.5})* K$, where K = 0.8		
Peak Factor = $1 + 14 / (4 + (474/1000)^{0.5}) \times 0.8$	=	3.39

Domestic Sewage Flow

Average Domestic Flow (474 x 280 L/cap/day x (1/86,400 sec/day)	=	1.54 L/sec
Peak Domestic Flow (3.39 x 1.536)	=	5.21 L/sec

Commercial/Retail Areas

Ground Floor Restaurant/Dinning Areas (m^2)	=	350
Ground Floor Retail Areas (m^2)	=	625

Commercial Sewage Flows

Average Daily Flows (Restaurant/Dining Areas)		
350 m^2 / 1.1 persons/m^2 x 125 L/person/day x (1/86,400 sec/day)	=	0.46 L/sec
Average Daily Flows (Retail Areas)		
625 m^2 x 5 Litres/m^2/day x (1/86,400 sec/day)	=	0.04 L/sec
Commercial Peaking Factor	=	1.0 x avg. day
Total Commercial Flow = (0.46 + 0.04) * 1.0	=	0.50 L/sec

Infiltration

Infiltration Allowance	=	0.33 L/ha/sec
Infiltration Flow (0.305 ha x 0.28 L/ha/sec)	=	0.10 L/sec

Total Peak Sewage Flow

Peak Sanitary Flow = 5.21 + 0.50+ 0.10	**=**	**5.70 L/sec**

The estimated peak sanitary flow rate from the proposed property at 2140 Baseline Road is **5.70 L/sec** based on City Design Guidelines.

The proposed building will have an independent sanitary sewer connection to the existing 300mm sanitary sewer on Gemini Way, with the connection approximately 30 metres west of Constellation Crescent. The 250mm sanitary sewer is proposed with a 2% slope, having a capacity of 85.4 L/sec based on Manning's Equation under full flow conditions. Based on the OBC, the maximum permitted hydraulic load for a 250mm at 2% is 4,500 fixture units.

A sanitary manhole is proposed to be installed at the property line, for monitoring purposes.

5.1 Offsite Sanitary Sewer Analysis

The proposed sanitary sewer within the development site will discharge to a 300mm sanitary sewer on Gemini Way. An analysis of the existing sanitary infrastructure was conducted to determine the capacity of the existing system and determine if the existing infrastructure could handle the anticipated additional flows to the overall system due to the new development proposed at 2140 Baseline Road.

Existing Conditions

Area	= 22.1 hectares
Residential Density for Townhome	= 2.7 person/unit
Residential Density for 2-bedroom apartment	= 2.1 person/unit
Residential Density for 3-bedroom apartment	= 3.1 person/unit
Residential Density for 4-bedroom apartment	= 4.1 person/unit
Residential Population	= 969 persons
Average Residential Flow Allowance	= 280 L/person/day
Residential Peaking Factor	= Harmon Formula
Commercial Flow Allowance	= 28,000 L/ha/fay
Commercial Peaking Factor	= 1.5

To confirm adequate capacity is available in the downstream system a review of the as-constructed conditions was completed and the peak sewage rates were re-calculated based on current City Guidelines.

Figure A4 in Appendix A illustrates the off-site sanitary sewers and tributary drainage area. It consists of residential and commercial uses. Using the City's urban building GIS layer, it was determined that there is approximately 6.8 hectares (182 townhomes) of residential lands and 15.3 hectares of commercial land tributary to the outlet sewer (sanitary manhole # 18696). The proposed development at 2140 Baseline Road will contain 44 2-bedroom suites, 12 3-bedroom suites, and 84 4-bedroom suites. The sewage flows, based on current City Guidelines, were re-calculated as follows:

Townhomes	= 182
2-bedroom apartment	= 44
3-bedroom apartment	= 12
4-bedroom apartment	= 84

182-Townhomes x 2.7 person/unit	= 491.4 persons
44- 2 Bedroom apartments x 2.1 person/unit	= 92.4 persons
12- 3 Bedroom apartments x 3.1 person/unit	= 37.2 persons
84- 4 Bedroom apartments x 4.1 person/unit	= 344.4 persons

Residential Population = 491.4+3.4+92.4+37.2+344.4	= 965.4 persons

Residential Sewage Flow

Residential Flow Allowance	= 280 L/person/day
Correction Factor, K	= 0.8
Peak Factor = $1 + (14 / (4 + (P/1000)^{0.5})) * K$	
Peak Factor = $1 + (14 / (4 + (965.4/1000)^{0.5})) * 0.8$	
Peak Factor = $1 + (2.81) * 0.8$	= 3.25

Avg. Domestic Flow = 965.4 x 280 L/person/day x (1/86,400 sec/day)	= 3.13 L/sec
Peak Domestic Flow = 3.13 L/sec x 3.25	= 10.2 L/sec

Institutional Sewage Flow

Commercial Flow Allowance	= 28,000 L/day/ha
Commercial Peaking Factor	= 1.5
Commercial Area	= 15.3 ha
Commercial Flow = 28,000 x 15.3 x (1/86,400 sec/day) x 1.5	= 7.4 L/sec

Extraneous Flows

Total Area	= 22.1 hectares
Extraneous Flow Allowance	= 0.33 L/ha/sec
Extraneous Flows = (0.33 x 22.1)	= 7.3 L/sec

Total Sewage Flow

Total Sanitary Flow = 10.2+7.4+7.3	= 24.9 L/sec

The re-calculated peak sewage flows under developed conditions for the existing system downstream of 2140 Baseline is calculated to be 24.9 L/sec including the newly proposed development at 2140 Baseline Road. It should be noted that the residential sanitary flow allowance is now 280 L/person/day as per Technical Bulletin ISTB-2018-01, and therefore the existing infrastructure is conservatively designed in accordance with today's standard guidelines.

The maximum percent (%) full capacity within with sanitary sewer system was determinized to be 68.8% between sewer runs 18693 and 18694, just two sewer sections downstream of the proposed sewer connection from site at 2140 Baseline Road. Existing sanitary sewer invert elevation data was taken from the City's website. It can be concluded that the existing sanitary sewer system can support the proposed development at 2140 Baseline Road.

6 Stormwater Management

6.1 Design Criteria

The storm sewer system is designed in conformance with the latest version of the City Design Guidelines (October 2012). Section 5 "Storm and Combined Sewer Design" and Section 8 "Stormwater Management".

The allowable release rate for the site is limited to 10.1 L/sec based on the requirements of "Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area", JFSA June 2012. This guideline sets the target release rate from the site to a maximum 33.5 L/ha/sec. Flows in excess of this target rate will be detained onsite for up to the 100-year storm event.

The following additional SWM criteria are required as noted in the JFSA Pinecrest Creek/Westboro Area SWM Guidelines (June 2012) for our site, as it falls within the Pinecrest Creek Watershed, upstream of the ORP pipe inlet:

- Runoff Volume Reduction: On-site retention of 10 mm storm.
- Water Quality: 80% TSS removal.
- Quantity Control: 100-yr discharge not to exceed 33.5 L/ha/sec.
- Erosion Control: Detain 25mm to meet outflow not exceeding 5.8 L/ha/sec.

6.1.1 Minor System Design Criteria

- The storm sewers have been designed and sized based on the Rational Method and the Manning's Equation under free flow conditions for the 2-year storm using a 10-minute inlet time.
- Inflow rates into the minor system are limited to an allowable release rate as noted above.

6.1.2 Major System Design Criteria

- The major system has been designed to accommodate on-site detention with sufficient capacity to attenuate the 100-year design storm. Excess runoff above the 100-year event will flow overland offsite.
- On site storage is provided and calculated for up to the 100-year design storm. Refer to Appendix D for the calculations of the required on-site storage volumes.

- We calculated the required storage volumes based on the Modified Rational Method as identified in Section 8.3.10.3 of the City's Sewer Guidelines.

- The 100-year discharge rate from the site is limited to 33.5 L/ha/sec as per the Pinecrest Creek / Westboro Area SWM Guidelines (Table 3.1).

6.2 Runoff Coefficients

Average runoff coefficients for all catchments were calculated using PCSWMM's area weighting routine. This modelling software has a GIS engine which allows for catchment (or polygon) definition including attributes. The runoff coefficients for all catchments were area weighted to derive at average runoff coefficients based on hard surfaces (concrete or asphalt) having an imperviousness of 100%, soft surfaces (landscaping surfaces) having a zero percent imperviousness. The conversion from an imperviousness percent to a runoff coefficient was taken as C = (IMP*0.70) / 100 + 0.20, with the imperviousness (IMP) as a percentage.

The average runoff coefficient for the overall site area under post-development conditions was calculated as 0.81, whereas the pre-development average runoff coefficient was less than 0.20. Runoff coefficients for individual catchment ranged from 0.20 to 0.90. It should be noted that prior to 2008, the site contained an asphalt roadway, and it was after 2008 that Constellation Crescent and Gemini Way were re-configured into their current location.

6.3 Time of Concentration

The time of concentration for the pre-development catchments were determined using the Airport Method (Federal Aviation Administration). The Airport Formula is suited well for undisturbed land and is typically used for drainage areas with a runoff coefficient of less than 0.40. From the MTO Drainage Manual the Airport Formula used is as follows:

$$\mathrm{Tc} = \frac{3.26 * (1.1 - C) * L^{0.5}}{Sw^{0.33}}$$

where:

Tc	=	Time of Concentration (minutes)
C	=	Runoff Coefficient
Sw	=	Watershed Slope (%)
L	=	Watershed Length (m)

The watershed length and slope that were used were determined by reference to the topographic survey. Detailed calculations for each catchment is provided in Table D1 of Appendix D for reference.

6.4 Pre-Development Conditions

The 0.30-hectare site is currently vacant, however prior to 2008 it was used as a connection roadway between Constellation Crescent and Baseline Road. From the existing ground elevations shown on the grading plan, storm runoff flows are in a northerly direction to catch basins on Constellation Crescent and Baseline Road. The pre-development runoff coefficient for the site was determined as 0.20.

Figure A2 in Appendix A illustrates the pre-development drainage conditions. Runoff from the site is directed southerly to catchbasins on Gemini Way, northerly to Baseline Road, or easterly to Constellation Crescent. Since external lands upstream of the site boundary drains towards the proposed site, it was necessary to expand the catchments areas tributary to the storm sewers on the adjacent streets. This was completed in order to compare the total peak flows under pre-development and post-development conditions. Also, catchment boundaries upstream, downstream and within the site boundary were separated for comparison purposes.

Using a time of concentration (T_C) of 10 minutes, the pre-development release rates from the site were determined for the 5-year and 100-year storms using the Rational Method as follows:

$Q_{PRE} = 2.78\ C\ I\ A$

where:

Q_{PRE}	=	Peak Discharge (L/sec)
C	=	Runoff Coefficient (C=0.20)
I	=	Average Rainfall Intensity for return period (mm/hr)
	=	$998.071/ (T_C+6.053)^{0.814}$ (5-year)
	=	$1735.688/ (T_C+6.014)^{0.820}$ (100-year)
Tc	=	Time of concentration (mins)
A	=	Drainage Area (hectares)

Table D2 summarizes the pre-development peak flows based on the time of concentrations determined using the Airport Formula. Table 1 below summarizes the 5-year and 100-year pre-development peak flows tributary to the storm sewers on Baseline Road or Constellation Crescent / Gemini Way for all catchments. Please note that pre-development catchments PRE-1 and PRE-2 were combined as they discharge to the same storm sewer.

Table 1 : Summary of Pre-Development Flows

Return Period Storm	Peak Flow to Baseline Storm Sewers (L/sec)			Peak Flow to Constellation / Gemini Storm Sewers (L/sec)			Total Peak Flows (L/sec)
	Onsite Areas	External Areas	Combined Onsite + External Areas	Onsite Areas	External Areas	Combined Onsite + External Areas	
	1B,2A	1A,1C, 2B		3B	3A,3C		
2-year	7.8	57.0	64.9	5.1	25.0	30.2	95.0
5-year	10.6	78.3	88.9	7.0	34.2	41.1	130.1
100-year	22.8	168.5	191.2	14.9	73.3	88.2	279.5

6.5 Calculation of Allowable Release Rate

With the proposed changes in land use, the overall imperviousness of the site will increase. To control runoff from the site it is necessary to limit post-development flows to allowable capture rate for all storm return periods up to the 100-year event. The allowable release rate from the site is based on the requirements of the "Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area", JFSA June 2012. The allowable release rate will be limited to 33.5 L/ha/sec or 10.1 L/sec for the 0.30-hectare parcel. To control runoff from the site it will be necessary to use an onsite inlet control device (ICD) and flow-controlled roof drains as noted in the proceeding sections.

6.6 Offsite Overland Flow Areas

Since there is a small amount of onsite drainage that will discharge over land directly to the right-of-way, it was necessary to subtract the peak flows from these areas, to ensure that no increase in runoff occurs under post development conditions. In addition, the 100-year discharge rate from the site needs to meet the allowable target rate of 10.1 L/sec.

The peak flows for drainage area PST-2B and PST-3B were estimated below to account for overland flow that will discharge offsite without being captured. For additional calculations of storm drainage areas please refer to Table D5 in Appendix D.

Using a post-development time of concentration (T_C) of 10 minutes and a runoff coefficient of 0.67 and 0.35, the 100-year uncontrolled flow rate, Q_{100UNC}, was determined using the Rational Method as follows:

Q_{100UNC} $= 2.78\ C\ I_{100}\ A$

where:

Q_{100UNC} = Peak Discharge (L/s)
C = Runoff Coefficient
I_{100} = Rainfall Intensity (mm/h) for 100-year storm
A = Drainage Area (ha)
I_{100} = $1735.688/\ (10 + 6.014)^{0.820} = 178.56$ mm/hr

(Area PST-2B) Q_{100UNC} = $2.78 \times 0.67 \times 125\% \times 178.56 \times (0.0051) = 2.1$ L/sec
(Area PST-3B) Q_{100UNC} = $2.78 \times 0.35 \times 125\% \times 178.56 \times (0.0061) = 1.3$ L/sec

The allowable release rate to the storm sewers (minor system) on Gemini Way is determined by subtracting the uncontrolled 100-year runoff from the allowable release rate as follows:

$Q_{REL} = Q_{ALLOW} - Q_{100UNC}$

The discharge rate to the Gemini Way storm sewer and the rates that will be used to determine storage requirements are:

$$\begin{aligned} Q_{REL} &= Q_{ALLOW} - Q_{100UNC} \\ &= Q_{ALLOW} - Q_{100UNC\text{-}8} - Q_{100UNC\text{-}9} \\ &= 10.1 - 2.1 - 1.3 \\ &= 6.6 \text{ L/sec} \end{aligned}$$

Therefore, the allowable discharge into the existing storm sewer (directly connected) from the site is **6.6 L/sec.**

6.7 Calculation of Post-Development Runoff

Stormwater runoff from the proposed site will drain from a combination of controlled and uncontrolled areas. As a result of the changes onsite the overall post development runoff coefficient will increase over pre-development conditions. This increase in runoff is the result of changes due to site development (i.e. additional hard surfaces, roof areas and hard landscaping).

The estimation of peak flows under post-development conditions was completed using the Rational Method as noted below, with detailed calculations included in Table D4 and table D5 in Appendix D.

For catchments within the proposed site a time of concentration (TC) of 10 minutes was used as per the SDG002. For catchments outside of the site boundary, the same Tc which was used for the pre-development conditions was maintained. Peak 2-year, 5-year and 100-year storm flows using the Rational Method are noted below. Note that average runoff coefficients for all catchments were derived using the area-weighting command in PCSWMM.

$$I_{2} = 732.951 / (Tc + 6.199)^{0.810} = 76.81 \text{ mm/hr}$$
$$I_{5} = 998.071 / (Tc + 6.053)^{0.814} = 104.19 \text{ mm/hr}$$
$$I_{100} = 1735.688 / (Tc + 6.014)^{0.820} = 178.56 \text{ mm/hr}$$

$$Q_{2POST} = 2.78 \times C_{AVG} \times 76.81 \text{ mm/hr} \times \text{Area}$$
$$Q_{5POST} = 2.78 \times C_{AVG} \times 104.19 \text{ mm/hr} \times \text{Area}$$
$$Q_{100\ POST} = 2.78 \times C_{AVG\ *}\ 25\% \times 178.56 \text{ mm/hr} \times \text{Area}$$

Based on the storm drainage areas the post-development runoff rates are calculated and summarized in Table 2 below with detailed calculations provided in Table D4 of Appendix D.

Figure A3 in Appendix A illustrates the post-development drainage system and catchments. For the roof areas, individual catchments were created for roof drains. There are six (6) different roof levels that contain roof drains, with these being denoted as R1, R2 etc.

A roof drain calculation sheet was prepared, and is provided in Table D8 of Appendix D. This was completed to estimate the 5-year and 100-year discharge rates, and the resultant storage volumes that will occur based on the number of proposed drains. The discharge rate from the roof and the resultant 100-yr storage is 16.1 L/sec and 37.4 m^3. Additional information on the roof drains and storage on the roof is presented in proceeding sections of this report.

Table 2 : Summary of Post Development Flows

Area No.	Area (ha)	Runoff Coefficient			Release Rate (L/s)		
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr
PST-1A	0.0208	0.200	0.20	0.25			
PST-1B	0.0629	0.680	0.68	0.85			
PST-1C	0.0342	0.840	0.84	1.00			
PST-1D	0.0112	0.900	0.90	1.00			
PST-1E	0.0071	0.900	0.90	1.00			
PST-1F (R1)	0.0135	0.900	0.90	1.00	(2.5)	(3.1)	(6.6)
PST-1F (R2)	0.0141	0.900	0.90	1.00			
PST-1F (R3)	0.0968	0.900	0.90	1.00			
PST-1F (R4)	0.0073	0.900	0.90	1.00			
PST-1F (R5)	0.0102	0.900	0.90	1.00			
PST-1F (R6)	0.0105	0.900	0.90	1.00			
PST-3C	0.0228	0.640	0.64	0.80			
PST-1G	0.0690	0.680	0.68	0.85	10.0	13.6	29.1
PST-2A	0.1400	0.820	0.82	1.00	32.5	44.3	92.9
PST-2B	0.0051	0.670	0.67	0.84	0.7	1.0	2.1
PST-3A	0.0669	0.200	0.20	0.25	2.9	3.9	8.3
PST-3B	0.0061	0.350	0.35	0.44	0.5	0.6	1.3
PST-3D	0.1036	0.710	0.71	0.89	16.0	21.7	46.5
Total	0.70				65.1	88.2	187.0
Note: Release rates denoted in (brackets) are controlled rates.							

In summary the 2-year 5-year and 100-year post-development flows are 65 L/sec, 88 L/sec and 187 L/sec, respectively. Control of runoff will be achieved using 1) a single inlet control located just downstream of underground storage chambers, and 2) flow-controlled roof drains. These controls will be used to restrict the discharge rates from the site to **10.1 L/sec** for the 100-year storm. Table 3 below further identifies the peak flows to each storm sewer

Table 3 : Summary of Post-Development Flows

Return Period Storm	Peak Flow to Constellation / Gemini Storm Sewers (L/sec)			Peak Flow to Baseline Storm Sewers (L/sec)			Total Post-Dev Peak Flows (L/sec)
	Onsite Areas	External Areas	Combined Onsite + External Areas	Onsite Areas	External Areas	Combined Onsite + External Areas	
	1A,1B,1C, 1D,1E,1F,3C	1G,2A,2B		3B	3A,3D		
2-year	2.5	43.3	45.7	0.5	18.9	19.3	65.1
5-year	3.1	58.9	62.0	0.6	25.6	26.2	88.2
100-year	6.6	124.2	130.8	1.3	54.9	56.2	187.0

A comparison between Tables 1 and 3 illustrates a reduction in peak flows to meet the allowable discharge rate of 10.1 L/sec from the site.

The following table below summarize the total pre-development peak flows to both storm sewer outlets, for all catchment areas and the catchments within the site only. By controlling post development peak flows to the restrictive rate of 33.5 L/ha/sec the resultant flow reductions of 32% overall and 72% for the site only are achieved.

Table 4 – Comparison of Pre-Development and Post-Development Peak Flows

All Catchments				Site Only			
Return Period Storm	Total Peak Flow (L/sec)		% Reduction	Return Period Storm	Total Peak Flow (L/sec)		% Reduction
	Pre-Dev	Post-Dev			Pre-Dev	Post-Dev	
2-year	95.0	65.1	32%	2-year	13.0	3.6	72%
5-year	130.1	88.2	32%	5-year	17.6	4.7	73%
100-year	279.5	187.0	33%	100-year	37.7	10.0 (6.6 controlled) (3.4 uncontrolled)	73%

The control of onsite runoff requires the detention of approximately 153.4 cubic metres. This will be achieved in underground chambers and on the rooftop.

6.8 Storage Requirements

Runoff from the site and building roof will be restricted via inlet control devices (ICDs) or with flow-controlled roof drains. Table 5 below summarizes the controlled release rates, and storage requirements for the roof and surface areas. Calculation of the on-site storage has been supported by calculations provided in Appendix D.

Table 5 - Summary of Storage Requirements

Area	Release Rate (L/s)			[2]Storage Required (m^3)			Storage Provided (m3)	Control Location	Control Type
	2-yr	5-yr	100-yr	2-yr	5-yr	100-yr			
Roofs	n/a	13.1	16.1	n/a	17.7	37.4	76.2	Roof	Flow Controlled Roof Drains
Surface Areas (controlled)	2.5	3.1	6.6	n/a	55.4	116	116	STMH101	ICD
Surface Areas (un-controlled)	1.1	1.6	3.4	none	none	none	none	none	none
[3]Totals	3.6	4.7	10.0	53.5	73.1	153.4	153.4		

Notes:
1-The Storage Required for the Surface Areas were calculated by subtracting the roof areas from the Total.
2-The total storage for the site was determined based on the Modified Rational Method.
3-The Release Rate Totals are for surface areas only, whereas the Storage Required is inclusive of the roofs.

For the building roofs flow-controlled drains are necessary. An estimate of the controlled release rate and associated 100-year storage requirements was completed for the flat roof areas. Table D7 provides the estimated 5-year and 100-year storage requirements for the entire site based on the Modified Rational Method. A combined 100-year storage of 153.4 cubic metres is required based on the allowable discharge rate of 6.6 L/sec. This 6.6 L/sec discharge rate along with the uncontrolled overland flows of 3.4 L/sec results in a total of 10.0 L/sec.

In addition to the above analysis, reference from Table 3.2a (page 17) of the JFSA report indicates that for an imperviousness level of 85% (interpolated) the onsite storage requirements would be 475 m^3/ha. Based on a site area of 0.30 hectares, results in 142.5 m^3. This closely matches the 153.4 m^3 volume estimate from Table 5 above. This small increase above the 142.5m^3 is the result of the uncontrolled peak flows that needed to be subtracted form the allowable discharge rate.

During the 100-year event the following summarizes the estimated water depths on the roof and in the underground chambers. It should be noted that the entire 100-year volume will be contained within the chambers and no surface ponding will occur.

Table 6 - Summary of Storage Depths

Storm	Ponding Depths on Roof (mm)	Water Depth within Underground Chambers (m)
2-year	Not calculated	Not calculated
5-year	49 - 103	0.54
100-year	68 - 141	1.13

6.9 Inlet Control Divide (ICD) Requirements

Inlet control devices will be used to restrict runoff from entering the stormwater system. Inlet control devices for the roofs and surface areas will consist of flow-controlled area and/or roof drains. Table 7 below summarizes the type, release rate and head requirements for each inlet control location.

Table 7 - Summary of Flow Control

Post-Dev Area No.	Control Location	Max Flow (L/sec)	Max Head (m)	Type	Model	Number of Drains	Weir Position
R1 to R6, PST-3C	Roof	1.26 each (or 20gpm)	0.15	Flow Controlled Roof Drain	WATTS-ACCUTROL	22	50% Position
PST-1A to PST-1E	STMH101	6.5	1.13	IPEX Tempest Inlet Control Device	IPEX LMF-85	n/a	n/a

6.10 Storm Sewer Design

The storm drainage areas are illustrated in Figure A2 in Appendix A. Drainage areas are shown on this drawing with average runoff coefficients calculated for each inlet. The maximum 100-year discharge rate to the storm sewer is 6.5 L/sec, with an additional 3.6 L/sec of overland flow from the site. A single 250mm storm sewer service (installed at minimum 2%) will be used. A 250mm sewer at 2% has a capacity of 88

L/sec. A 2-year storm design sheet was prepared to confirm adequate capacity is provided for the 2-year storm is provided in Appendix D for reference.

6.11 Quality Control Measures

The site is located within the Pinecrest Creek subcatchment as identified in Figure 3.2 (Appendix H) taken form the Pinecrest Creek/Westboro Area SWM Guidelines (June 2012). As this area discharges directly to the Pinecrest Creek and is upstream of the ORP pipe inlet the following summarizes the specific additional quality and erosion control requirements.

- Runoff Volume Reduction: On-site retention of 10 mm storm.
- Water Quality: 80% TSS removal.
- Erosion Control: Detain 25mm to meet outflow not exceeding 5.8 L/ha/sec.

As a total suspended solids (TSS) removal efficiency of 80% is required, it is proposed to provide an oil grit separator for quality control. A Stormceptor STC750 will we necessary to provide the minimum 80% TSS and 85% volume reduction. The following summarizes the design parameters used in the sizing of the Stormceptor manhole:

Table 8 – Design Parameters Used for Oil Grit Separator Sizing

Parameter	Value Used
Drainage Area	0.30 hectares
Imperviousness	85%
TSS Removal Requirements	80 %
Runoff Volume Capture	85%
Flow attenuation upstream of OG separator (taken as 5-yr, 100-yr discharge, storage on roof)	0.016 m^3/s at 0.004 ha.m 0.013 m^3/s at 0.002 ha.m.
Particle distribution	fine

Output from the PCSWMM for Stormceptor program is provided in Appendix E for reference. A Stormceptor model STC750 is necessary to meet the required TSS removal of 80%.

To provide the necessary 10mm of volume reduction, the method outlined in Page 2 of Appendix D of the JFSA report was used. The following clarifies the methodology used.

<u>Volume Required to Infiltrate the 10mm storm</u>

Runoff Volume = 0.30 ha * (10mm – 1.57mm) * 10 m3/ha*mm
= 25.3 m^3

An additional depth of granular stone below the infiltration chambers and below the control device will be used to promote the infiltration of a runoff volume of 25.3 m^3. A design sheet provided from the manufacturer (ADS) for the Stormtech MC-3500 chambers requires twenty-two (22) chambers to provide the required 116 m^3. The granular footprint area under the chambers is 120 m2. The required depth of an additional bed for infiltration of 25.3 m^3, is as follows is:

Depth Required (m)	=	Volume / (area *void ratio)
	=	25.3 / (120 * 0.4)
	=	0.53 m

This depth and area of additional stone for infiltration is illustrated on the grading plan.

Erosion Control Requirement for detaining 25mm storm to 5.8 L/ha/sec.

A simplified approach was completed to determine the volume and peak flow that results from the 25mm storm, based on this requirement. In a similar method as above, the 25mm volume was determined as follows:

Erosion Control Volume, (ECV)	=	0.30 ha * (25mm – 1.57mm) * 10 m3/ha*mm
	=	70.3 m^3

The total 25mm volume that would accumulate in the underground chambers was derived by subtracting the volume that was stored upstream of the chambers on the roof. Using the Modified Rational Method for the roof area only (0.1524 ha), and a release rate of 0.88 L/sec (0.1524 ha at 5.8 L/ha/sec) would result in a 2-year volume of 34 m3. The 2-year volume was used as it was a conservative volume for determining the volume occurring during the 25mm event. Therefore, the volume in the chambers would be:

Required Volume in Chambers to meet ECV	= 70.3 – 34.3
	= 36 m^3
At an EVC of 5.8 L/ha/sec the discharge rate would be:	= 5.8 L./ha/sec * 0.30 ha
	= 1.74 L/sec

A discharge rate of 1.74 L/sec would occur at a depth above the orifice of 0.075mm for IPEX model LMF-85. Using a 250mm outlet pipe would result in a depth of 0.25m / 2 + 0.075m = 0.20 m above the bottom of the chambers. The total volume provided below this water depth, as taken from the Manufacture's Cumulative Volume Table, would be:

Storage Volume in Chambers (at 0.43m or 9" +8" = 17")	= 1.29 m^3/chambers x 22 chambers
	= 28.3 m^3
Storage volume in Endcaps (at 0.43m or 9" +8" = 17")	= 1.29 m^3/endcap x 6 endcaps
	= 2.14 m^3
Storage volume in Granular base (0.40 void ratio)	= 120 m^2 x 0.53m x 0.40
	= 25.4 m^3

The estimated erosion control storage volume based on at the allowable discharge of 1.74 L/sec would be 55.8 m3. This in addition to an approximate volume of 34 m^3 on the roof would exceed the required volume. This approach confirms that an appropriate volume is provided for erosion control. The actual discharge rate during the 25mm event would be lower than the calculated rate of 1.74 L/sec.

7 Erosion and Sediment Control

During all construction activities, erosion and sedimentation shall be controlled by the following techniques:

- Filter cloth shall be installed between the frame and cover of all adjacent catch basins and catch basin manhole structures.
- Light duty silt fencing will be used to control runoff around the construction area. Silt fencing locations are identified on the site grading and erosion control plan.
- Visual inspection shall be completed daily on sediment control barriers and any damage repaired immediately. Care will be taken to prevent damage during construction operations.
- In some cases barriers may be removed temporarily to accommodate the construction operations. The affected barriers will be reinstated at night when construction is completed.
- Sediment control devices will be cleaned of accumulated silt as required. The deposits will be disposed of as per the requirements of the contract.
- During the course of construction, if the engineer believes that additional prevention methods are required to control erosion and sedimentation, the contractor will install additional silt fences or other methods as required to the satisfaction of the engineer.
- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) OPSS 805 and City specifications.

8 Conclusions

This report addresses site servicing and stormwater runoff from the proposed development located at the 2140 Baseline Road in the City of Ottawa. The proposed 0.305-hectare development by Baseline Constellation Partnership Inc. consists of a proposed 14-storey student residence, which is comprised of 140 suites, and ground floor commercial areas.

The following summarizes the servicing requirements for the site:

- The allowable release rate for the site is limited to 10.1 L/sec based on the requirements of "Stormwater Management Guidelines for the Pinecrest Creek/Westboro Area", JFSA June 2012. This guideline sets the target release rate from the site to a maximum 33.5 L/ha/sec. This equates to a maximum discharge rate of 10.1 L/sec for the 0.30-hectare site. Peak flows more than this target rate will be detained onsite for up to the 100-year storm event.
- To meet the stringent stormwater requirements, underground chambers will be used which will have a single outlet manhole and flow control device (ICD). An IPEX LMF 85 will be used to control flows to 6.6 L/sec at 1.13m head. The total 100year storage requirement for the site is 153.4m^3, of which 116 m^3 will be in underground chambers and 37.4m^3 on the roof.
- In addition, flow from the building rooftops will be restricted to a total maximum flow rate of 16.1 L/sec using flow-controlled roof drains. Total required storage on these rooftop is estimated at 37.4 cubic metres for the 100-year storm. Roof storage provided will be coordinated with the architect and mechanical consultants. An estimate of storage available on the roof areas is 76.2 m^3. Watts flow-controlled drains are proposed based on 22 drains at 1 weir per drain with each set at the 50% open position having a maximum capture rate each of 20 gpm at 150mm depth.
- An estimated peak sewage flow of 5.70 L/sec based on City Guidelines. A 250mm sewer lateral will be installed with a slope of 2.00% having a full flow capacity of 68 L/sec.
- A review of the sanitary catchment areas tributary to the sanitary sewer system was completed to confirm that adequate capacity is available based on the proposed uses onsite. It was determined that adequate reserve capacity is available in the downstream sewer system to service the proposed development.
- The building will be serviced by two 200mm diameter PVC watermain's, with an isolation valve between the two watermain laterals. The two watermains will be connected directly from the building to the existing watermain on Gemini Way. The use of two parallel watermains is required as the water demand is greater than 50 m^3/day as noted in Section 4.3.1 of the City's Water Distribution Guidelines.
- Under maximum day plus fire flow conditions, the calculated pressure drop from the municipal watermain to the proposed building is from 37.3 psi to 37.1 psi at the building based on two (2) 200mm water services. In the event one (1) of the 200mm water services is under service or shut off, the estimated pressure drop through a single watermain would be from 37.3 psi to 35.4 psi. Under either of these scenarios, adequate flow and pressure is provided to the building. This meet the City of Ottawa's minimum pressure guideline of 20 psi. Therefore, the existing municipal watermain along Gemini Way has adequate capacity to service the proposed building for both domestic and fire protection.
- The estimated fire flow requirement of 150 L/sec was completed based on the FUS. A review of the total combined flow from hydrants within a 150m distance from the building was completed to confirm that adequate fire flow is available.

Appendix A – Figures

Figure A1: Site Location Plan

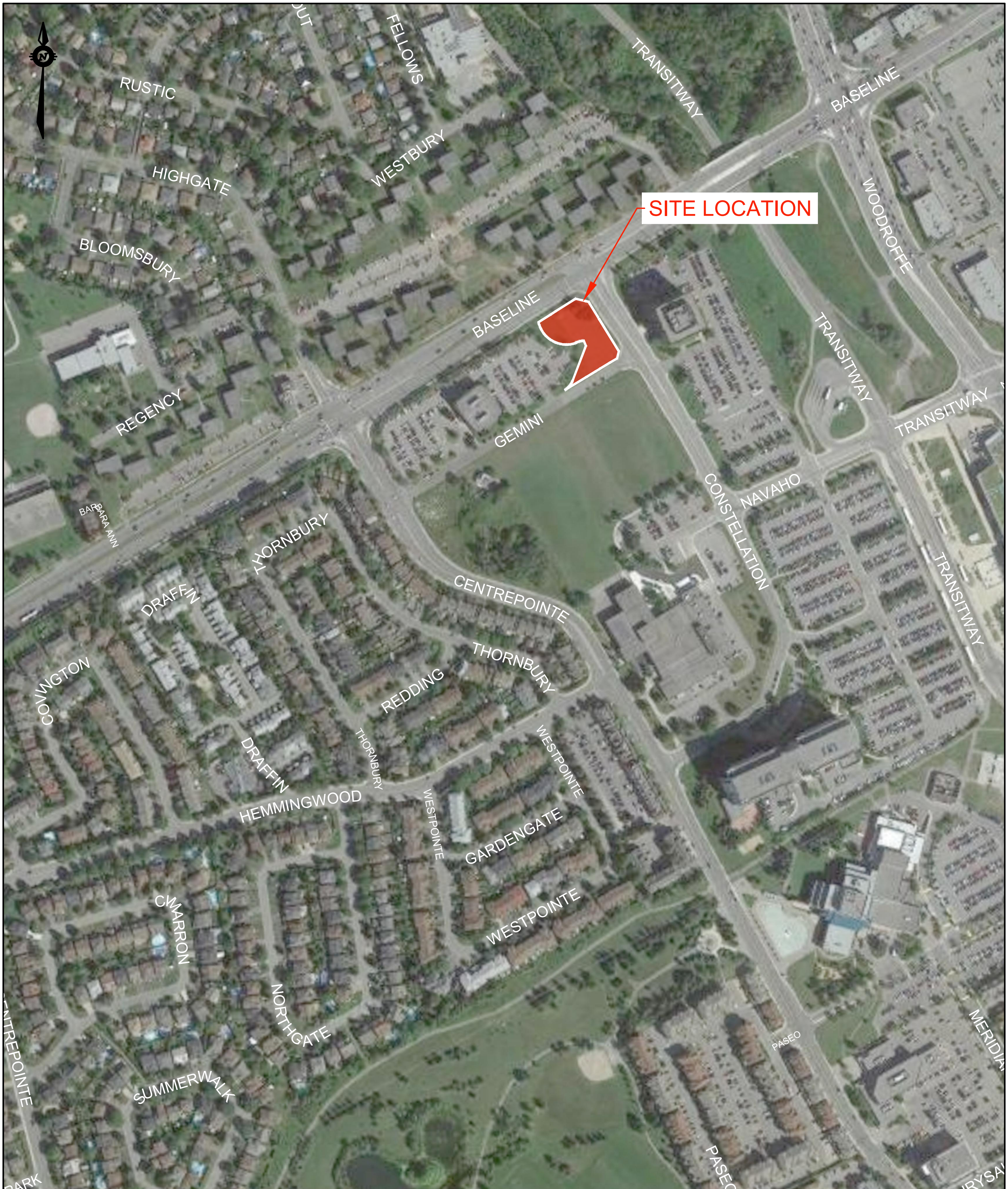
Figure A2: Pre-Development Catchments

Figure A3.1: Post-Development Catchments

Figure A3.2: Roof Catchments

Figure A4: Offsite Sanitary Sewers

Figure A5: Fire Hydrant Locations



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DESIGN JLF	STUDENT HOUSING 2140 BASELINE ROAD OTTAWA, ONTARIO.		SCALE 1:5000
DRAWN MZG			
DATE 13/12/18	SITE LOCATION PLAN		SKETCH NO FIG A1
FILE NO OTT-00245012-A0			

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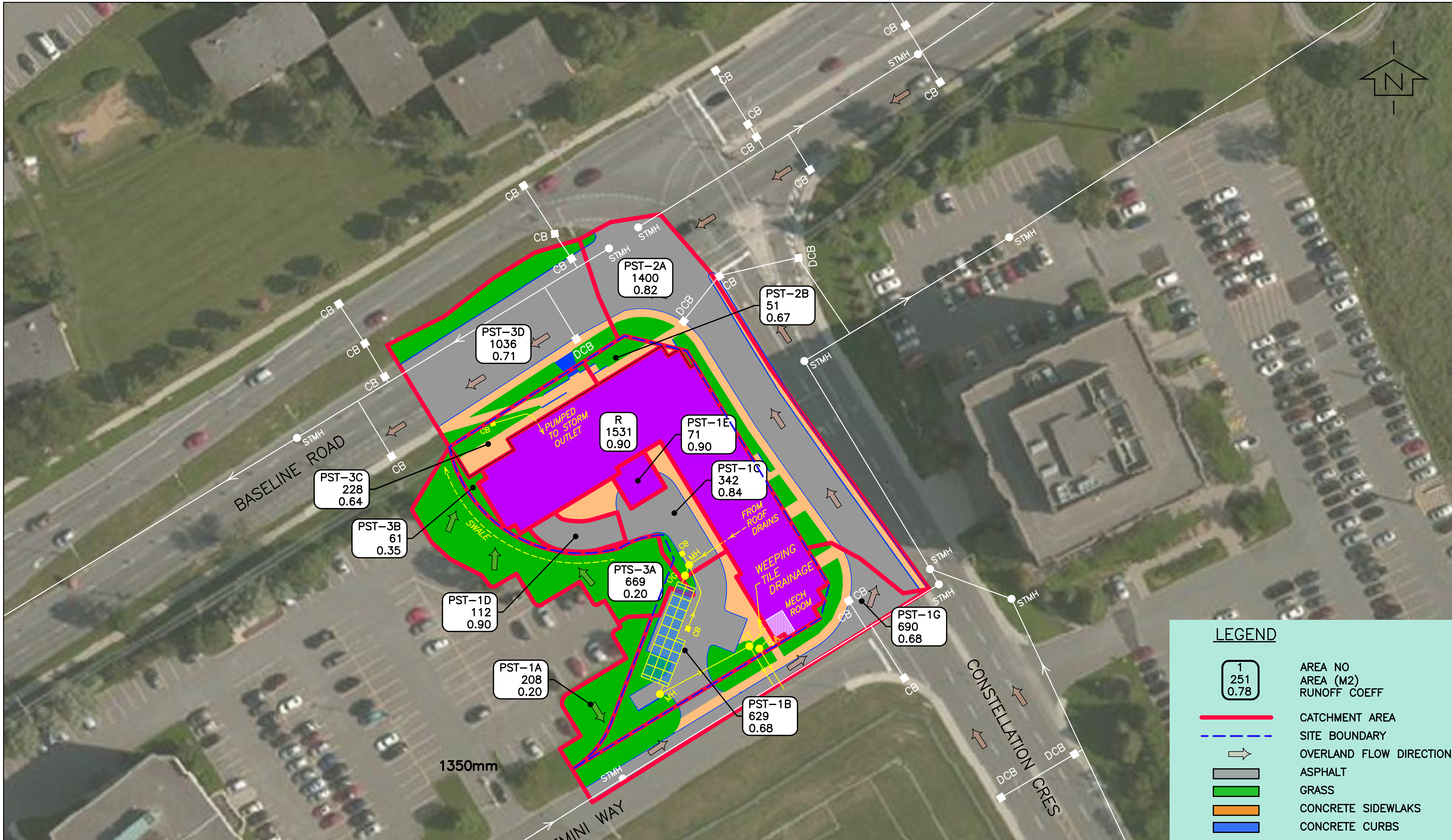
DESIGN JLF	2140 BASELINE ROAD	SCALE 1:750
DRAWN SAB	BASELINE CONSTELLATION PARTERSHIP	FIGURE NO
DATE DEC 2018	PRE–DEVELOPMENT CATCHMENTS	FIG A2
FILE NO 245012		



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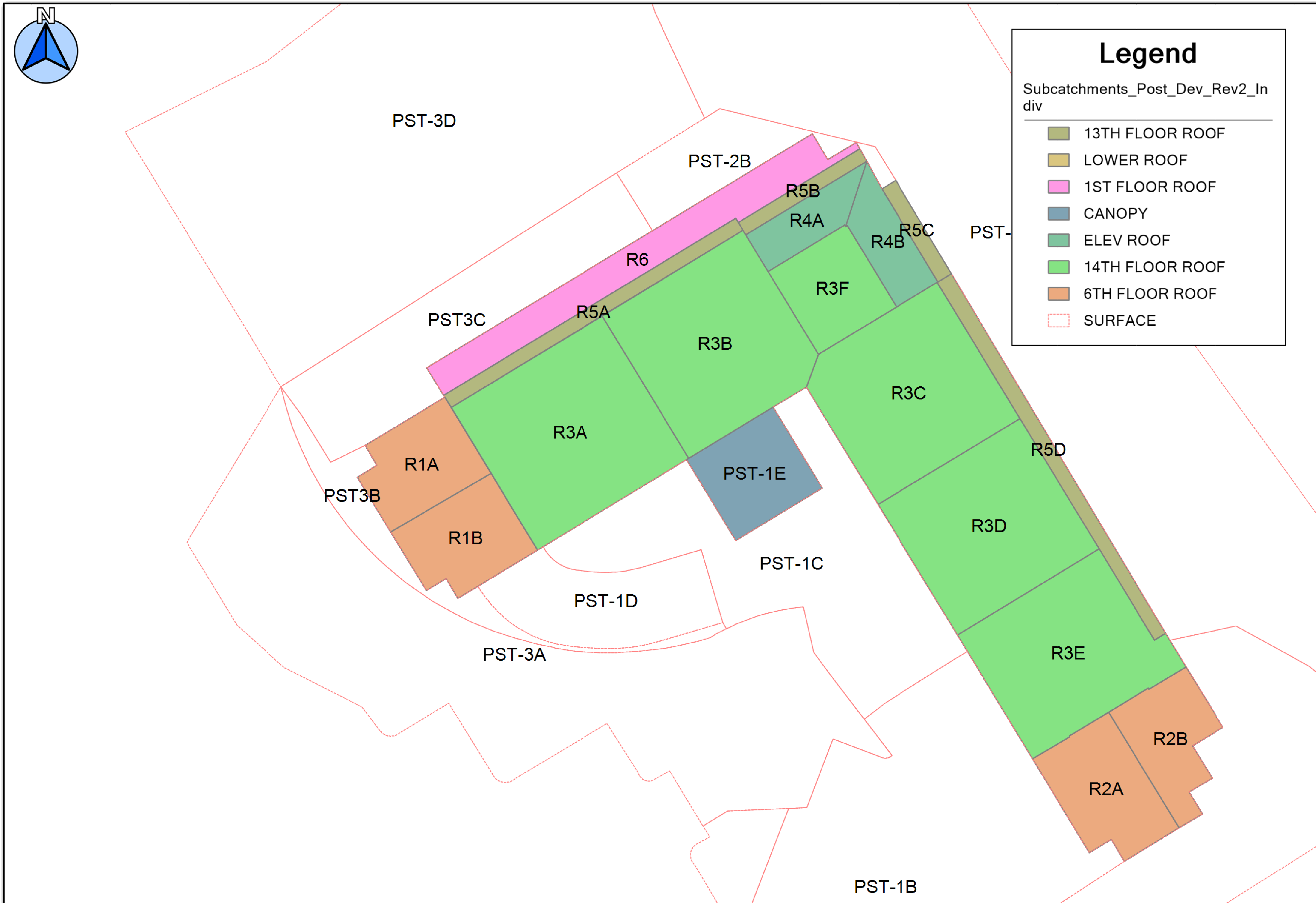
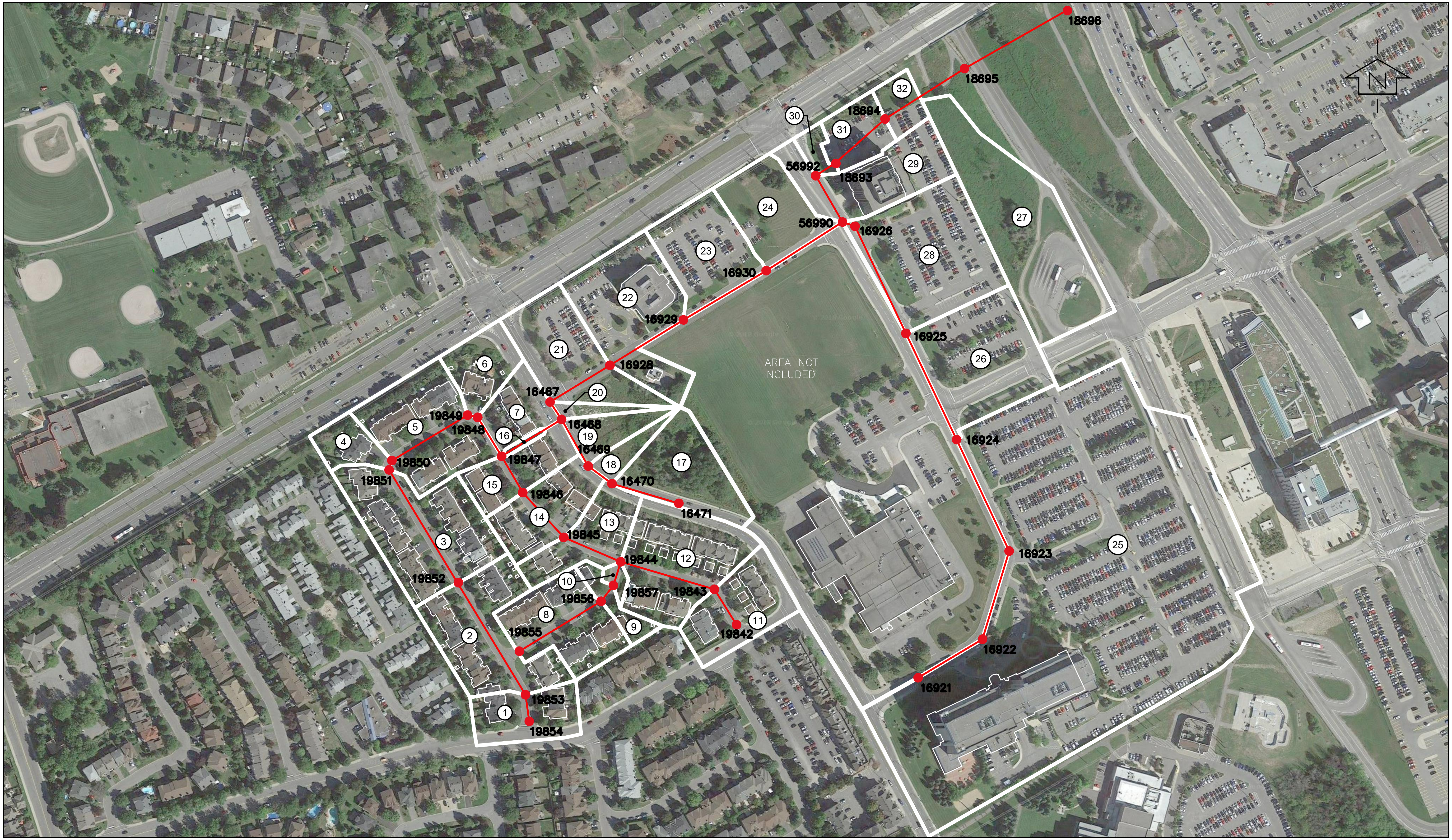
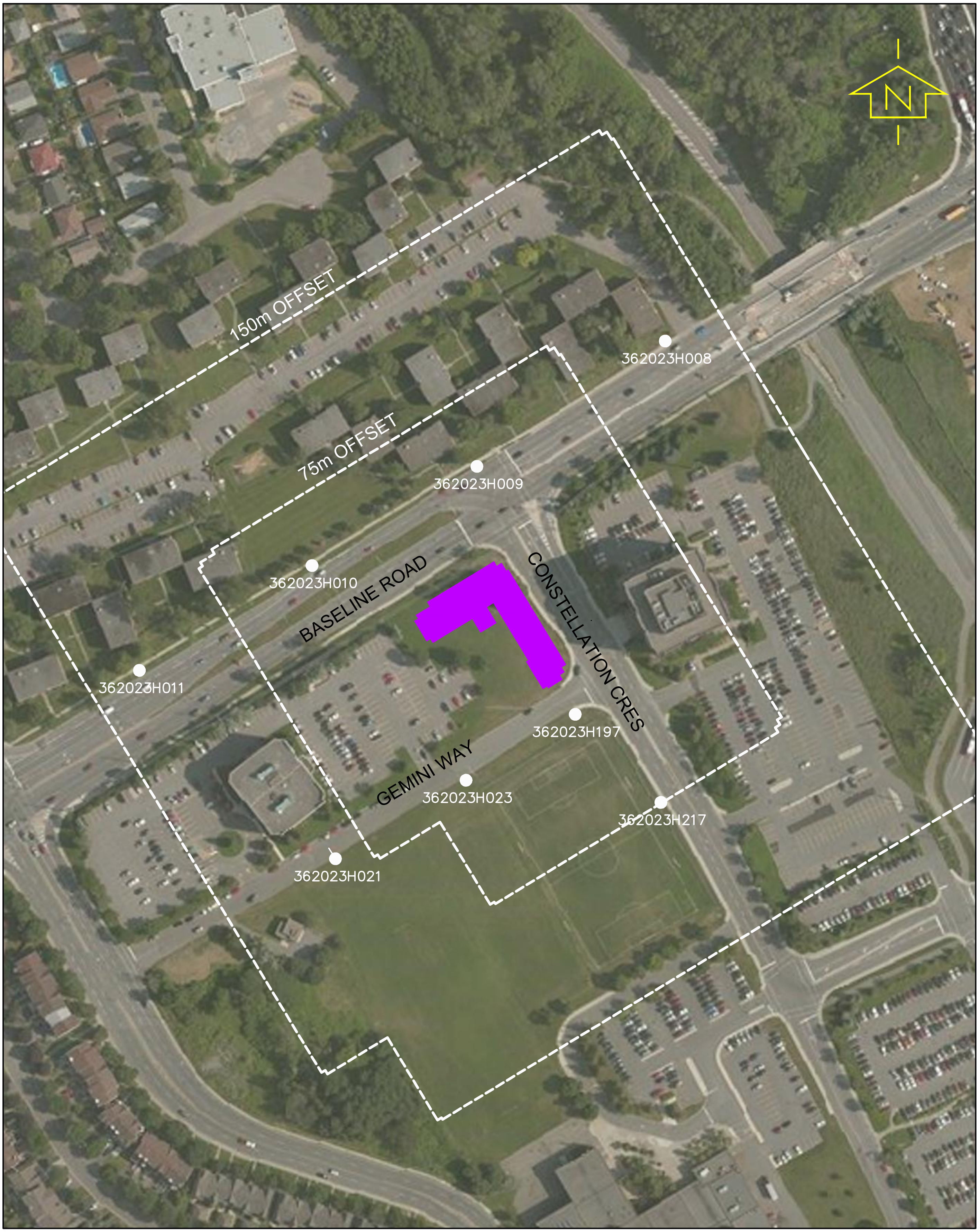
DESIGN	JLF	2140 BASELINE ROAD	SCALE	1:750
DRAWN	SAB	BASELINE CONSTELLATION PARTERSHIP	FIGURE NO	
DATE	DEC 2018	POST-DEVELOPMENT CATCHMENTS		FIG A3.1
FILE NO	245012			



DESIGN: JLF	2140 BASELINE ROAD OTTAWA STUDENT RESIDENCE	SCALE: SEE SCALE BAR
DRAWN: SAB		FIGURE A3.2
DATE: DEC 2018	ROOF CATCHMENTS	
FILE No: 245012		



exp Services Inc. 100-2650 Queensview Drive Ottawa, ON K2B 8H6 www.exp.com	DESIGN JLF	2140 BASELINE ROAD BASELINE CONSTELLATION PARTERSHIP	SCALE 1:3000	
	DRAWN SAB		FIGURE NO	
	DATE DEC 2018	OFFSITE SANITARY SEWERS	FIG A4	
	FILE NO 245012			



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DESIGN JLF	2140 BASELINE ROAD BASELINE CONSTELLATION PARTERSHIP		SCALE 1:2500
DRAWN SAB			SKETCH NO
DATE DEC 2018	FIRE HYDRANT LOCATIONS		FIG A5
FILE NO 245012			

Appendix B – Sanitary Sewer Design Tables

Table B1: Sanitary Sewer Calculation Sheet

Table B2: Offsite Sanitary Sewer Calculation Sheet

exp.

Table B1: SANITARY SEWER CALCULATION SHEET

LOCATION				RESEDENTIAL AREAS AND POPULAITONS												COMMERCIAL			INDUSTRIAL			INSTITUTIONAL		INFILTRATION				SEWER DATA						
					NUMBER OF UNITS							POPULATION				AREA (ha)			AREA (ha)					AREA (ha)										
Street	U/S MH	D/S MH	Desc	Area (ha)	Singles	Semis	Towns	1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	4-Bed Apt.	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor (per MOE)	AREA (Ha)	ACCU AREA (Ha)	INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Gemini	Bldg	main		0.3050					44	12	84	474	474	3.39	5.21			0.497						0.305	0.305	0.10	5.70	250	251.46	2.00	11.400	85.4	7%	1.72
				0.305					**44**	**12**	**84**	**474**												**0.305**										

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)	Peak Population Flow, (L/sec) =	P*q*M/86.4	Unti Type	Persons/Unit	
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	Peak Extraneous Flow, (L/sec) =	I*Ac	Singles	3.4	
or L/gross ha/sec =	0.324				Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K	Semi-Detached	5.7	
Institutianal Avg. Daily Flow (L/s/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	A_c = Cumulative Area (hectares)		Townhomes	2.7	
or L/gross ha/sec =	0.324		1.0	(when area <20%)	P = Population (thousands)		Single Apt. Unit	1.4	
Light Industrial Flow (L/gross ha/day) =	35,000						2-bed Apt. Unit	2.1	
or L/gross ha/sec =	0.40509	Residential Correction Factor, K =	0.80		Sewer Capacity, Qcap (L/sec) =	$1/N\ S^{1/2}\ R^{2/3}\ A_c$	3-bed Apt. Unit	3.1	
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		(Manning's Equation)		4-bed Apt. Unit	4.1	
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)					

Designed:	Project:
J. Fitzpatrick, P.Eng.	2140 Baseline Road
Checked:	Location:
B. Thomas, P.Eng.	Ottawa, Ontario
File Reference:	Page No:
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COMMERICAL FLOWS ESTIMATE BASED ON USES

Ground Floor - Restruarant Areas

Restuarant/Dining Area (m2) =	350	
Occupancy (persons/m2) =	1.1	
Max Occupancy	318.2	
Avg. Demand (L/per/day) =	125	<-- (from SDG002, Appendix 4-A)
Avg Demand (L/day) =	39,773	
or L/sec =	**0.46**	

Ground Floor - Retail Areas

Retail Areas (m2) =	625	
Avg. Demand (L/m2/day) =	5.0	<-- (from SDG002, Appendix 4-A)
Avg Demand (L/day) =	3,125	
or L/sec =	**0.04**	

exp.

Table B2: SANITARY SEWER CALCULATION SHEET

LOCATION				RESEDENTIAL AREAS AND POPULAITONS													COMMERCIAL			INDUSTRIAL			INSTITUTIONAL		INFILTRATION				SEWER DATA						
						NUMBER OF UNITS							POPULATION				AREA (ha)			AREA (ha)					AREA (ha)										
Street	U/S MH	D/S MH	Desc	Indv Area (ha)	Accu Area (ha)	Singles	Semis	Towns	1-Bed Apt.	2-Bed Apt.	3-Bed Apt.	4-Bed Apt.	INDIV	ACCU	Peak Factor	Peak Flow (L/sec)	INDIV	ACCU	Peak Flow (L/sec)	INDIV	ACCU	Peak Factor (per MOE)	AREA (Ha)	ACCU AREA (Ha)	INDIV	ACCU	INFILT FLOW (L/s)	TOTAL FLOW (L/s)	Nom Dia (mm)	Actual Dia (mm)	Slope (%)	Length (m)	Capacity (L/sec)	Q/Q_{CAP} (%)	Full Velocity (m/s)
Thornbury Cres	19854	19853	1	0.3743	0.37			8					21.6	21.60	3.70	0.26									0.3743	0.37	0.12	0.38	250	251.46	0.251	31.900	30.2	1.3%	0.61
Thornbury Cres	19853	19852	2	0.7619	1.14			18					48.6	70.20	3.63	0.83									0.7619	1.14	0.37	1.20	250	251.46	0.153	156.430	23.7	5.1%	0.48
Thornbury Cres	19852	19851	3	0.9265	2.06			29					78.3	148.50	3.55	1.71									0.9265	2.06	0.68	2.39	250	251.46	0.204	157.110	27.3	8.8%	0.55
Thornbury Cres	19851	19850	4	0.1892	2.25			3					8.1	156.60	3.55	1.80									0.1892	2.25	0.74	2.54	250	251.46	0.270	11.100	31.4	8.1%	0.63
Thornbury Cres	19850	19849	5	0.7531	3.01			22					59.4	216.00	3.51	2.46									0.7531	3.01	0.99	3.45	250	251.46	0.209	105.190	27.6	12.5%	0.55
Thornbury Cres	19849	19848	6	0.3004	3.31			4					10.8	226.80	3.50	2.57									0.3004	3.31	1.09	3.66	250	251.46	0.244	12.290	29.8	12.3%	0.60
Thornbury Cres	19848	19847	7	0.2730	3.58			6					16.2	243.00	3.49	2.75									0.2730	3.58	1.18	3.93	250	251.46	0.166	54.360	24.6	16.0%	0.49
Redding Way	19855	19856	8	0.5786	0.58			23					62.1	62.10	3.64	0.73									0.5786	0.58	0.19	0.92	250	251.46	0.167	114.020	24.7	3.7%	0.50
Redding Way	19856	19857	9	0.1309	0.71			1					2.7	64.80	3.63	0.76									0.1309	0.71	0.23	1.00	250	251.46	0.167	23.930	24.7	4.0%	0.50
Redding Way	19857	19844	10	0.0421	0.75									64.80	3.63	0.76									0.0421	0.75	0.25	1.01	250	251.46	0.171	29.320	24.9	4.1%	0.50
Thornbury Cres	19842	19843	11	0.5019	0.50			10					27	27.00	3.69	0.32									0.5019	0.50	0.17	0.49	250	251.46	0.180	49.990	25.6	1.9%	0.51
Thornbury Cres	19843	19844	12	0.7942	1.30			22					59.4	86.40	3.61	1.01									0.7942	1.30	0.43	1.44	250	251.46	0.215	116.230	28.0	5.1%	0.56
Thornbury Cres	19844	19845	13	0.3995	2.45			9					24.3	175.50	3.53	2.01									0.3995	2.45	0.81	2.82	250	251.46	0.177	73.530	25.4	11.1%	0.51
Thornbury Cres	19845	19846	14	0.4391	2.89			14					37.8	213.30	3.51	2.43									0.4391	2.89	0.95	3.38	250	251.46	0.194	72.230	26.6	12.7%	0.53
Thornbury Cres	19846	19847	15	0.3370	3.22			13					35.1	248.40	3.49	2.81									0.3370	3.22	1.06	3.87	250	251.46	0.125	80.210	21.3	18.2%	0.43
Thornbury Cres	19847	16468	16	0.0225	6.82									491.40	3.38	5.38									0.0225	6.82	2.25	7.63	250	251.46	0.191	83.620	26.4	28.9%	0.53
															3.80																				
Centrepointe Dr	16471	16471	17	0.5568	0.557										3.80		0.557	0.557	0.271						0.5568	0.557	0.18	0.45	250	251.46	0.193	83.000	26.5	1.7%	0.53
Centrepointe Dr	16471	16469	18	0.1145	0.671										3.80		0.115	0.671	0.326						0.1145	0.671	0.22	0.55	250	251.46	0.343	35.000	35.4	1.5%	0.71
Centrepointe Dr	16469	16468	19	0.2006	0.872										3.80		0.201	0.872	0.424						0.2006	0.872	0.29	0.71	300	299.36	0.311	64.300	53.6	1.3%	0.68
Centrepinte Dr	16468	16467	20	0.7690	8.5									491.4	3.38	5.38	0.769	1.6	0.798						0.7690	8.5	2.79	8.97	300	299.36	0.162	24.670	38.7	23.2%	0.49
Gemini Way	16467	16928	21	0.6521	9.1									491.4	3.38	5.38	0.652	2.3	1.115						0.6521	9.1	3.01	9.51	300	299.36	0.024	82.610	15.0	63.5%	0.19
Gemini Way	16928	16929	22	0.8329	10.0									491.4	3.38	5.38	0.833	3.1	1.520						0.8329	10.0	3.28	10.19	300	299.36	0.136	103.130	35.4	28.8%	0.45
Gemini Way	16929	16930	23	0.5604	10.5									491.4	3.38	5.38	0.560	3.7	1.792						0.5604	10.5	3.47	10.64	300	299.36	0.131	114.850	34.7	30.6%	0.44
Gemini Way	16930	56990	24	0.4975	11.0					44	12	84	474	965.4	3.25	10.17	0.498	4.2	2.034						0.4975	11.0	3.63	15.83	300	299.36	0.204	107.740	43.4	36.4%	0.55
Gemini Way	16921	16922	25	6.8141	6.8										3.80		6.814	6.8	3.312						6.8141	6.8	2.25	5.56	250	251.46	0.170	88.340	24.9	22.3%	0.50
Gemini Way	16922	16923			6.8																					6.8	2.25	2.25	250	251.46	0.201	109.640	27.1	8.3%	0.54
Gemini Way	16923	16924			6.8																					6.8	2.25	2.25	250	251.46	0.217	147.420	28.1	8.0%	0.57
Gemini Way	16924	16925	26	0.8776	7.7										3.80		0.878	7.7	3.739						0.8776	7.7	2.54	6.28	250	251.46	0.171	140.700	24.9	25.2%	0.50
Gemini Way	16925	16926	27,28	2.2755	10.0										3.80		2.276	10.0	4.845						2.2755	10.0	3.29	8.13	250	251.46	0.221	140.550	28.4	28.7%	0.57
Gemini Way	16926	56990			10.0																					10.0	3.29	3.29	250	251.46	0.121	16.580	21.0	15.7%	0.42
Constellation Dr	56990	56992	29	0.6071	21.6									965.4	3.25	10.17	0.607	14.8	7.174						0.6071	21.6	7.12	24.46	300	299.36	0.458	52.400	65.1	37.6%	0.82
Constellation Dr	56992	18693	30	0.0826	21.7									965.4	3.25	10.17	0.083	14.8	7.214						0.0826	21.7	7.15	24.53	300	299.36	0.471	27.610	66.0	37.2%	0.83
Constellation Dr	18693	18694	31	0.2582	21.9									965.4	3.25	10.17	0.258	15.1	7.340						0.2582	21.9	7.23	24.74	300	299.36	0.140	78.830	36.0	68.8%	0.45
Constellation Dr	18694	18695	32	0.1539	22.1									965.4	3.25	10.17	0.154	15.3	7.415						0.1539	22.1	7.29	24.87	300	299.36	0.337	112.730	55.8	44.5%	0.70
Constellation Dr	18695	18696			22.1									965.4	3.25	10.17		15.3	7.415							22.1	7.29	24.87	300	299.36	0.187	139.010	41.6	59.8%	0.52
				22.077	**243.477**			**182**		**44**	**12**	**84**	**965**												**22.077**										

Residential Avg. Daily Flow, q (L/p/day) =	280	Commercial Peak Factor =	1.5	(when area >20%)	
Commercial Avg. Daily Flow (L/gross ha/day) =	28,000		1.0	(when area <20%)	
or L/gross ha/sec =	0.324				
Institutianal Avg. Daily Flow (L/s/ha) =	28,000	Institutional Peak Factor =	1.5	(when area >20%)	
or L/gross ha/sec =	0.324		1.0	(when area <20%)	
Light Industrial Flow (L/gross ha/day) =	35,000				
or L/gross ha/sec =	0.40509	Residential Correction Factor, K =	0.80		
Light Industrial Flow (L/gross ha/day) =	55,000	Manning N =	0.013		
or L/gross ha/sec =	0.637	Peak extraneous flow, I (L/s/ha) =	0.33	(Total I/I)	

Peak Population Flow, (L/sec) =	P*q*M/86.4	<u>Unti Type</u>	<u>Persons/Unit</u>
Peak Extraneous Flow, (L/sec) =	I*Ac	Singles	3.4
Residential Peaking Factor, M =	1 + (14/(4+P^0.5)) * K	Semi-Detached	2.7
A_c = Cumulative Area (hectares)		Townhomes	2.7
P = Population (thousands)		Single Apt. Unit	1.4
		2-bed Apt. Unit	2.1
Sewer Capacity, Qcap (L/sec) =	1/N $S^{1/2}$ $R^{2/3}$ A_c	3-bed Apt. Unit	3.1
(Manning's Equation)		4-bed Apt. Unit	4.1

Designed:	Project:
J. Fitzpatrick, P.Eng.	2140 Baseline Road
Checked:	Location:
B. Thomas, P.Eng.	Ottawa, Ontario
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Appendix C – Water Servicing Design Tables

Table C1: Water Demand Chart

Table C2: Fire Flow Requirements based on Fire Underwriters Survey (FUS) 1999

Table C3: Estimated Water Pressure at Proposed Building

Table C4: Fire Flow Contributions Based on Hydrant Spacing

TABLE C1: Water Demand Chart

Location: 2140 Baseline Road
Project No: OTT-00245012
Designed by: J.Fitzpatrick
Checked By: B. Thomas
Date Revised: December 2018

Water Consumption

Residential = **350** L/cap/day
Commercial = 5,000 L/1000m^2/day

Population Densities

Single Family	3.4	person/unit
Semi-Detahced	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

Proposed Buildings	No. of Residential Units – Singles/Semis/Towns: Single Familty	Semi-Detached	Duplexz	Townhome	Apartments: Bachelor	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom	Avg Apt.	Total Persons (pop)	Residential Demands in (L/sec): Avg. Day Demand (L/day)	Peaking Factors (x Avg Day): Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Commercial: Area (m^2)	Avg Demand (L/day)	Peaking Factors (x Avg Day): Max Day	Peak Hour	Max Day Demand (L/day)	Peak Hour Demand (L/day)	Total Demands (L/sec): Avg Day (L/s)	Max Day (L/s)	Max Hour (L/s)
Residential Units							44	12	84		474.0	165,900	2.95	4.40	489,737	730,624							1.92	5.67	8.46
Commercial (Ground Flr)																		42,898	1.50	2.70	64,347	115,824	0.50	0.74	1.34
Total =							44	12			474.0	165,900			489,737	730,624							2.42	6.41	9.80

PEAKING FACTORS FROM MOECC TABLE 3-3 (Peaking Factors for Water Systems Servicing Fewer Than 500 persons

Dwelling Units Serviced	Equiv Pop	Night Min Factor	Maximum Day Factor	Peak Hour Factor
10	30	0.10	9.50	14.30
50	150	0.10	4.90	7.40
100	300	0.20	3.60	5.40
150	450	0.30	3.00	4.50
167	500	0.40	2.90	4.30

Ground Floor - Restruarant Areas

Restuarant/Dining Area (m2) =	350
Occupancy (persons/m2) =	1.1
Max Occupancy	318.18
Avg. Demand (L/per/day) =	125
- (from SDG002, Appendix 4-A)	
Avg Demand (L/day) =	**39,773**

Ground Floor - Retail Areas

Retail Areas =	625
Avg. Demand (L/m2/day) =	5
- (from SDG002, Appendix 4-A)	
Avg Demand (L/day) =	**3,125**

TABLE C2: FIRE FLOW REQURIEMENTS BASED ON FIRE UNDERWRITERS SURVEY(FUS) 1999

PROJECT: **2140 Baaseline Road**

An estimate of the Fire Flow required for a given fire area may be estimated by:

F = 220 * C * SQRT(A)

where: F = required fire flow in litres per minute

A = total floor area in m^2 (including all storeys, but excluding basements at least 50% below grade)

C = coefficient related to the type of construction

Task	Options	Multiplier	Area	% Used	Area Used	Input	Value Used	Fire Flow Total (L/min)
Choose Building Frame (C)	Wood Frame	1.5				Non-combustible Construction	0.8	
	Ordinary Construction	1						
	Non-combustible Construction	0.8						
	Fire Resistive Construction	0.6						
Input Building Floor Areas (A)	Floor 14		1,049					
	Floor 13		1,179					
	Floor 12		1,179					
	Floor 11		1,179					
	Floor 10		1,179	50%	590	100% of 2 largest floors + 50% of all floors above them up to eight	8165.0 m²	
	Floor 9		1,179	50%	590			
	Floor 8		1,179	50%	590			
	Floor 7		1,179	50%	590			
	Floor 6		1,179	50%	590			
	Floor 5		1,483	50%	742			
	Floor 4		1,483	50%	742			
	Floor 3		1,483	50%	742			
	Floor 2		1,483	100%	1,483			
	Floor 1 (Ground Floor Commercial)		1,510	100%	1,510			
	Basement (At least 50% below grade, not included)		0					
Fire Flow (F)	F = 220 * C * SQRT(A)							15,903
Fire Flow (F)	Rounded to nearest 1,000							**16,000**

Reductions/Increases Due to Factors Effecting Burning

Task	Options	Multiplier	Input	Value Used	Fire Flow Change (L/min)	Fire Flow Total (L/min)
Choose Combustibility of Building Contents	Non-combustible	-25%	Limited Combustible	-15%	-2,400	13,600
	Limited Combustible	-15%				
	Combustible	0%				
	Free Burning	15%				
	Rapid Burning	25%				
Choose Reduction Due to Sprinkler System	**Adequate** Sprinkler Conforms to NFPA13	-30%	Adequate Sprinkler Conforms to NFPA13	-30%	-4,080	9,520
	No Sprinkler	0%				
	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	Standard Water Supply for Fire Department Hose Line and for Sprinkler System	-10%	-1,600	7,920
	Not Standard Water Supply or Unavailable	0%				
	Fully Supervised Sprinkler System	-10%	Not Fully Supervised or N/A	0%	0	7,920
	Not Fully Supervised or N/A	0%				

Task	Exposures	Separ-ation Dist (m)	Cond	Separation Conditon	Exposed Wall type	Exposed Wall Length: Length (m)	No of Storeys	Lenth-height Factor	Sub-Conditon	Charge (%)	Total Charge (%)	Total Exposure Charge (L/min)	
Choose Structure Exposure Distance	Side 1 (west)	110	6	> 45.1	Type B	38	4	152	6	0%	11%	1,496	9,416
	Side 2 (east)	42	5	30.1 to 45	Type B	25	8	200	5E	5%			
	Front (north)	51	6	> 45.1	Type B	16	3	48	6	0%			
	Back (south)	25	4	20.1 to 30	Type B	15	15	30	4A	6%			
Obtain Required Fire Flow	Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =												**9,000**
	Total Required Fire Flow, L/s =												**150**

Exposure Charges for Exposing Walls of Wood Frame Construciton (from Table G5)

Type A	Wood-Frame or non-conbustible
Type B	Ordinary or fire-resisitve with unprotected openings
Type C	Ordinary or fire-resisitve with semi-protected openings
Type D	Ordinary or fire-resisitve with blank wall

Conditons for Separation

Separation Dist	Condition
0m to 3m	1
3.1m to 10m	2
10.1m to 20m	3
20.1m to 30m	4
30.1m to 45m	5
> 45.1m	6

TABLE C3: ESTIMATED WATER PRESSURE AT PROPOSED BUILDING

Description	From	To	Demand (L/sec)	Pipe Length (m)	Pipe Dia (mm)	Dia (m)	Slope of HGL (m/m)	Head Loss (m)	Elev From (m)	Elev To (m)	*Elev Diff (m)	Pressure From kPa	(psi)	Pressure To kPa	(psi)	Pressure Drop (psi)
Peak Hour Conditons																
Single 200mm watermain	Main	Basement	9.350	13 m	204	0.204	0.00071	0.0092	83.33	83.10	0.2	409.6	(59.4)	411.7	(59.7)	-0.3
Double 200mm watermain	Main	Basement	4.675	13 m	204	0.204	0.0002	0.0026	83.33	83.10	0.2	409.6	(59.4)	411.8	(59.7)	-0.3
Max Day Plus Fireflow Conditons																
Single 200mm watermain	Main	Basement	156.4	13 m	204	0.204	0.13099	1.7029	83.33	83.10	0.2	257.5	(37.3)	243.1	(35.3)	2.1
Double 200mm watermain	Main	Basement	78.205	13 m	204	0.204	0.03629	0.4717	83.33	83.10	0.2	257.5	(37.3)	255.1	(37.0)	0.3
Max Day Plus Fireflow Conditons (Review of 150mm diameter)																
Single 150mm watermain	Main	Basement	156.4	13 m	150	0.150	0.58558	7.6126	83.33	83.10	0.2	257.5	(37.3)	185.1	(26.8)	10.5
Double 150mm watermain	Main	Basement	78.205	13 m	150	0.150	0.16221	2.1087	83.33	83.10	0.2	257.5	(37.3)	239.1	(34.7)	2.7

Water Demand Info

Average Demand =	2.42	L/sec
Max Day Demand =	6.41	L/sec
Peak Hr Deamand =	9.35	L/sec
Fireflow Requriement =	150	L/sec
Max Day Plus FF Demand =	156.4	L/sec

Pipe Lengths

From watermain to building =	13 m
Hazen Williams C Factor for Friction Loss in Pipe, C=	110

Boundary Conditon

	Peak Hour	Max Day Plus Fireflow	
HGL (m)	127.5	112.0	(From City of Ottawa)
Approx Ground Elev (m) =	85.75	85.75	
Pressure (m) =	41.75	26.25	
Pressure (Pa) =	409,568	257,513	
Pressure (psi) =	59.4	37.3	

TABLE C4: FIRE FLOW CONTRIBUTIONS BASED ON HYDRANT SPACING

Hydrant #	Location	[3]Straight Distance (m)	[1]Distance (m)	[2]Fire Flow Contribution (L/min)	Comment
362023H011	Baseline Road	134	124	3800	
362023H010	Baseline Road	55	28	5700	
362023H009	Baseline Road	46	18	5700	
362023H008	Baseline Road	132	125	3800	
362023H021	Gemini Way	113	175	0	
362023H023	Gemini Way	57	102	3800	
362023H197	Gemini Way	18	72	5700	
362023H217	Constellation Cres	75	75	3800	
Total Fireflow Available in L/min (L/sec) or L/sec				32,300 (538)	
FUS RFF in L/min or L/sec				10,000 (167)	
Meets Requreiment (Yes/No)				Yes	

Notes:

[1]Distance is measured along a road or fire route.

[2]Fire Flow Contribution for Class AA Hydrant from Table 1 of Appendix I, ISTB-2018-02

[3]Straight distance from hydrant ot closest part of building.

Appendix D – Stormwater Design Tables

Table D1: Estimation of Catchment Time of Concentration Under Pre-Development Conditions

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TABLE D1: ESTIMATION OF CATCHMENT TIME OF CONCENTRATION UNDER PRE-DEVELOPMENT CONDITIONS

Catchment No.	Sub Catchment	Outlet Location	Area (ha)	Indiv Area (ha)	High Elev (m)	Low Elev (m)	Flow Path Length (m)	Indiv Slope	Avg. C	Time of Conc. Tc	Description
PRE-1			0.1625								
PRE-1A	1A	Storm Sewer ON Gemini Way		0.0208	86.40	86.32	6.7	1.2%	0.20	7.12	areas u/s site
PRE-1B	1B			0.0736	86.75	86.55	12.0	1.7%	0.20	8.59	within site
PRE-1C	1C			0.0682	86.55	86.47	4.0	2.0%	0.57	2.75	areas d/s site
PRE-2			0.2302								
PRE-2A	2A	Storm Sewer ON Constellation Dr		0.0903	86.50	86.14	12.8	2.8%	0.20	7.46	within site
PRE-2B	2B			0.1399	86.14	86.04	5.00	2.0%	0.80	1.74	areas d/s site
PRE-3			0.3100								
PRE-3A	3A	Storm Sewers on Baseline Rd		0.0688	86.32	86.17	8.40	1.8%	0.20	7.02	areas u/s site
PRE-3B	3B			0.1376	86.32	85.86	27.20	1.7%	0.20	12.87	within site
PRE-3C	3C			0.1036	85.45	85.11	17.00	2.0%	0.69	4.38	areas d/s site
totals			0.7027	0.7027							
		onsite areas only (1B, 2A,3B) ---->		0.3014							

TABLE D2: PRE-DEVELOPMENT RUNOFF CALCULATIONS

Area Description	Sub-Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr			Storm = 5 yr			Storm = 100 yr			Breakdown of Peak 100-yr Flows (L/sec)		
			I_5 (mm/hr)	Cavg	Q_{5PRE} (L/sec)	I_5 (mm/hr)	Cavg	Q_{5PRE} (L/sec)	I_{100} (mm/hr)	Cavg	Q_{100PRE} (L/sec)	U/S Site	Onsite	D/S Site
PRE-1														
PRE-1A	0.0208	7.12	90.01	0.20	1.0	122.54	0.20	1.4	210.1	0.25	3.0	3.0		
PRE-1B	0.0736	8.59	82.70	0.20	3.4	112.42	0.20	4.6	192.6	0.25	9.9		9.9	
PRE-1C	0.0682	2.75	124.22	0.57	13.4	170.21	0.57	18.4	292.7	0.71	39.5			39.5
sub-total	0.1625				17.8			24.4			52.4	3.0	9.9	39.5
PRE-2														
PRE-2A	0.0903	7.46	88.17	0.20	4.4	119.99	0.20	6.0	205.7	0.25	12.9		12.9	
PRE-2B	0.1399	1.74	136.86	0.80	42.6	187.99	0.80	58.5	323.6	1.00	125.9			125.9
sub-total	0.2302				47.0			64.5			138.8		12.9	125.9
PRE-3														
PRE-3A	0.0688	7.02	90.54	0.20	3.5	123.27	0.20	4.7	211.4	0.25	10.1	10.1		
PRE-3B	0.1376	12.87	67.31	0.20	5.1	91.22	0.20	7.0	156.0	0.25	14.9		14.9	
PRE-3C	0.1036	4.38	108.43	0.69	21.6	148.13	0.69	29.4	254.4	0.86	63.2			63.2
sub-total	0.3100				30.2			41.1			88.2	10.1	14.9	63.2
Total Site	0.7027				**95.0**			**130.1**			**279.5**	13.1	**37.7**	228.6

Notes

1) Intensity, I = 998.071/(Tc+6.035) $^{0.814}$ (5-year, City of 0ttawa)

2) Intensity, I = 1735.688/(Tc+6.014) $^{0.820}$ (100-year, City of Ottawa)

3) Cavg for 100-year is increased by 25% to a maximum of 1.0

Total 100-yr flow to Storm Sewer on Constellation Dr = 191.2

Total 100-yr flow to Storm Sewer on Baseline Rd = 88.2

TABLE D3: ALLOWABLE RUNOFF CALCULATIONS (SITE ONLY)

Area (onsite)	Area (ha)	Discharge Rate (L/ha/sec)	Q_{ALLOW} (L/sec)	Desc
PRE-1B	0.0736	33.5	2.5	
PRE-2A	0.0903	33.5	3.0	
PRE-3B	0.1376	33.5	4.6	
Total	0.3014	33.5	10.1	

Notes

1) Allowable Capture Rate is based on 5-year storm at Tc=10 minutes.

2) Intensity, I_5 = 998.071/(Tc+6.035)^0.814 (5-year, City of 0ttawa)

TABLE D4: AVERAGE RUNOFF COEFFICIENTS (Post Development)

Runoff Coeffients $C_{ASPH/CONC}$ = 0.90 C_{ROOF} = 0.90 C_{GRASS} = 0.20

Area No.	Asphalt /Conc Areas (m^2)	A * C_{ASPH}	Roof Areas (m^2)	A * C_{ROOF}	Grassed Areas (m^2)	A * C_{GRASS}	Sum AC	Total Area (m^2)	C_{AVG} (see note)	Comment
PST-1A								208	0.20	Surface Area
PST-1B								629	0.68	Surface Area
PST-1C								342	0.84	Surface Area
PST-1D								112	0.90	Surface Area
PST-1E								71	0.90	Surface Area
PST-1F (R1)								135	0.90	Flat Roof (6th floor)
PST-1F (R2)								141	0.90	Flat Roof (6th floor)
PST-1F (R3)								968	0.90	Flat Roof (14th floor)
PST-1F (R4)								73	0.90	Flat Roof (stairwell)
PST-1F (R5)								102	0.90	Flat Roof (13th floor)
PST-1F (R6)								105	0.90	Flat Roof (1st floor)
PST-1G								690	0.68	Surface Area
PST-2A								1400	0.82	Surface Area
PST-2B								51	0.67	Surface Area
PST-3A								669	0.20	Surface Area
PST-3B								61	0.35	Surface Area
PST-3C								228	0.64	Surface Area
PST-3D								1036	0.71	Surface Area
Total								7,022		

Note: Cavg derived with area-weighting command in PCSWMM

TABLE D5: SUMMARY OF POST DEVELOPMENT RUNOFF (Uncontrolled and Controlled)

Area No	Area (ha)	Time of Conc, Tc (min)	Storm = 2 yr				Storm = 5 yr				Storm = 100 yr				Comments
			C_{AVG}	I_2 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_5 (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	C_{AVG}	I_{100} (mm/hr)	Q (L/sec)	Q_{CAP} (L/sec)	
PST-1A	0.0208	10	0.20	76.81	0.9		0.20	104.19	1.2		0.25	178.56	2.6		to CB1
PST-1B	0.0629	10	0.68	76.81	9.1		0.68	104.19	12.4		0.85	178.56	26.5		to CB1
PST-1C	0.0342	10	0.84	76.81	6.1		0.84	104.19	8.3		1.00	178.56	17.0		to CB2
PST-1D	0.0112	10	0.90	76.81	2.2		0.90	104.19	2.9		1.00	178.56	5.6		to trench drain
PST-1E	0.0071	10	0.90	76.81	1.4		0.90	104.19	1.9		1.00	178.56	3.5		flow controlled drains
PST-1F (R1)	0.0135	10	0.90	76.81	2.6	**(2.5)**	0.90	104.19	3.5	**(3.1)**	1.00	178.56	6.7	**(6.6)**	flow controlled drains
PST-1F (R2)	0.0141	10	0.90	76.81	2.7		0.90	104.19	3.7		1.00	178.56	7.0		flow controlled drains
PST-1F (R3)	0.0968	10	0.90	76.81	18.6		0.90	104.19	25.2		1.00	178.56	48.0		flow controlled drains
PST-1F (R4)	0.0073	10	0.90	76.81	1.4		0.90	104.19	1.9		1.00	178.56	3.6		flow controlled drains
PST-1F (R5)	0.0102	10	0.90	76.81	2.0		0.90	104.19	2.7		1.00	178.56	5.1		flow controlled drains
PST-1F (R6)	0.0105	10	0.90	76.81	2.0		0.90	104.19	2.7		1.00	178.56	5.2		flow controlled drains
PST-3C	0.0228	4.67	0.64	106.11	4.3		0.64	144.71	5.9		0.80	248.83	12.6		to CB3
PST-1G	0.0690	10	0.68	76.81	10.0	**10.0**	0.68	104.19	13.6	**13.6**	0.85	178.56	29.1	**29.1**	uncontrolled offsite
PST-2A	0.1400	5.22	0.82	101.95	32.5	**32.5**	0.82	138.93	44.3	**44.3**	1.00	238.80	92.9	**92.9**	uncontrolled offsite
PST-2B	0.0051	10	0.67	76.81	0.7	**0.7**	0.67	104.19	1.0	**1.0**	0.84	178.56	2.1	**2.1**	uncontrolled offsite
PST-3A	0.0669	10	0.20	76.81	2.9	**2.9**	0.20	104.19	3.9	**3.9**	0.25	178.56	8.3	**8.3**	uncontrolled offsite
PST-3B	0.0061	10	0.35	76.81	0.5	**0.5**	0.35	104.19	0.6	**0.6**	0.44	178.56	1.3	**1.3**	uncontrolled offsite
PST-3D	0.1036	9.62	0.71	78.30	16.0	**16.0**	0.71	106.24	21.7	**21.7**	0.89	182.11	46.5	**46.5**	external areas to Storm
Totals	0.7022				115.9	**65.1**			157.4	**88.2**			323.8	**187.0**	
Total pre-development for comparison										*130.1*				*279.5*	

Notes

2-yr Storm Intensity, I = 732.951/(Tc+6.199)^0.810 (City of Ottawa)

5-yr Storm Intensity, I = 998.071/(Tc+6.035)^0.814 (City of Ottawa)

100-yr Storm Intensity, I = 1735.688/(Tc+6.014)&^0.820 (City of Ottawa)

Time of Concentration (min), Tc = ***10***

For Flows under column Qcap which are shown in brackets ***(0.0)*** *, denotes flows that are controlled*

	POST-DEV	PRE-DEV
Total 100-yr flow to Storm Sewer on Gemini / Constellation =	**130.8**	191.2
Total 100-yr flow to Storm Sewer on Baseline Rd =	**56.2**	88.2
Total 100-yr flows from site =	**10.0**	

TABLE D6: SUMMARY OF TOTAL STORAGE REQUIRED & PROVIDED

Area No.	Area (ha)	Release Rate (L/s)			Storage Required (m^3)			Storage Provided (m^3)					Control Method
		2-yr	5-yr	100-yr	2-yr	5-yr	100-yr	Roof	Surface Ponding	UG Chambers	UG CB/MHs	Total	
PST-1A	0.0208												Flow Controlled at STMH 101
PST-1B	0.0629												Flow Controlled at STMH 101
PST-1C	0.0342												Flow Controlled at STMH 101
PST-1D	0.0112												Flow Controlled at STMH 101
PST-1E	0.0071	2.5	3.1	6.6	53.5	73.1	153.4	37.4		116.0		153.4	Flow Controlled at STMH 101
PST-1F (R1)	0.0135												Flow Controlled Roof Drains
PST-1F (R2)	0.0141												Flow Controlled Roof Drains
PST-1F (R3)	0.0968												Flow Controlled Roof Drains
PST-1F (R4)	0.0073												Flow Controlled Roof Drains
PST-1F (R5)	0.0102												Flow Controlled Roof Drains
PST-1F (R6)	0.0105												Flow Controlled Roof Drains
PST-3C	0.0228												Flow Controlled at STMH 101
PST-1G	0.0690	10.02	13.6	29.1									None
PST-2A	0.1400	32.54	44.3	92.9									None
PST-2B	0.0051	0.73	1.0	2.1									None
PST-3A	0.0669	2.86	3.9	8.3									None
PST-3B	0.0061	0.46	0.6	1.3									None
PST-3D	0.1036	16.01	21.7	46.5									None
Totals (all)=	**0.702**	**65.1**	**88.2**	**187.0**	**53.5**	**73.1**	**153.4**	**37.4**				**153.4**	
Totals (site) =	**0.302**	**3.6**	**4.7**	**10.0**	**53.5**	**73.1**	**153.4**	**37.4**				**153.4**	

Table D7 - Storage Volumes for 2-year, 5-Year and 100-Year Storms

Area No: **1A-1E, 3C, Roofs**

C_{AVG} = 0.78 (2-yr)

C_{AVG} = 0.78 (5-yr)

C_{AVG} = 0.98 (100-yr, Max 1.0)

Time Interval = 10 (mins)

Drainage Area = 0.3115 (hectares)

Duration (min)	Release Rate = 2.5 (L/sec); Return Period = 2 (years); IDF Parameters, A = 732.951, B = 0.810; (I = A/(T_c+C), C = 6.199					Release Rate = 3.1 (L/sec); Return Period = 5 (years); IDF Parameters, A = 998.071, 0.814; (I = A/(T_c+C), C = 6.053					Release Rate = 6.6 (L/sec); Return Period = 100 (years); IDF Parameters, A = 1735.688, 0.820; (I = A/(T_c+C), C = 6.014				
	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)	Rainfall Intensity, I (mm/hr)	Peak Flow (L/sec)	Release Rate (L/sec)	Storage Rate (L/sec)	Storage (m^3)
0	167.2	113.4	2.45	110.9	0.00	230.5	156.3	3.056	153.2	0.00	398.6	337.9	6.600	331.3	0.00
10	76.8	52.1	2.45	49.6	29.78	104.2	70.7	3.056	67.6	40.56	178.6	151.4	6.600	144.8	86.86
20	52.0	35.3	2.45	32.8	39.40	70.3	47.6	3.056	44.6	53.50	120.0	101.7	6.600	95.1	114.10
30	40.0	27.2	2.45	24.7	44.47	53.9	36.6	3.056	33.5	60.33	91.9	77.9	6.600	71.3	128.29
40	32.9	22.3	2.45	19.8	47.61	44.2	30.0	3.056	26.9	64.58	75.1	63.7	6.600	57.1	137.04
50	28.0	19.0	2.45	16.6	49.70	37.7	25.5	3.056	22.5	67.44	64.0	54.2	6.600	47.6	142.84
60	24.6	16.7	2.45	14.2	51.13	32.9	22.3	3.056	19.3	69.42	55.9	47.4	6.600	40.8	146.81
70	21.9	14.9	2.45	12.4	52.12	29.4	19.9	3.056	16.9	70.82	49.8	42.2	6.600	35.6	149.54
80	19.8	13.4	2.45	11.0	52.78	26.6	18.0	3.056	15.0	71.79		0.0	6.600	-6.6	-31.68
90	18.1	12.3	2.45	9.9	53.21	24.3	16.5	3.056	13.4	72.44	41.1	34.8	6.600	28.2	152.54
100	16.7	11.4	2.45	8.9	53.43	22.4	15.2	3.056	12.1	72.84	37.9	32.1	6.600	25.5	153.18
110	15.6	10.6	2.45	8.1	53.51	20.8	14.1	3.056	11.1	73.03	35.2	29.8	6.600	23.2	153.39
120	14.6	9.9	2.45	7.4	53.46	19.5	13.2	3.056	10.1	73.05	32.9	27.9	6.600	21.3	153.25
130	13.7	9.3	2.45	6.8	53.30	18.3	12.4	3.056	9.4	72.93	30.9	26.2	6.600	19.6	152.82
140	12.9	8.8	2.45	6.3	53.05	17.3	11.7	3.056	8.7	72.70	29.2	24.7	6.600	18.1	152.14
150	12.3	8.3	2.45	5.9	52.72	16.4	11.1	3.056	8.0	72.36	27.6	23.4	6.600	16.8	151.24
160	11.7	7.9	2.45	5.5	52.33	15.6	10.5	3.056	7.5	71.93	26.2	22.2	6.600	15.6	150.17
170	11.1	7.5	2.45	5.1	51.87	14.8	10.1	3.056	7.0	71.43	25.0	21.2	6.600	14.6	148.93
180	10.6	7.2	2.45	4.8	51.36	14.2	9.6	3.056	6.6	70.85	23.9	20.3	6.600	13.7	147.55
190	10.2	6.9	2.45	4.5	50.81	13.6	9.2	3.056	6.2	70.21	22.9	19.4	6.600	12.8	146.03
200	9.8	6.6	2.45	4.2	50.21	13.0	8.8	3.056	5.8	69.52	22.0	18.6	6.600	12.0	144.41
Max =					**53.51**					**73.05**					**153.39**

Notes

1) Peak flow is equal to the product of 2.78 x C x I x A

2) Rainfall Intensity, I = $A/(Tc+C)^B$

3) Release Rate = Min (Release Rate, Peak Flow)

4) Storage Rate = Peak Flow - Release Rate

5) Storage = Duration x Storage Rate

6) Maximium Storage = Max Storage Over Duration

7) Parameters a,b,c are for City of Ottawa

Table D8: 5-year & 100-year Roof Design Sheet - For Roof Drains using Flow Controlled Roof Drains

Project: 2140 Baseline Rd
Location: City of Ottawa
Date:Dec 2018

Area #	Drain Type	Roof Drain Type	No Drains per Area	No of Weirs per Drain	Weir Position	Runoff Coeff (Cavg)		Drainage Area		5-year Event								
						5-year	100-year	m^2	ha	Runoff Rate (L/sec)	5yr Ponding Depth (mm)	Ponding Depth at Drain (mm)	Roof Drain Capacity Per Drain (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	Depth of Overlflow Above Drain (mm)	Flow From Overflow (L/sec)	Total Flow Roof Drain + Overflow Drain (L/sec)
R1A	RD	RD1	1	1	4-1/2 open	0.90	0.90	67	0.0067	1.740	82	82	13.1	0.826	0.826	0	0.000	0.826
R1B	RD	RD1	1	1	4-1/2 open	0.90	0.90	69	0.0069	1.788	83	83	13.2	0.830	0.830	0	0.000	0.830
R2A	RD	RD1	1	1	4-1/2 open	0.90	0.90	78	0.0078	2.046	85	85	13.4	0.848	0.848	0	0.000	0.848
R2B	RD	RD1	1	1	4-1/2 open	0.90	0.90	63	0.0063	1.630	80	80	12.9	0.815	0.815	0	0.000	0.815
R3A	RD	RD1	1	1	4-1/2 open	0.90	0.90	201	0.0201	5.249	102	102	15.2	0.959	0.959	0	0.000	0.959
R3B	RD	RD1	1	1	4-1/2 open	0.90	0.90	186	0.0186	4.843	101	101	15.1	0.951	0.951	0	0.000	0.951
R3C	RD	RD1	1	1	4-1/2 open	0.90	0.90	179	0.0179	4.661	100	100	15.0	0.947	0.947	0	0.000	0.947
R3D	RD	RD1	1	1	4-1/2 open	0.90	0.90	173	0.0173	4.520	100	100	15.0	0.944	0.944	0	0.000	0.944
R3E	RD	RD1	1	1	4-1/2 open	0.90	0.90	168	0.0168	4.377	99	99	14.9	0.940	0.940	0	0.000	0.940
R3F	RD	RD1	1	1	4-1/2 open	0.90	0.90	61	0.0061	1.583	80	80	12.8	0.810	0.810	0	0.000	0.810
R4A	RD	RD2	1	1	4-1/2 open	0.90	0.90	34	0.0034	0.893	66	66	11.5	0.726	0.726	0	0.000	0.726
R4B	RD	RD3	1	1	4-1/2 open	0.90	0.90	39	0.0039	1.019	69	69	11.7	0.741	0.741	0	0.000	0.741
R5A	RD	RD4	2	1	4-1/2 open	0.90	0.90	34	0.0034	0.877	72	72	12.1	0.762	0.762	0	0.000	0.762
R5B	RD	RD5	1	1	4-1/2 open	0.90	0.90	14	0.0014	0.367	96	96	14.6	0.923	0.367	0	0.000	0.367
R5C	RD	RD6	1	1	4-1/2 open	0.90	0.90	12	0.0012	0.305	103	103	15.3	0.963	0.305	0	0.000	0.305
R5D	RD	RD7	3	1	4-1/2 open	0.90	0.90	42	0.0042	1.106	67	67	11.6	0.730	0.730	0	0.000	0.730
R6	RD	RD8	3	1	4-1/2 open	0.90	0.90	105	0.0105	2.742	49	49	9.9	0.623	0.623	0	0.000	0.623
Totals								**1,524.6**	**0.1525**	**39.75**			**227.26**	**14.34**	**13.12**		**0.0**	**13.12**

Area #	100-year Event										Storage Required *(Modified Rational Method)*		Maximium Storage Provided at Spill Elevation					
	Runoff Rate (L/sec)	100yr Ponding Depth (mm)	Ponding Depth at Drain (mm)	Roof Drain Capacity Per Drain (gpm)	Roof Drain Capacity Per Drain (L/sec)	Total Flow From Roof Drains (L/sec)	Depth of Overlflow Above Drain (mm)	Flow From Overflow (L/sec)	Total Flow Roof Drain + Overflow Drain (L/sec)		5-year (m^3)	100-year (m^3)	Area Available for Storage (m^2)	RD Depth Below Lowpoint	Max Overflow Depth (mm)	Max Prism Depth (mm)	Max Prisim Volume (m^3)	Total Volume (m3)
R1A	2.982	108	108	15.8	0.996	0.996	0	0.000	0.996		0.55	1.25	66.8	-150	150	150	3.3	3.34
R1B	3.065	109	109	15.9	1.000	1.000	0	0.000	1.000		0.58	1.31	68.6	-150	150	150	3.4	3.43
R2A	3.506	111	111	16.1	1.019	1.019	0	0.000	1.019		0.73	1.61	78.5	-150	150	150	3.9	3.92
R2B	2.793	106	106	15.6	0.986	0.986	0	0.000	0.986		0.49	1.12	62.5	-150	150	150	3.1	3.13
R3A	8.995	129	129	17.9	1.128	1.128	0	0.000	1.128		3.17	6.38	201.3	-150	150	150	10.1	10.07
R3B	8.299	127	127	17.7	1.120	1.120	0	0.000	1.120		2.82	5.71	185.8	-150	150	150	9.3	9.29
R3C	7.988	127	127	17.7	1.116	1.116	0	0.000	1.116		2.66	5.41	178.8	-150	150	150	8.9	8.94
R3D	7.745	126	126	17.6	1.112	1.112	0	0.000	1.112		2.54	5.18	173.4	-150	150	150	8.7	8.67
R3E	7.501	126	126	17.6	1.109	1.109	0	0.000	1.109		2.42	4.96	167.9	-150	150	150	8.4	8.39
R3F	2.713	106	106	15.6	0.981	0.981	0	0.000	0.981		0.46	1.06	60.7	-150	150	150	3.0	3.04
R4A	1.530	91	91	14.0	0.883	0.883	0	0.000	0.883		0.14	0.38	34.2	-150	150	150	1.7	1.71
R4B	1.747	95	95	14.4	0.910	0.910	0	0.000	0.910		0.20	0.50	39.1	-150	150	150	2.0	1.96
R5A	1.502	99	99	14.9	0.943	0.943	0	0.000	0.943		0.20	0.50	33.6	-150	150	150	1.7	1.68
R5B	0.629	133	133	18.3	1.154	0.629	0	0.000	0.629		0.20	0.50	14.1	-150	150	150	0.7	0.70
R5C	0.523	141	141	19.1	1.207	0.523	0	0.000	0.523		0.20	0.50	11.7	-150	150	150	0.6	0.59
R5D	1.896	92	92	14.2	0.893	0.893	0	0.000	0.893		0.20	0.50	42.4	-150	150	150	2.1	2.12
R6	4.700	68	68	11.7	0.738	0.738	0	0.000	0.738		0.20	0.50	105.2	-150	150	150	5.3	5.26
Totals	**68.11**			**274.12**	**17.29**	**16.08**		**0.0**	**16.08**		**17.74**	**37.35**	**1525**				**76.2**	**76.2**

min depth = 49 (5-year) **min depth = 68** (100-year)
max depth = 103 (5-year) **max depth = 141** (100-year)

76.23

Runoff Based on the Following:
Time of Conc (mins) = 10 10
Storm Frequency (years) = 5 100
Storm Intensity (mm/hr) = 104.2 178.6

Roof Drain Types

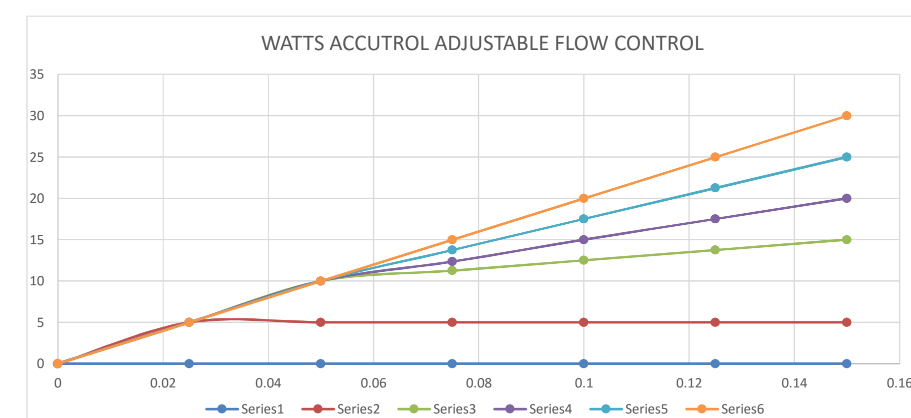
Drain Type	Max Overflow Depth (mm)
RD1	150 mm

Roof Drains have Following Flow Rates: WATTS Flow Conttolled Drain

Weir Position		Flow (gpm) per depth							Max Flow Rate per Weir
		0	25	50	75	100	125	150	
		0	0.025	0.05	0.075	0.1	0.125	0.15	
1-None		0	0	0	0	0	0	0	0.000
2-Closed		0	5	5	5	5	5	5	0.315
3-1/4 open		0	5	10	11	13	14	15	0.946
4-1/2 open		0	5	10	12	15	18	20	1.262
5-3/4 open		0	5	10	14	18	21	25	1.577
6-Full		0	5	10	15	20	25	30	1.893

Weir Position for All Drains = **4-1/2 open**

100-yr Release Rate **16.08**
100-yr Volume **37.35**



MC-3500 Site Calculator

Project Information:

Project Name:	Otto's BMW
Location:	660 Hunt Club Road
Date:	February 2015
Engineer:	J Fitzpatrick
StormTech RPM:	V Sharma

System Requirements

Units		Metric	
Required Storage Volume		115.6	cubic meters
Stone Porosity (Industry Standard = 40%)		40	%
Stone Above Chambers	(305 mm min.)	305	mm
Stone Foundation Depth	(229 mm min.)	229	mm
Average Cover over Chambers	(610 mm min.)	610	mm
Bed size controlled by WIDTH or LENGTH?		length	
Limiting WIDTH or LENGTH dimension		22	meters
Storage Volume per Chamber		5.0	cubic meters
Storage Volume per End Cap		1.2	cubic meters

System Sizing

Number of Chambers Required	22	each
Number of End Caps Required	6	each
Bed Size (including perimeter stone)	120	square meters
Stone Required (including perimeter stone)	215	metric tonnes
Volume of Excavation	237	cubic meters
Non-woven Filter Fabric Required (20% Safety Factor)	399	square meters
Length of Isolator Row	21.0	meters
Non-woven Isolator Row Fabric (20% Safety Factor)	100	square meters
Woven Isolator Row Fabric (20% Safety Factor)	127	square meters
Installed Storage Volume	117	cubic meters

Controlled by Length

Maximum Length = 22 meters

2 rows of 9 chambers
1 row of 4 chambers

Maximum Length = 21.0 meters
Maximum Width = 6.8 meters

610 mm

305 mm

229 mm

TABLE D10: 2-YEAR STORM SEWER CALCULATION SHEET

exp.

Return Period Storm =	**2-year**	(2-year, 5-year, 100-year)
Default Inlet Time=	10	(minutes)
Manning Coefficient =	0.013	(dimensionless)

From Node	To Node	AREA INFO				FLOW (UNRESTRICTED)							INDIV CAP FLOW (L/s)	CUMUL CAP FLOW (L/s)	SEWER DATA										
		Area No.	Area (ha)	∑ Area (ha)	Average R	Indiv. 2.78*A*R	Accum. 2.78*A*R	Tc (mins)	I (mm/h)	Indiv. Flow	Return Period	Q (L/s)			Dia (mm) Actual	Dia (mm) Nominal	Type	Slope (%)	Length (m)	Capacity, Q_{CAP} (L/sec)	Velocity (m/s) Vf	Velocity (m/s) Va	Time in Pipe, Tt (min)	Hydraulic Ratios Q/Q_{CAP}	Hydraulic Ratios Va/Vf
CB 3	Building	PST-3C	0.0228	0.0228	0.64	0.041	0.041	10.00	76.81	3.12	2-year	3.1			201.2	200	PVC	1.00	9.00	33.31	1.04	0.55	0.27	0.09	0.53
Building	STMMH 102	R	0.1531	0.1759	0.90	0.383	0.424																		
		PST-1E	0.0071	0.1830	0.90	0.018	0.441																		
		PST-1D	0.0112	0.1942	0.90	0.028	0.469	10.00	76.81	2.15	2-year	36.1			251.5	250	PVC	2.00	4.40	85.42	1.71	1.21	0.06	0.42	0.71
CB 1	STMMH 102	PST-1B	0.0629	0.0629	0.68	0.119	0.119																		
		PST-1A	0.0208	0.0837	0.20	0.012	0.130	10.00	76.81	0.89	2-year	10.0			201.2	200	PVC	1.40	14.40	39.41	1.24	0.83	0.29	0.25	0.67
CB 2	STMMH 102	PST-1C	0.0342	0.0342	0.84	0.080	0.080	10.00	76.81	6.13	2-year	6.1			201.2	200	PVC	1.00	2.70	33.31	1.04	0.67	0.07	0.18	0.64
STMMH 102	OGS			0.3121			0.680	10.29	75.71		2-year	51.5			251.5	250	PVC	1.00	2.40	60.40	1.21	1.21	0.03	0.85	1.00
OGS	Stormtech			0.3121			0.680	10.32	75.59		2-year	51.4			610.0	600	PVC	1.00	1.70	641.68	2.17	1.13	0.03	0.08	0.52
Stormtech	STMMH 101			0.3121			0.680	10.35	75.49		2-year	51.3	6.6	6.60	251.5	250	PVC	1.00	2.00	60.40	1.21	1.21	0.03	0.85	1.00
STMMH 101	STMMH 100			0.3121			0.680	10.38	75.39		2-year	51.2		6.60	251.5	250	PVC	1.00	19.00	60.40	1.21	1.21	0.26	0.85	1.00
Building	STMMH 100	(weeping tiles)						10.00	76.81		2-year		*0.34	6.94	201.2	200	PVC	2.00	2.50	47.10	1.48	1.48	0.03	0.01	1.00
STMMH 100	Ex. 675mm St						0.680	10.64	74.44		2-year	50.6		6.94	251.5	250	PVC	2.00	9.60	85.42	1.71	1.54	0.10	0.59	0.90
TOTALS =			**0.31**			**0.680**																			

Definitions:

Q = 2.78*AIR, where

Q = Peak Flow in Litres per second (L/s)

A = Watershed Area (hectares)

I = Rainfall Intensity (mm/h)

R = Runoff Coefficients (dimensionless)

Ottawa Rainfall Intensity Values from Sewer Design Guidelines, SDG002

	a	b	c
2-year	732.951	6.199	0.810
5-year	998.071	6.053	0.814
100-year	1735.688	6.014	0.820

Building Foundation Drain Allowance (L/sec) = **0.34** (From Section 6.5 of Geotech Report)

Designed:	Project:	
J. Fitzpatrick, P.Eng.	Baseline Constellation Partnership Inc.	
Checked:	Location:	
B. Thomas, P.Eng.	2140 Baseline Road	
Dwg Reference:	File Ref:	Sheet No:
FIGURE A3.1	**245012 Storm Design Sheets, Dec 2018.xlsx**	1 of 1

Appendix E – Stormceptor Sizing

Output from PCSWMM for Stormceptor

STC 750 Specifications

Stormceptor® FORTERRA

Detailed Stormceptor Sizing Report – Baseline Road

Project Information & Location			
Project Name	2140 Baseline Rd	**Project Number**	245012
City	ottawa	**State/ Province**	Ontario
Country	Canada	**Date**	12/14/2018
Designer Information		**EOR Information (optional)**	
Name	jason fitzpatrick	**Name**	
Company	Exp Services	**Company**	
Phone #	613-688-1899	**Phone #**	
Email	jason.fitzpatrick@exp.com	**Email**	

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	Baseline Road
Recommended Stormceptor Model	STC 750
Target TSS Removal (%)	80.0
TSS Removal (%) Provided	87
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	79	98
STC 750	87	100
STC 1000	87	100
STC 1500	88	100
STC 2000	90	100
STC 3000	91	100
STC 4000	93	100
STC 5000	93	100
STC 6000	94	100
STC 9000	96	100
STC 10000	96	100
STC 14000	97	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)**	1598.1
Elevation (ft)	370	**Total Infiltration (mm)**	3133.3
Years of Rainfall Data	37	**Total Rainfall that is Runoff (mm)**	16246.7

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)	0.30
Imperviousness %	85.0

Up Stream Storage	
Storage (ha-m)	Discharge (cms)
0.000	0.000
0.002	0.013
0.004	0.016

Water Quality Objective	
TSS Removal (%)	80.0
Runoff Volume Capture (%)	85.00
Oil Spill Capture Volume (L)	
Peak Conveyed Flow Rate (L/s)	
Water Quality Flow Rate (L/s)	

Up Stream Flow Diversion	
Max. Flow to Stormceptor (cms)	

Design Details	
Stormceptor Inlet Invert Elev (m)	
Stormceptor Outlet Invert Elev (m)	
Stormceptor Rim Elev (m)	
Normal Water Level Elevation (m)	
Pipe Diameter (mm)	
Pipe Material	
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	Baseline Road

Site Details

Drainage Area	
Total Area (ha)	0.30
Imperviousness %	85.0

Surface Characteristics	
Width (m)	110.00
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

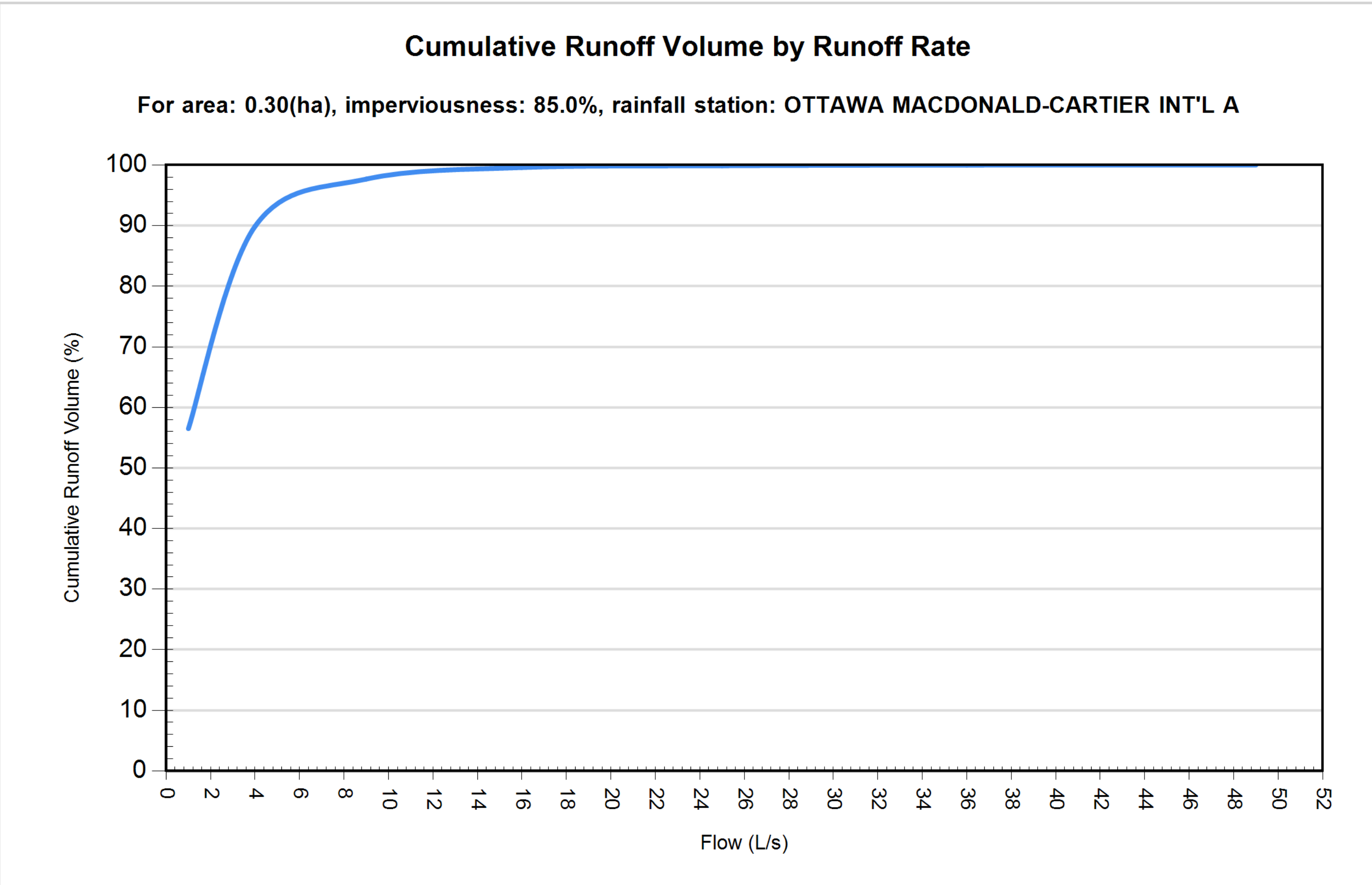
Winter Months	
Winter Infiltration	0

TSS Loading Parameters	
TSS Loading Function	

Buildup/Wash-off Parameters	
Target Event Mean Conc. (EMC) mg/L	
Exponential Buildup Power	
Exponential Washoff Exponent	

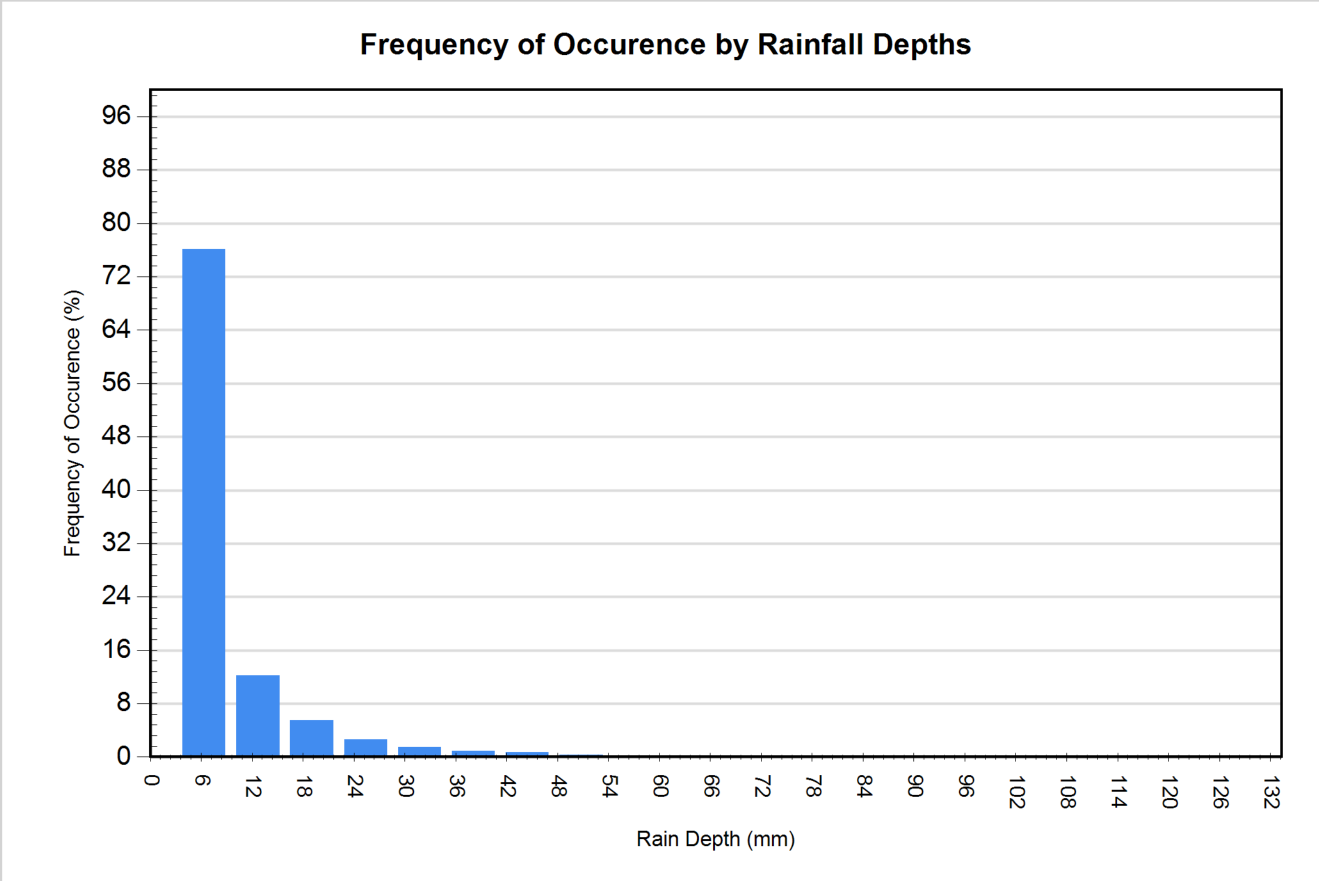
TSS Availability Parameters	
Availability Constant A	
Availability Factor B	
Availability Exponent C	
Min. Particle Size Affected by Availability (micron)	

Cumulative Runoff Volume by Runoff Rate			
Runoff Rate (L/s)	Runoff Volume (m^3)	Volume Over (m^3)	Cumulative Runoff Volume (%)
1	27678	21322	56.5
4	44047	4955	89.9
9	47878	1125	97.7
16	48825	177	99.6
25	48932	71	99.9
36	48993	10	100.0
49	49003	0	100.0



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

Appendix F – Correspondence

Correspondence from City of Ottawa

Jason Fitzpatrick

From: Fraser, Mark <Mark.Fraser@ottawa.ca>
Sent: Sunday, December 9, 2018 10:30 AM
To: Jason Fitzpatrick
Cc: Bruce Thomas
Subject: RE: 2140 Baseline Road
Attachments: 2140 Baseline Dec 2018.pdf

Categories: RECEIVED - ACTION REQUIRED

Hi Jason,

The following are boundary conditions, HGL, for hydraulic analysis at 2140 Baseline (zone 2W) assumed to be connected to the 203mm on Gemini Way (see attached PDF for location).

Minimum HGL = 127.5m
Maximum HGL = 134.6m
MaxDay + FireFlow (150 L/s) = 112.0m

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 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

From: Jason Fitzpatrick <jason.fitzpatrick@exp.com>
Sent: December 04, 2018 10:05 AM
To: Fraser, Mark <Mark.Fraser@ottawa.ca>
Cc: Bruce Thomas <bruce.thomas@exp.com>
Subject: 2140 Baseline Road

Hi Mark,

We are updating our servicing report for 2140 Baseline Road and are requesting new hydraulic boundary conditions.

As per your previous comments 12, 14, and 15 the following summarizes our revised demands.

Average day = 2.0 L/sec
Max day = 5.8 L/sec
Peak hour = 8.6 L/sec
RFF (FUS) = 150 L/sec

On our previous submission our estimated population was 473 persons, and you had requested re-calculation of the demands using MOE peaking factors (i.e.. less than 500 persons)

We have therefore re-calculated the demands using the MOE peaking factors, for the now updated population of 445 persons.

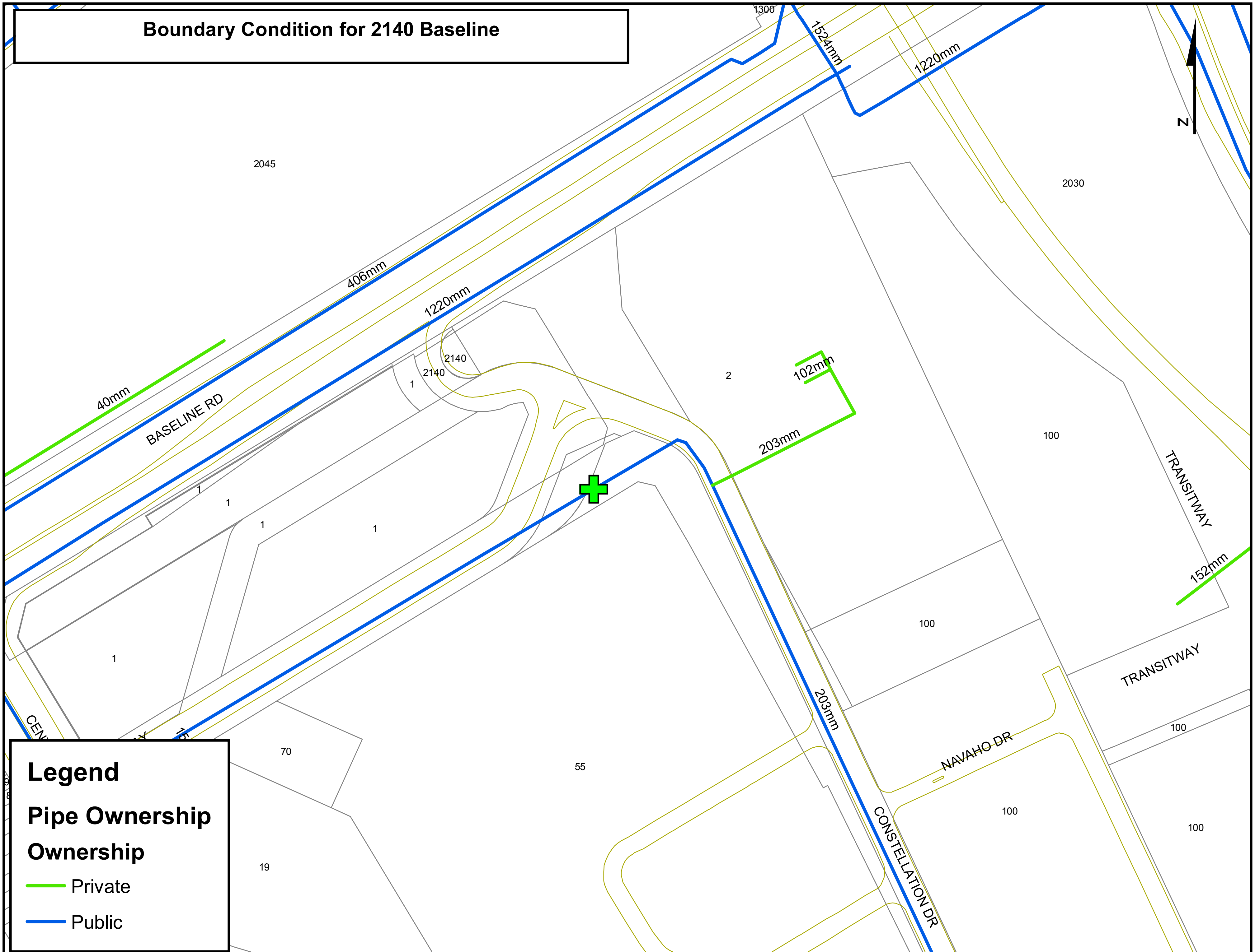
We have also looked at the demands for the ground floor commercial area as per your comment #21. If we apply the same principals to the water demands we get slightly higher demands of 2.4 L/sec, 6.4 L/sec, 9.3 L/sec. I've attached two tables which use: 1) unit demands for commercial based on floor area of 5,000 L/m2/day and 2) based on SDG002 Appendix 4-A for sewage rates and applied to water demands. These differences are minor and will not affect the results, as the fire flow requirements will govern the water service sizing. I will let you review and decide which method you prefer.

In addition, we have updated the fire flow calculation based on the FUS. The required fire flow based on this method worked out to the same as the OBC method.

Thanks

Jason Fitzpatrick, P.Eng.
EXP | Project Engineer
t : +1.613.688.1899 | m : +1.613.302.7441 | e : jason.fitzpatrick@exp.com
2650 Queensview Drive
Suite 100
Ottawa, ON K2B 8H6
CANADA

Boundary Condition for 2140 Baseline



Legend

Pipe Ownership

Ownership

- Private
- Public

Appendix G – Manufacturer Information

WATTS ACCUTROL Specification Sheet

IPEX Tempest Inlet Control Devices – Technical Manual

Stormtech MC-3500 Design Manual (Pages B16, B17)

Adjustable Accutrol Weir

Tag: ____________________

Adjustable Flow Control for Roof Drains

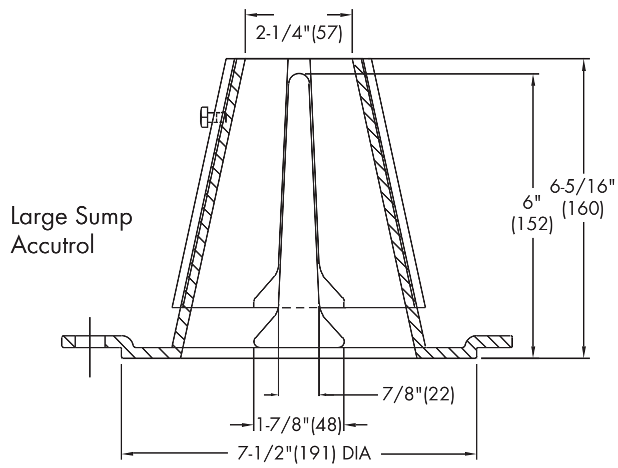
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

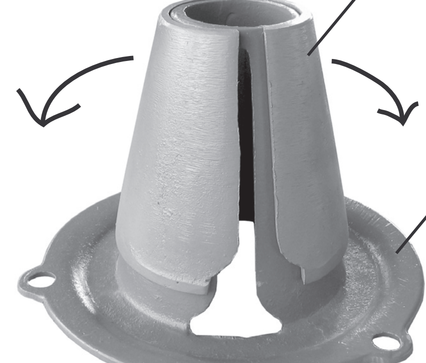
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the 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 ____________________

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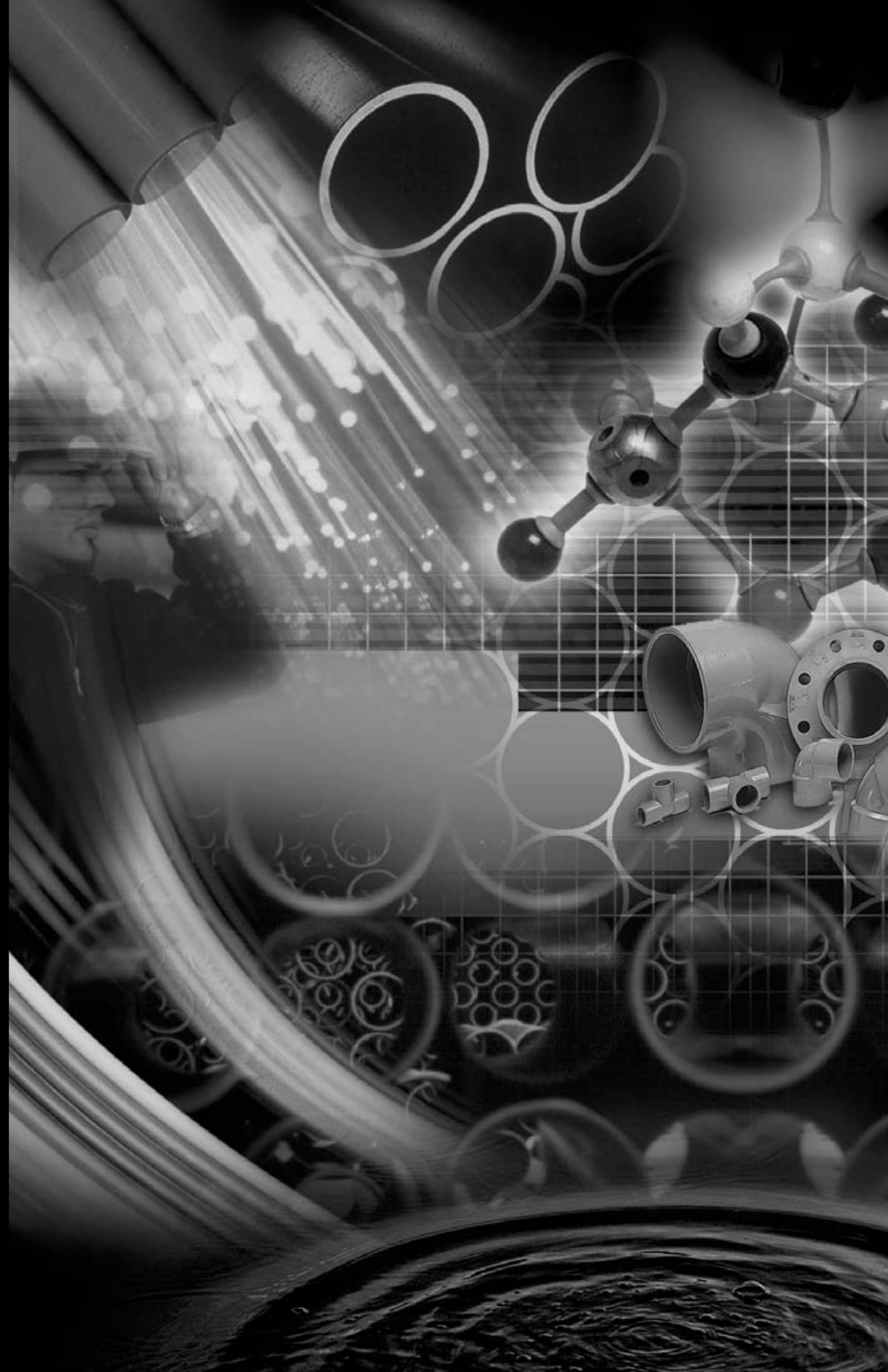
Volume III: TEMPEST™ INLET CONTROL DEVICES



Municipal Technical Manual Series

SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

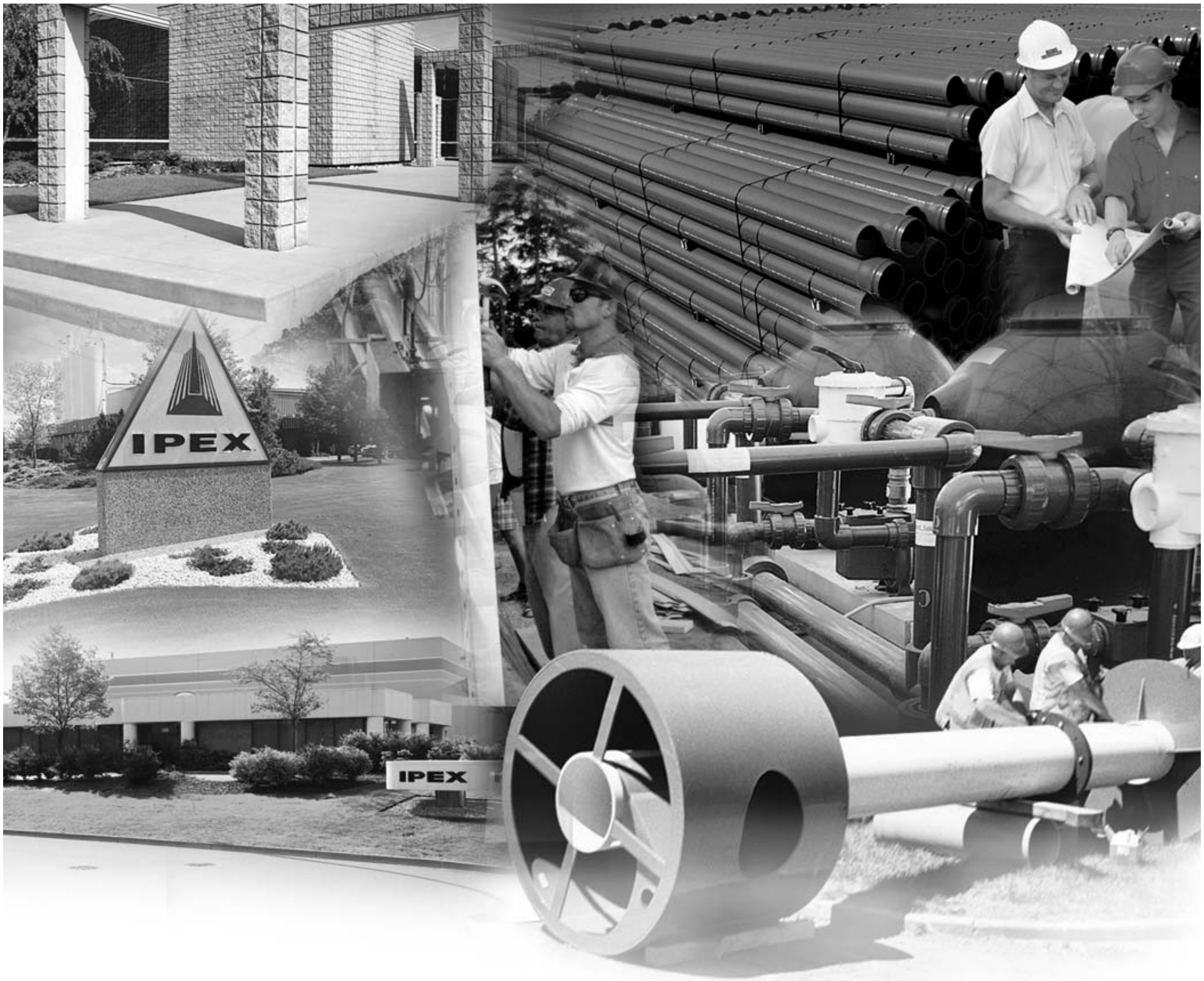
MHF (Medium to High Flow) ICD

IPEX

IPEX Tempest™ Inlet Control Devices

Municipal Technical Manual Series

Vol. I, 2nd Edition



About IPEX

At IPEX, we have been manufacturing non-metallic pipe and fittings since 1951. We formulate our own compounds and maintain strict quality control during production. Our products are made available for customers thanks to a network of regional stocking locations throughout North America. We offer a wide variety of systems including complete lines of piping, fittings, valves and custom-fabricated items.

More importantly, we are committed to meeting our customers' needs. As a leader in the plastic piping industry, IPEX continually develops new products, modernizes manufacturing facilities and acquires innovative process technology. In addition, our staff take pride in their work, making available to customers their extensive thermoplastic knowledge and field experience. IPEX personnel are committed to improving the safety, reliability and performance of thermoplastic materials. We are involved in several standards committees and are members of and/or comply with the organizations listed on this page.

For specific details about any IPEX product, contact our customer service department.

CONTENTS

PRODUCT INFORMATION: TEMPEST LOW, MEDIUM FLOW (LMF) ICD

Purpose

To control the amount of storm water runoff entering a sewer system by allowing a specified flow volume out of a catch basin or manhole at a specified head. This approach conserves pipe capacity so that catch basins downstream do not become uncontrollably surcharged, which can lead to basement floods, flash floods and combined sewer overflows.

Product Description

Our LMF ICD is designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter and larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 14 preset flow curves, the LMF ICD has the ability to provide flow rates: 2lps – 17lps (31gpm – 270gpm)

Product Function

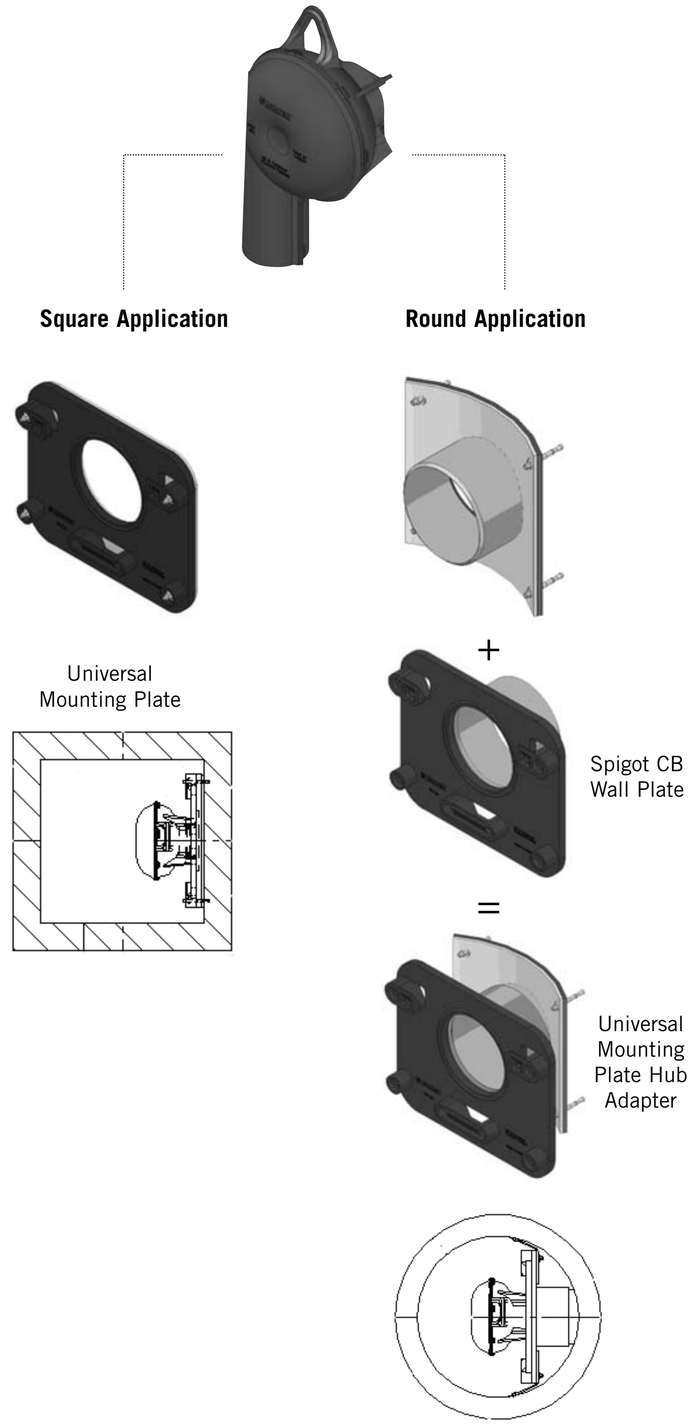
The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during a rain event, preserving greater sewer capacity.

Product Construction

Constructed from durable PVC, the LMF ICD is light weight 8.9 Kg (19.7 lbs).

Product Applications

Will accommodate both square and round applications:



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

Chart 1: LMF 14 Preset Flow Curves

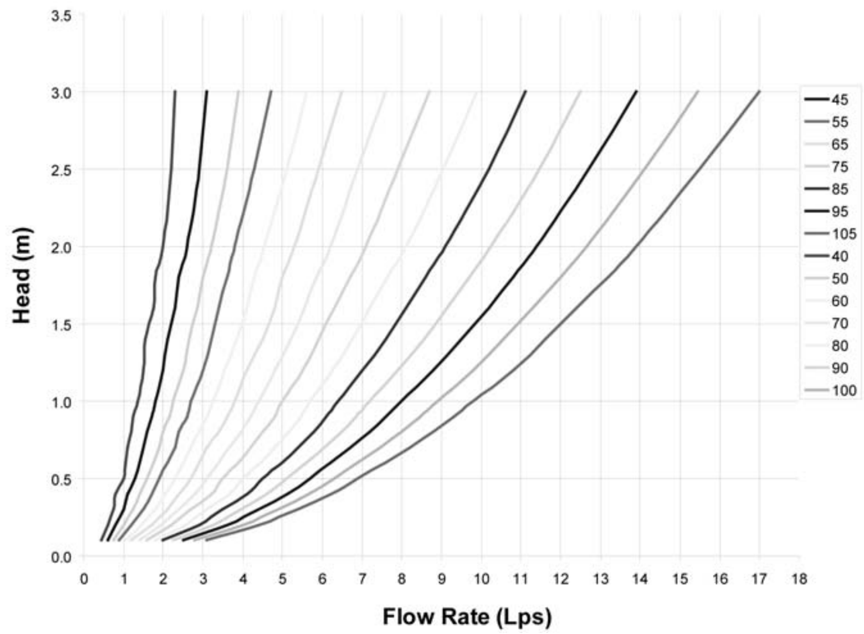
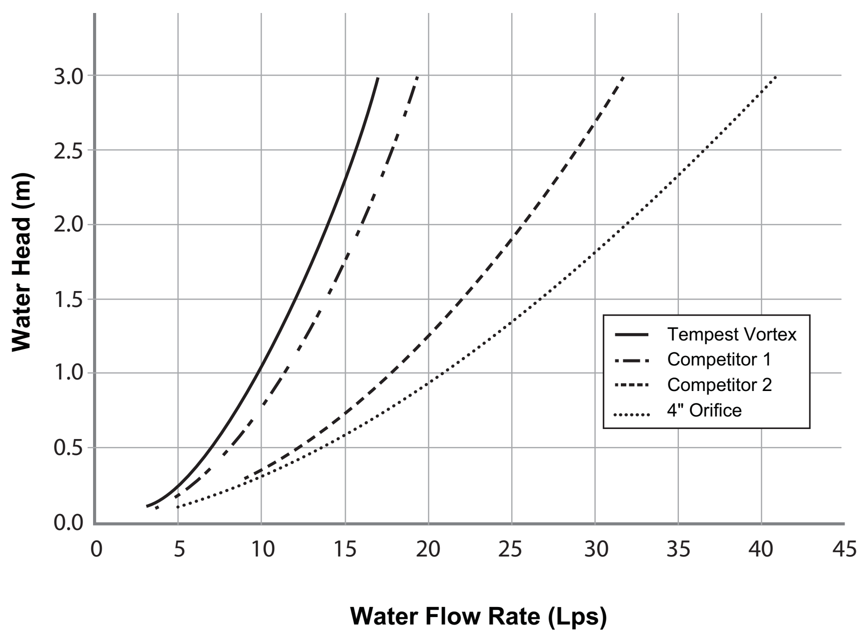


Chart 2: LMF Flow vs. ICD Alternatives



NOTE: Do not use or test the products in this manual with compressed air or other gases including air-over-water-boosters

PRODUCT INSTALLATION

Instructions to assemble a TEMPEST LMF ICD into a Square Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device.
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST LMF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the spigot catch basin wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the CB spigot wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot wall plate and the catch basin wall.
6. Apply solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the universal mounting plate hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the ICD device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the mounting plate and has created a seal.

⚠ WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut back the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook will be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above must not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices will consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

PRODUCT INFORMATION: TEMPEST HF & MHF ICD

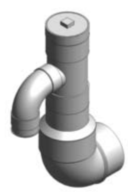
Product Description

Our HF, HF Sump and MHF ICD's are designed to accommodate catch basins or manholes with sewer outlet pipes 6" in diameter or larger. Any storm sewer larger than 12" may require custom modification. However, IPEX can custom build a TEMPEST device to accommodate virtually any storm sewer size.

Available in 5 preset flow curves, these ICDs have the ability to provide constant flow rates: 9lps (143 gpm) and greater

Product Function

TEMPEST HF (High Flow): designed to manage moderate to higher flows 15 L/s (240 gpm) or greater and prevent the propagation of odour and floatables. With this device, the cross-sectional area of the device is larger than the orifice diameter and has been designed to limit head losses. The HF ICD can also be ordered without flow control when only odour and floatable control is required.



TEMPEST HF (High Flow) Sump: The height of a sewer outlet pipe in a catch basin is not always conveniently located. At times it may be located very close to the catch basin floor, not providing enough sump for one of the other TEMPEST ICDs with universal back plate to be installed. In these applications, the HF Sump is offered. The HF Sump offers the same features and benefits as the HF ICD; however, is designed to raise the outlet in a square or round catch basin structure. When installed, the HF sump is fixed in place and not easily removed. Any required service to the device is performed through a clean-out located in the top of the device which can be often accessed from ground level.

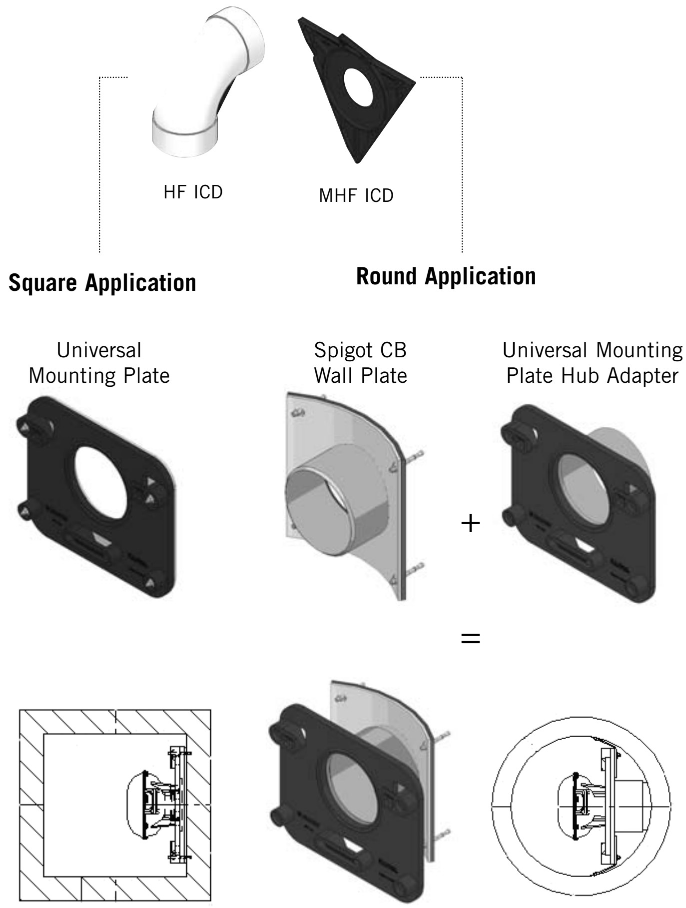
TEMPEST MHF (Medium to High Flow): The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

Product Construction

The HF, HF Sump and MHF ICDs are built to be light weight at a maximum weight of 6.8 Kg (14.6 lbs).

Product Applications

The HF and MHF ICD's are available to accommodate both square and round applications:



The HF Sump is available to accommodate low to no sump applications in both square and round catch basins:

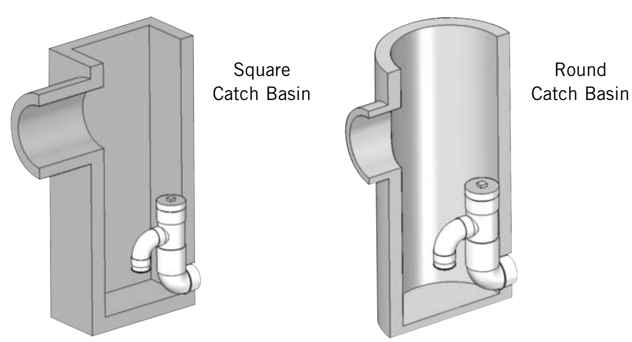
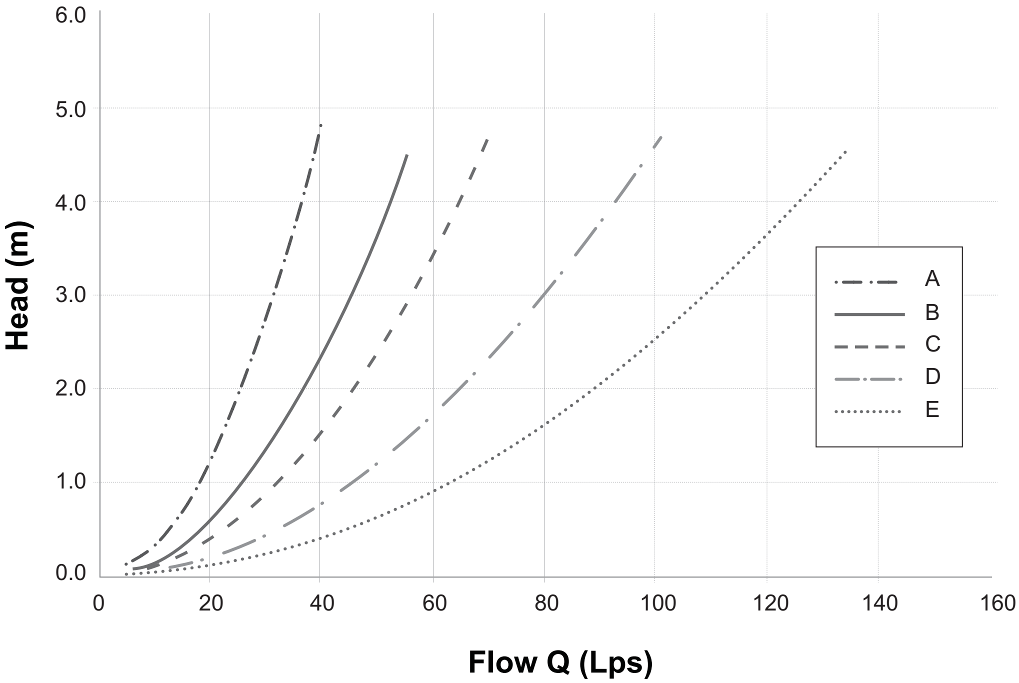


Chart 3: HF & MHF Preset Flow Curves



PRODUCT INSTALLATION

Instructions to assemble a TEMPEST HF or MHF ICD into a Square Catch Basin:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers, (4) nuts, universal mounting plate, ICD device
2. Use the mounting wall plate to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a minimum of 1-1/2" depth up to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the universal wall mounting plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the wall mounting plate and the catch basin wall.
6. From the ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the universal wall mounting plate and has created a seal.

WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- Call your IPEX representative for more information or if you have any questions about our products.

Instructions to assemble a TEMPEST HF or MHF ICD into a Round Catch Basin:

STEPS:

1. Materials and tooling verification.
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level and marker.
   - Material: (4) concrete anchor 3/8 x 3-1/2, (4) washers and (4) nuts, spigot CB wall plate, universal mounting plate hub adapter, ICD device.
2. Use the round catch basin spigot adaptor to locate and mark the hole (4) pattern on the catch basin wall. You should use a level to ensure that the plate is at the horizontal.
3. Use an impact drill with a 3/8" concrete bit to make the four holes at a depth between 1-1/2" to 2-1/2". Clean the concrete dust from the holes.
4. Install the anchors (4) in the holes by using a hammer. Thread the nuts on the top of the anchors to protect the threads when you hit the anchors with the hammer. Remove the nuts from the ends of the anchors.
5. Install the spigot CB wall plate on the anchors and screw the 4 nuts in place with a maximum torque of 40 N.m (30 lbf-ft). There should be no gap between the spigot CB wall plate and the catch basin wall.
6. Put solvent cement on the hub of the universal mounting plate, hub adapter and the spigot of the CB wall plate, then slide the hub over the spigot. Make sure the universal mounting plate is at the horizontal and its hub is completely inserted onto the spigot. Normally, the corners of the hub adapter should touch the catch basin wall.
7. From ground above using a reach bar, lower the device by hooking the end of the reach bar to the handle of the ICD device. Align the triangular plate portion into the mounting wall plate. Push down the device to be sure it has centered in to the wall mounting plate and has created a seal.

WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

PRODUCT TECHNICAL SPECIFICATION

Instructions to assemble a TEMPEST HF Sump into a Square or Round Catch Basin:

STEPS:

1. Materials and tooling verification:
   - Tooling: impact drill, 3/8" concrete bit, torque wrench for 9/16" nut, hand hammer, level, mastic tape and metal strapping
   - Material: (2) concrete anchor 3/8 x 3-1/2, (2) washers, (2) nuts, HF Sump pieces (2).
2. Apply solvent cement to the spigot end of the top half of the sump. Apply solvent cement to the hub of the bottom half of the sump. Insert the spigot of the top half of the sump into the hub of the bottom half of the sump.
3. Install the 8" spigot of the device into the outlet pipe. Use the mastic tape to seal the device spigot into the outlet pipe. You should use a level to be sure that the fitting is standing at the vertical.
4. Use an impact drill with a 3/8" concrete bit to make a series of 2 holes along each side of the body throat. The depth of the hole should be between 1-1/2" to 2-1/2". Clean the concrete dust from the 2 holes.
5. Install the anchors (2) in the holes by using a hammer. Put the nuts on the top of the anchors to protect the threads when you hit the anchors. Remove the nuts from the ends of the anchors.
6. Cut the metal strapping to length and connect each end of the strapping to the anchors. Screw the nuts in place with a maximum torque of 40 N.m (30 lbf-ft). The device should be completely flush with the catch basin wall.

WARNING

- Verify that the outlet pipe doesn't protrude into the catch basin. If it does, cut down the pipe flush to the catch basin wall.
- The solvent cement which is used in this installation is to be approved for PVC.
- The solvent cement should not be used below 0°C (32°F) or in a high humidity environment. Refer to the IPEX solvent cement guide to confirm the required curing time or visit the IPEX Online Solvent Cement Training Course available at www.ipexinc.com.
- Call your IPEX representative for more information or if you have any questions about our products.

General

Inlet control devices (ICD's) are designed to provide flow control at a specified rate for a given water head level and also provide odour and floatable control where specified. All ICD's will be IPEX Tempest or approved equal.

All devices shall be removable from a universal mounting plate. An operator from street level using only a T-bar with a hook shall be able to retrieve the device while leaving the universal mounting plate secured to the catch basin wall face. The removal of the TEMPEST devices listed above shall not require any unbolting or special manipulation or any special tools.

High Flow (HF) Sump devices shall consist of a removable threaded cap which can be accessible from street level with out entry into the catchbasin (CB). The removal of the threaded cap shall not require any special tools other than the operator's hand.

ICD's shall have no moving parts.

Materials

ICD's are to be manufactured from Polyvinyl Chloride (PVC) or Polyurethane material, designed to be durable enough to withstand multiple freeze-thaw cycles and exposure to harsh elements.

The inner ring seal will be manufactured using a Buna or Nitrile material with hardness between Duro 50 and Duro 70.

The wall seal is to be comprised of a 3/8" thick Neoprene Closed Cell Sponge gasket which is attached to the back of the wall plate.

All hardware will be made from 304 stainless steel.

Dimensioning

The Low Medium Flow (LMF), High Flow (HF) and the High Flow (HF) Sump shall allow for a minimum outlet pipe diameter of 200mm with a 600mm deep Catch Basin sump.

Installation

Contractor shall be responsible for securing, supporting and connecting the ICD's to the existing influent pipe and catchbasin/manhole structure as specified and designed by the Engineer.

SALES AND CUSTOMER SERVICE

Canadian Customers call IPEX Inc.

Toll free: (866) 473-9462

www.ipexinc.com

U.S. Customers call IPEX USA LLC

Toll free: (800) 463-9572

www.ipexamerica.com

About the IPEX Group of Companies

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are:

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, ABS, PEX, FR-PVDF and PE pipe and fittings (1/4" to 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

Products manufactured by IPEX Inc. and distributed in the United States by IPEX USA LLC.

Tempest™ is a trademark of IPEX Branding Inc.

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IPEX

5.0 Cumulative Storage Volumes

Tables 7 and **8** provide cumulative storage volumes for the MC-3500 chamber and end cap. These tables can be used to calculate the stage-storage relationship for the retention or detention system. Digital spreadsheets in which the number of chambers and end caps can be input for quick cumulative storage calculations are available at www.stormtech.com. For assistance with site-specific calculations or input into routing software, contact the StormTech Technical Services Department.

TABLE 7 – MC-3500 Incremental Storage Volume Per Chamber

Assumes 40% stone porosity. Calculations are based upon a 9” (230 mm) stone base under the chambers, 12” (300 mm) of stone above chambers, and 9” (230 mm) of spacing between chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft^3 (m^3)	Total System Cumulative Storage ft^3 (m^3)
66 (1676)	0.00	178.96 (5.068)
65 (1651)	0.00	177.25 (5.019)
64 (1626)	0.00	175.54 (4.971)
63 (1600)	Stone 0.00	173.83 (4.922)
62 (1575)	Cover 0.00	172.11 (4.874)
61 (1549)	0.00	170.40 (4.825)
60 (1524)	0.00	168.69 (4.777)
59 (1499)	0.00	166.98 (4.728)
58 (1473)	0.00	165.27 (4.680)
57 (1448)	0.00	163.55 (4.631)
56 (1422)	0.00	161.84 (4.583)
55 (1397)	0.00	160.13 (4.534)
54 (1372)	109.95 (3.113)	158.42 (4.486)
53 (1346)	109.89 (3.112)	156.67 (4.436)
52 (1321)	109.69 (3.106)	154.84 (4.385)
51 (1295)	109.40 (3.098)	152.95 (4.331)
50 (1270)	109.00 (3.086)	151.00 (4.276)
49 (1245)	108.31 (3.067)	148.88 (4.216)
48 (1219)	107.28 (3.038)	146.55 (4.150)
47 (1194)	106.03 (3.003)	144.09 (4.080)
46 (1168)	104.61 (2.962)	141.52 (4.007)
45 (1143)	103.04 (2.918)	138.86 (3.932)
44 (1118)	101.33 (2.869)	136.13 (3.855)
43 (1092)	99.50 (2.818)	133.32 (3.775)
42 (1067)	97.56 (2.763)	130.44 (3.694)
41 (1041)	95.52 (2.705)	127.51 (3.611)
40 (1016)	93.39 (2.644)	124.51 (3.526)
39 (991)	91.16 (2.581)	121.47 (3.440)
38 (965)	88.86 (2.516)	118.37 (3.352)
37 (948)	86.47 (2.449)	115.23 (3.263)
36 (914)	84.01 (2.379)	112.04 (3.173)
35 (889)	81.49 (2.307)	108.81 (3.081)
34 (864)	78.89 (2.234)	105.54 (2.989)
33 (838)	76.24 (2.159)	102.24 (2.895)
32 (813)	73.52 (2.082)	98.90 (2.800)
31 (787)	70.75 (2.003)	95.52 (2.705)
30 (762)	67.92 (1.923)	92.12 (2.608)
29 (737)	65.05 (1.842)	88.68 (2.511)
28 (711)	62.12 (1.759)	85.21 (2.413)
27 (686)	59.15 (1.675)	81.72 (2.314)
26 (680)	56.14 (1.590)	78.20 (2.214)
25 (635)	53.09 (1.503)	74.65 (2.114)
24 (610)	49.99 (1.416)	71.09 (2.013)
23 (584)	46.86 (1.327)	67.50 (1.911)
22 (559)	43.70 (1.237)	63.88 (1.809)
21 (533)	40.50 (1.147)	60.25 (1.706)
20 (508)	37.27 (1.055)	56.60 (1.603)
19 (483)	34.01 (0.963)	52.93 (1.499)
18 (457)	30.72 (0.870)	49.25 (1.395)
17 (432)	27.40 (0.776)	45.54 (1.290)
16 (406)	24.05 (0.681)	41.83 (1.184)
15 (381)	20.69 (0.586)	38.09 (1.079)
14 (356)	17.29 (0.490)	34.34 (0.973)
13 (330)	13.88 (0.393)	30.58 (0.866)
12 (305)	10.44 (0.296)	26.81 (0.759)
11 (279)	6.98 (0.198)	23.02 (0.652)
10 (254)	3.51 (0.099)	19.22 (0.544)
9 (229)	0.00	15.41 (0.436)
8 (203)	0.00	13.70 (0.388)
7 (178)	0.00	11.98 (0.339)
6 (152)	Stone 0.00	10.27 (0.291)
5 (127)	Foundation 0.00	8.56 (0.242)
4 (102)	0.00	6.85 (0.194)
3 (76)	0.00	5.14 (0.145)
2 (51)	0.00	3.42 (0.097)
1 (25)	0.00	1.71 (0.048)

NOTE: Add 1.71 ft^3 (0.030 m^3) of storage for each additional inch (25 mm) of stone foundation.
Contact StormTech for cumulative volume spreadsheets in digital format.

5.0 Cumulative Storage Volume

StormTech

TABLE 8 – MC-3500 Incremental Storage Volume Per End Cap

Assumes 40% stone porosity. Calculations are based upon a 9" (230 mm) stone base under the chambers, 12" (300 mm) of stone above end caps, and 9" (230 mm) of spacing between end caps and 6" (150 mm) of stone perimeter.

Depth of Water in System Inches (mm)	Cumulative End Cap Storage ft^3 (m^3)	Total System Cumulative Storage ft^3 (m^3)
66 (1676)	0.00	46.96 (1.330)
65 (1651)	0.00	46.39 (1.314)
64 (1626)	0.00	45.82 (1.298)
63 (1600)	Stone 0.00	45.25 (1.281)
62 (1575)	Cover 0.00	44.68 (1.265)
61 (1549)	0.00	44.11 (1.249)
60 (1524)	0.00	43.54 (1.233)
59 (1499)	0.00	42.98 (1.217)
58 (1473)	0.00	42.41 (1.201)
57 (1448)	0.00	41.84 (1.185)
56 (1422)	0.00	41.27 (1.169)
55 (1397)	0.00	40.70 (1.152)
54 (1372)	15.64 (0.443)	40.13 (1.136)
53 (1346)	15.64 (0.443)	39.56 (1.120)
52 (1321)	15.63 (0.443)	38.99 (1.104)
51 (1295)	15.62 (0.442)	38.41 (1.088)
50 (1270)	15.60 (0.442)	37.83 (1.071)
49 (1245)	15.56 (0.441)	37.24 (1.054)
48 (1219)	15.51 (0.439)	36.64 (1.037)
47 (1194)	15.44 (0.437)	36.02 (1.020)
46 (1168)	15.35 (0.435)	35.40 (1.003)
45 (1143)	15.25 (0.432)	34.77 (0.985)
44 (1118)	15.13 (0.428)	34.13 (0.966)
43 (1092)	14.99 (0.424)	33.48 (0.948)
42 (1067)	14.83 (0.420)	32.81 (0.929)
41 (1041)	14.65 (0.415)	32.13 (0.910)
40 (1016)	14.45 (0.409)	31.45 (0.890)
39 (991)	14.24 (0.403)	30.75 (0.871)
38 (965)	14.00 (0.396)	30.03 (0.850)
37 (948)	13.74 (0.389)	29.31 (0.830)
36 (914)	13.47 (0.381)	28.58 (0.809)
35 (889)	13.18 (0.373)	27.84 (0.788)
34 (864)	12.86 (0.364)	27.08 (0.767)

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft^3 (m^3)	Total System Cumulative Storage ft^3 (m^3)
33 (838)	12.53 (0.355)	26.30 (0.745)
32 (813)	12.18 (0.345)	25.53 (0.723)
31 (787)	11.81 (0.335)	24.74 (0.701)
30 (762)	11.42 (0.323)	23.93 (0.678)
29 (737)	11.01 (0.312)	23.12 (0.655)
28 (711)	10.58 (0.300)	22.29 (0.631)
27 (686)	10.13 (0.287)	21.45 (0.607)
26 (680)	9.67 (0.274)	20.61 (0.583)
25 (635)	9.19 (0.260)	19.75 (0.559)
24 (610)	8.70 (0.246)	18.88 (0.559)
23 (584)	8.19 (0.232)	18.01 (0.510)
22 (559)	7.67 (0.217)	17.13 (0.485)
21 (533)	7.13 (0.202)	16.24 (0.460)
20 (508)	6.59 (0.187)	15.34 (0.434)
19 (483)	6.03 (0.171)	14.43 (0.409)
18 (457)	5.46 (0.155)	13.52 (0.383)
17 (432)	4.88 (0.138)	12.61 (0.357)
16 (406)	4.30 (0.122)	11.69 (0.331)
15 (381)	3.70 (0.105)	10.76 (0.305)
14 (356)	3.10 (0.088)	9.83 (0.278)
13 (330)	2.49 (0.071)	8.90 (0.252)
12 (305)	1.88 (0.053)	7.96 (0.225)
11 (279)	1.26 (0.036)	7.02 (0.199)
10 (254)	0.63 (0.018)	6.07 (0.172)
9 (229)	0.00	5.12 (0.145)
8 (203)	0.00	4.55 (0.129)
7 (178)	0.00	3.99 (0.113)
6 (152)	Stone 0.00	3.42 (0.097)
5 (127)	Foundation 0.00	2.85 (0.081)
4 (102)	0.00	2.28 (0.064)
3 (76)	0.00	1.71 (0.048)
2 (51)	0.00	1.14 (0.032)
1 (25)	0.00	0.56 (0.016)

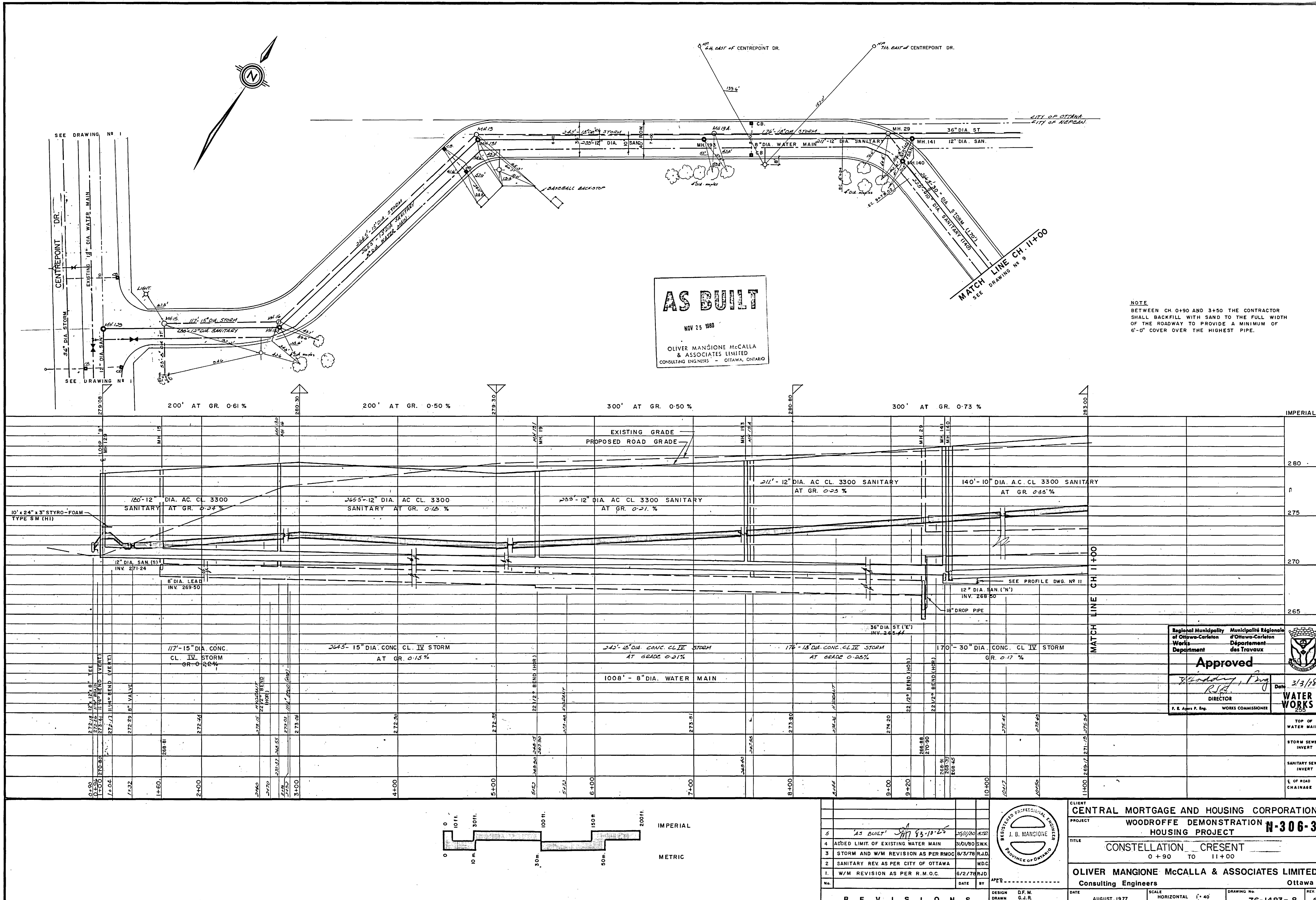
NOTE: Add 0.56 ft^3 (0.016 m^3) of storage for each additional inch (25 mm) of stone foundation.
Contact StormTech for cumulative volume spreadsheets in digital format.

Appendix H –Background Information

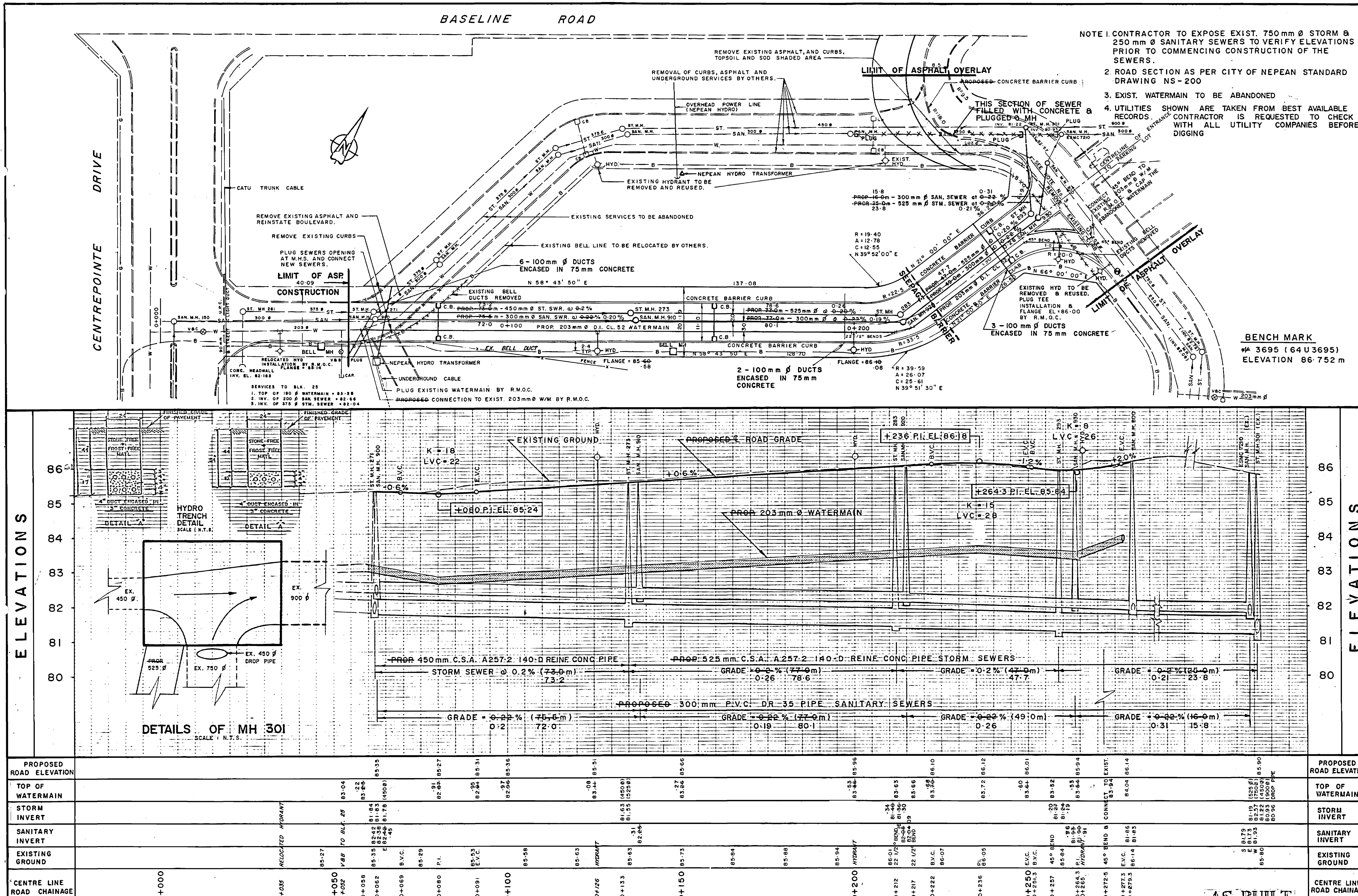
As-Built Drawings (All 11x17 Reduction, Scale: NTS)

- **Plan & Profile – Re Alignment of Constellation Crescent (1 drawings)**
- **Plan & Profile – Constellation Crescent (1 drawing)**
- **Plan & Profile – Baseline Road and Constellation Crescent Intersection Modifications (3 drawings)**

Excerpt pages form "Stormwater Management Guidelines for the Pinecrest Creek / Westboro Area, JFSA, June 2012. (pages 12-19)



SEE DRAWING Nº 1
CENTREPOINT DR.
EXISTING 12" DIA. WATER MAIN
36" DIA. STORM
12" DIA. SAN.
MH.129
MH.15
117'-15" DIA. STORM
MH.16
LIGHT
BASEBALL BACKSTOP
MH.13
MH.151
MH.19
MH.193
MH.19A
CB.
8" DIA. WATER MAIN
211'-12" DIA. SANITARY
176'-18" DIA. STORM
MH.29
MH.141
MH.140
36" DIA. ST.
12" DIA. SAN.
CITY OF OTTAWA
CITY OF NEPEAN
MATCH LINE CH. 11+00
SEE DRAWING Nº 9
AS BUILT
NOV 25 1980
OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
CONSULTING ENGINEERS - OTTAWA, ONTARIO
NOTE
BETWEEN CH. 0+90 AND 3+50 THE CONTRACTOR SHALL BACKFILL WITH SAND TO THE FULL WIDTH OF THE ROADWAY TO PROVIDE A MINIMUM OF 6'-0" COVER OVER THE HIGHEST PIPE.
200' AT GR. 0.61 %
200' AT GR. 0.50 %
300' AT GR. 0.50 %
300' AT GR. 0.73 %
IMPERIAL
METRIC
EXISTING GRADE
PROPOSED ROAD GRADE
180'-12" DIA. AC CL. 3300 SANITARY AT GR. 0.24 %
365.5'-12" DIA. AC CL. 3300 SANITARY AT GR. 0.18 %
333'-12" DIA. AC CL. 3300 SANITARY AT GR. 0.21 %
211'-12" DIA. AC CL. 3300 SANITARY AT GR. 0.23 %
140'-10" DIA. A.C. CL 3300 SANITARY AT GR. 0.35 %
10' x 24" x 3" STYRO-FOAM TYPE SM (HI)
12" DIA. SAN. (S) INV. 271.24
8" DIA. LEAD INV. 269.50
SEE PROFILE DWG. Nº 11
12" DIA. SAN. ('N') INV. 268.50
18" DROP PIPE
36" DIA. ST. ('E') INV. 265.44
117'-15" DIA. CONC. CL. IV STORM GR. 0.22 %
364.5'-15" DIA. CONC CL. IV STORM AT GR. 0.15 %
343'-15" DIA. CONC. CL IV STORM AT GRADE 0.21 %
176'-18" DIA. CONC. CL IV STORM AT GRADE 0.25 %
170'-30" DIA. CONC. CL IV STORM GR. 0.17 %
1008'-8" DIA. WATER MAIN
MATCH LINE CH. 11+00
Regional Municipality of Ottawa-Carleton Works Department
Municipalité Régionale d'Ottawa-Carleton Département des Travaux
Approved
DIRECTOR
Date 3/3/78
WATER WORKS
WORKS COMMISSIONER
TOP OF WATER MAIN
STORM SEWER INVERT
SANITARY SEWER INVERT
℄ OF ROAD CHAINAGE
IMPERIAL
METRIC
5 'AS BUILT' 25/11/80
4 ADDED LIMIT OF EXISTING WATER MAIN 31/01/80 S.W.K.
3 STORM AND W/M REVISION AS PER RMOC 8/3/78 R.J.D.
2 SANITARY REV. AS PER CITY OF OTTAWA W.D.C.
1. W/M REVISION AS PER R.M.O.C. 6/2/78 R.J.D.
No. DATE BY
REVISIONS
J. B. MANGIONE
REGISTERED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO
DESIGN D.F.M.
DRAWN G.J.R.
CHECKED J.B.M.
CLIENT
CENTRAL MORTGAGE AND HOUSING CORPORATION
PROJECT
WOODROFFE DEMONSTRATION HOUSING PROJECT
N-306-3
TITLE
CONSTELLATION CRESENT
0+90 TO 11+00
OLIVER MANGIONE McCALLA & ASSOCIATES LIMITED
Consulting Engineers Ottawa
DATE AUGUST, 1977
SCALE HORIZONTAL 1" 40' VERTICAL 1" 4'
DRAWING No. 76-1483-8
REV. 5



NO.	DATE	REVISIONS	BY	NO.	DATE	REVISIONS	BY	NO.	DATE	REVISIONS	BY	NO.	DATE	REVISIONS	BY
1	9.9.88	GENERAL	D.N.	6	27.11.89	REVISED ROAD REALIGNMENT	D.N.	11	13.8.90	ISSUED FOR TENDER	D.N.				
2	27.9.88	AS PER R.M.O.C.	D.N.	7	29.11.89	DETAILS OF M.H. 301 ADDED	D.N.	12	14.8.90	HYDRO DUCTS ADDED	D.N.				
3	29.9.88	AS PER UTILITIES	D.N.	8	11.12.89	AS PER R.M.O.C.	D.N.	13	24.9.90	AS PER R.M.O.C. — HYD.	D.N.				
4	27.10.88	AS PER R.M.O.C. DWG NO. N-306-3	D.N.	9	15.3.90	AS PER C.M.H.C.	D.N.	14	21.11.90	" AS BUILT "	D.N.				
5	10.11.89	ROAD REALIGNMENT	D.N.	10	25.7.90	"AS BUILT" — BELL	D.N.								

REGISTERED PROFESSIONAL ENGINEER
SEPT. 12/88
D. NARAINE
PROVINCE OF ONTARIO

Cecil D. Naraine Associates Limited
CONSULTING ENGINEERS MUNICIPAL - CIVIL

CANADA MORTGAGE AND HOUSING CORPORATION

RE ALIGNMENT OF CONSTELLATION CRESCENT

SCALE: HORIZ. 1:500 VERT. 1:50
DESIGNED: C.D.N.
DRAWN: C.D.W.
CHECKED: C.D.N.
DATE: SEPT. 1988
DRWG. NO. 3042-101

This as-built has been prepared based in part upon information furnished by others. Dillon Consulting Limited cannot assure the accuracy of others' Information and thus Is not responsible for the accuracy of this as-built document or for any error or omission that may have been incorporated into it as a result. Those relying on this as-built document are advised to obtain independent verification of its accuracy before applying it for any purpose.

AS-BUILT

DILLON CONSULTING

NO.	REVISIONS	BY	D-M-Y
0	DESIGN CIRCULATION	GSH	21-JAN-08
1	ISSUED FOR FINAL REVIEW	GSH	22-MAY-08
2	FINAL DESIGN CIRCULATION	GSH	06-APR-09
3	ISSUED FOR MOE APPLICATION	GSH	27-APR-09
4	ISSUED FOR TENDER	GSH	27-MAY-09
5	ISSUED FOR CONSTRUCTION	GSH	28-JUL-09
6	AS-BUILT	LB	06-JAN-11

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

BASELINE ROAD AND CONSTELLATION CRESCENT INTERSECTION MODIFICATION

PLAN/PROFILE
STA. 20+000 TO STA. 20+300
BASELINE ROAD

W. NEWELL, P.ENG.
Director Infrastructure Services

B. MASON, P.ENG.
Manager Construction Services West

Dwn: AJM | Chkd: GSH | Des: LDM | Chkd: GSH

Ottawa

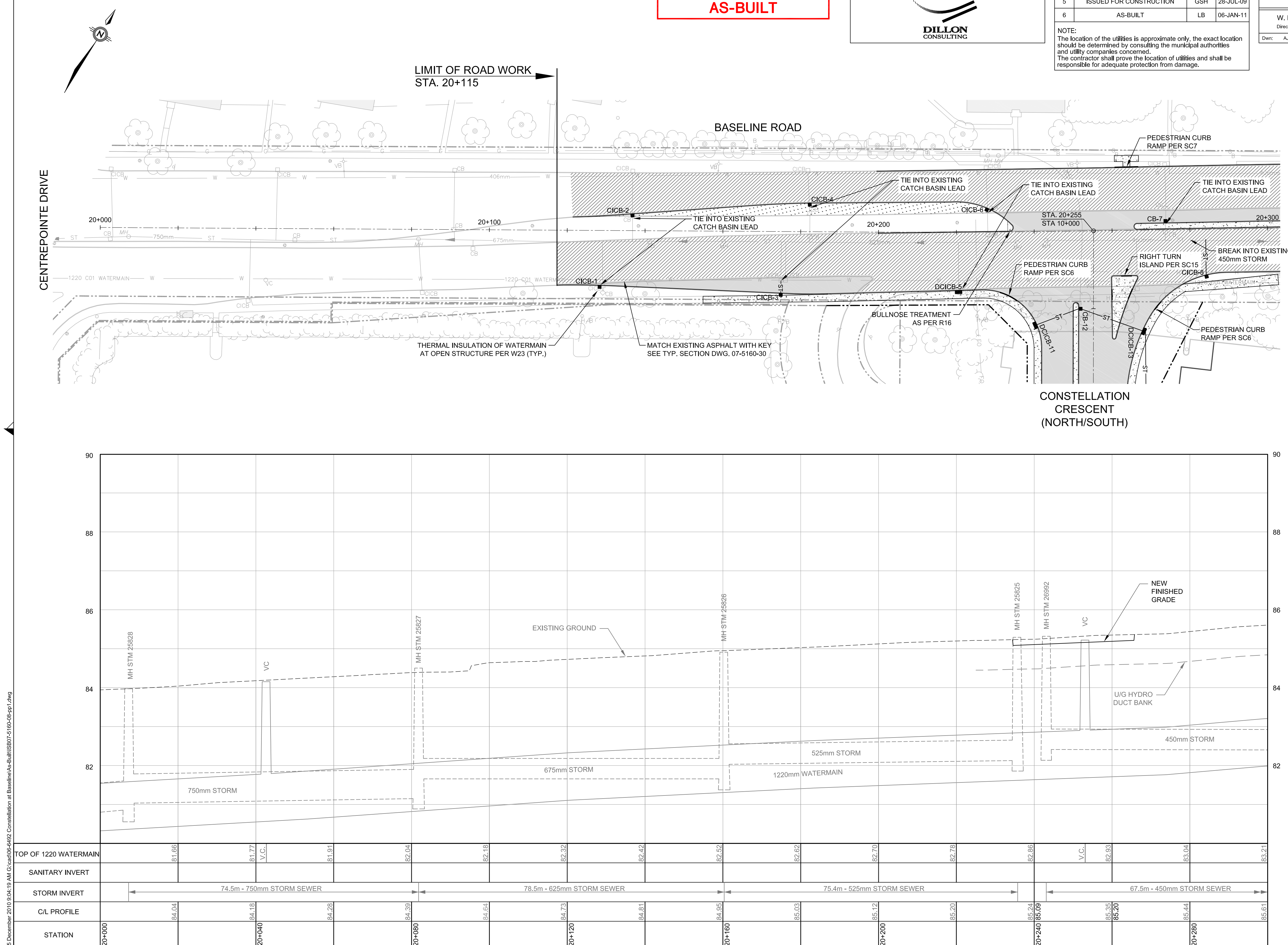
CONTRACT NO.
ISB07-5160

DWG. NO.
07-5160-08

SHEET 08 OF 30

Date: January 2011

Scale: 1:500



GENERAL NOTES:

1. ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON AS-BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD.

CATCH BASIN TABLE

NO.	STATION	OFFSET	TYPE		ELEVATION		
			STRUCTURE	GRATE TYPE	GRATE	LOW INVERT	
CICB-1	20+128.4	14.05(R)	705.010	S23	84.492m	~~82.09m~~	*83.22m*
CICB-2	20+136.7	4.35(L)	705.010	S23	84.675m	~~82.90m~~	*82.92m*
CICB-3	20+175.0	15.80(R)	705.010	S23	84.716m	~~82.51m~~	*83.33m*
CICB-4	20+182.2	7.39(L)	705.010	S23	84.977m	~~83.03m~~	*83.04m*
DCICB-5	20+220.5	14.93(R)	705.020	S23 x2	84.930m	~~82.74m~~	*83.70m*
CICB-6	20+228.0	6.13(L)	705.010	S23	85.180m	~~83.37m~~	*83.38m*
CB-7	20+273.8	1.81(L)	705.010	S19	85.314m	~~84.31m~~	*83.57m*
CICB-8	20+284.0	11.70(R)	705.010	S23	85.375m	~~82.83m~~	*83.29m*

GENERAL NOTES:

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MAINTENANCE HOLE TABLE

NO.	STATION	OFFSET	TYPE			ELEVATION		
			TYPE	STRUCTURE	GRATE TYPE	GRATE	INVERT IN	INVERT OUT
MH-1	10+044.4	2.69(L)	STORM	M-4	S24.1	~~85.587~~ *85.47*	~~80.860~~ *80.78*	~~80.830~~ *80.78*
MH-2	10+054.7	4.10(L)	SANITARY	701.010	S24	~~85.737~~ *85.47*	~~81.770~~ *81.64*	~~81.745~~ *81.65*
MH-3	10+094.1	2.10(L)	STORM	M-5	S24.1	~~85.989~~ *85.90*	~~81.150~~ *E 82.62* *S 81.08*	~~80.920~~ *80.88*
MH-4	10+099.5	2.04(L)	STORM	M-4	S24.1	~~85.984~~ *85.90*	~~81.170~~ *81.21*	~~81.155~~ *81.21*
MH-5	10+100.8	4.42(L)	SANITARY	701.010	S24	~~85.977~~ *85.86*	~~81.830~~ *W 81.89* *S 82.02*	~~81.810~~ *81.88*

CATCH BASIN TABLE

NO.	STATION	OFFSET	TYPE		ELEVATION		
			STRUCTURE	GRATE TYPE	GRATE	INVERT OUT	
DCICB-11	10+024.1	14.52(R)	705.020	S23 x2	84.890m	~~82.85m~~	*82.85m*
CB-12	10+020.0	3.76(R)	705.010	S19	85.135m	~~82.54m~~	*83.54m*
DCICB-13	10+025.6	12.55(L)	705.020	S23 x2	85.006m	~~82.90m~~	*83.40m*
CICB-14	10+090.8	15.11(R)	705.010	S23	85.686m	83.49m	
CICB-15	10+110.2	14.03(R)	705.010	S23	85.663m	83.31m	5
DCICB-16	10+142.5	9.48(R)	705.020	S23 x2	85.637m	83.39m	
DCICB-17	10+142.2	8.14(L)	705.020	S23 x2	85.660m	83.31m	
CICB-18	10+302.7	7.29(R)	705.010	S23	85.768m	83.468m	
CICB-19	10+302.8	5.58(R)	705.010	S23	85.802m	83.502m	
CICB-20	10+340.0	6.01(L)	705.010	S23	85.933m	83.633m	
CICB-21	10+340.0	5.06(R)	705.010	S23	85.952m	83.652m	

DILLON CONSULTING

NO.	REVISIONS	BY	D-M-Y
0	DESIGN CIRCULATION	GSH	21-JAN-08
1	ISSUED FOR FINAL REVIEW	GSH	22-MAY-08
2	FINAL DESIGN CIRCULATION	GSH	06-APR-09
3	ISSUED FOR MOE APPLICATION	GSH	27-APR-09
4	ISSUED FOR TENDER	GSH	27-MAY-09
5	ISSUED FOR CONSTRUCTION	GSH	28-JUL-09
6	AS-BUILT	LB	06-JAN-11

NOTE:
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BASELINE ROAD AND CONSTELLATION CRESCENT INTERSECTION MODIFICATION

PLAN/PROFILE STA. 10+000 TO STA. 10+360 CONSTELLATION CRESCENT (NORTH/SOUTH)

W. NEWELL, P.ENG. Director Infrastructure Services	B. MASON, P.ENG. Manager Construction Services West
Dwn: AJM Chkd: GSH	Des: LDM Chkd: GSH

Ottawa

CONTRACT NO. ISB07-5160

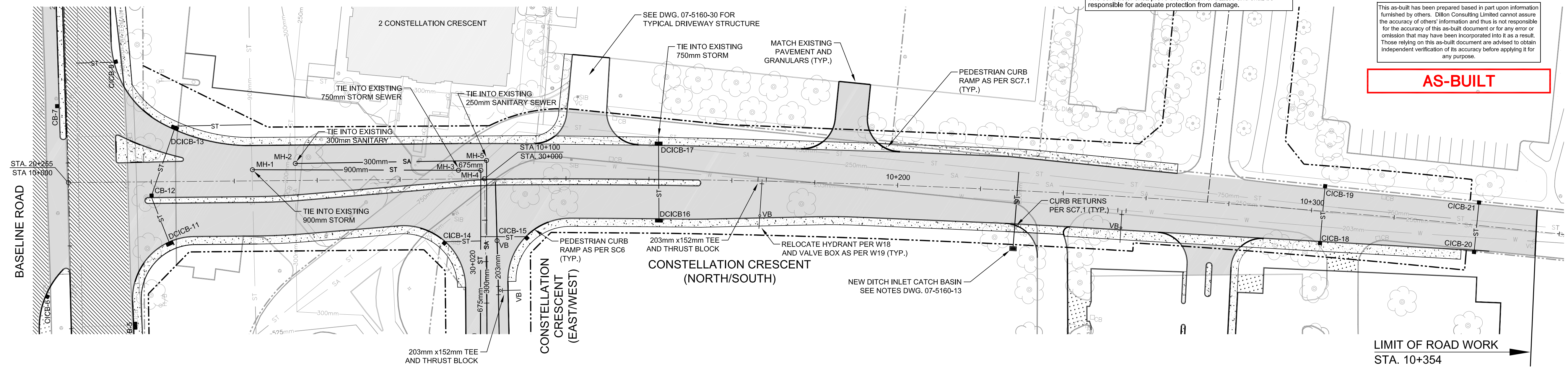
DWG. NO. 07-5160-10

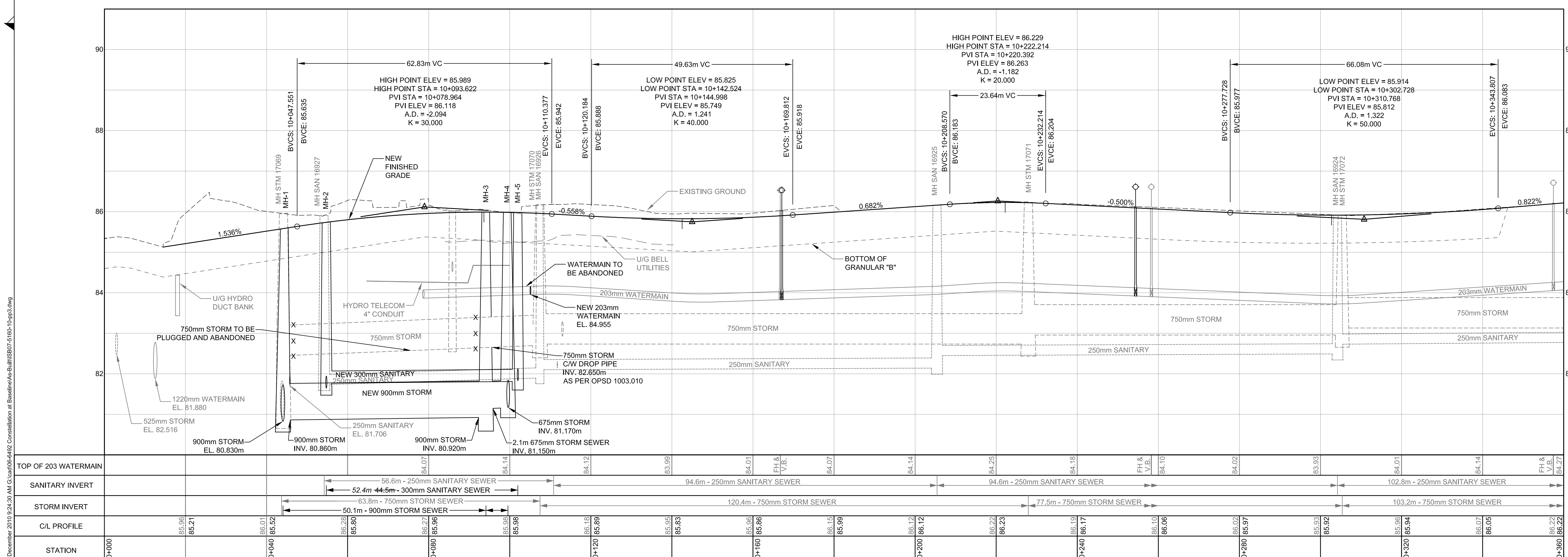
SHEET 10 OF 30

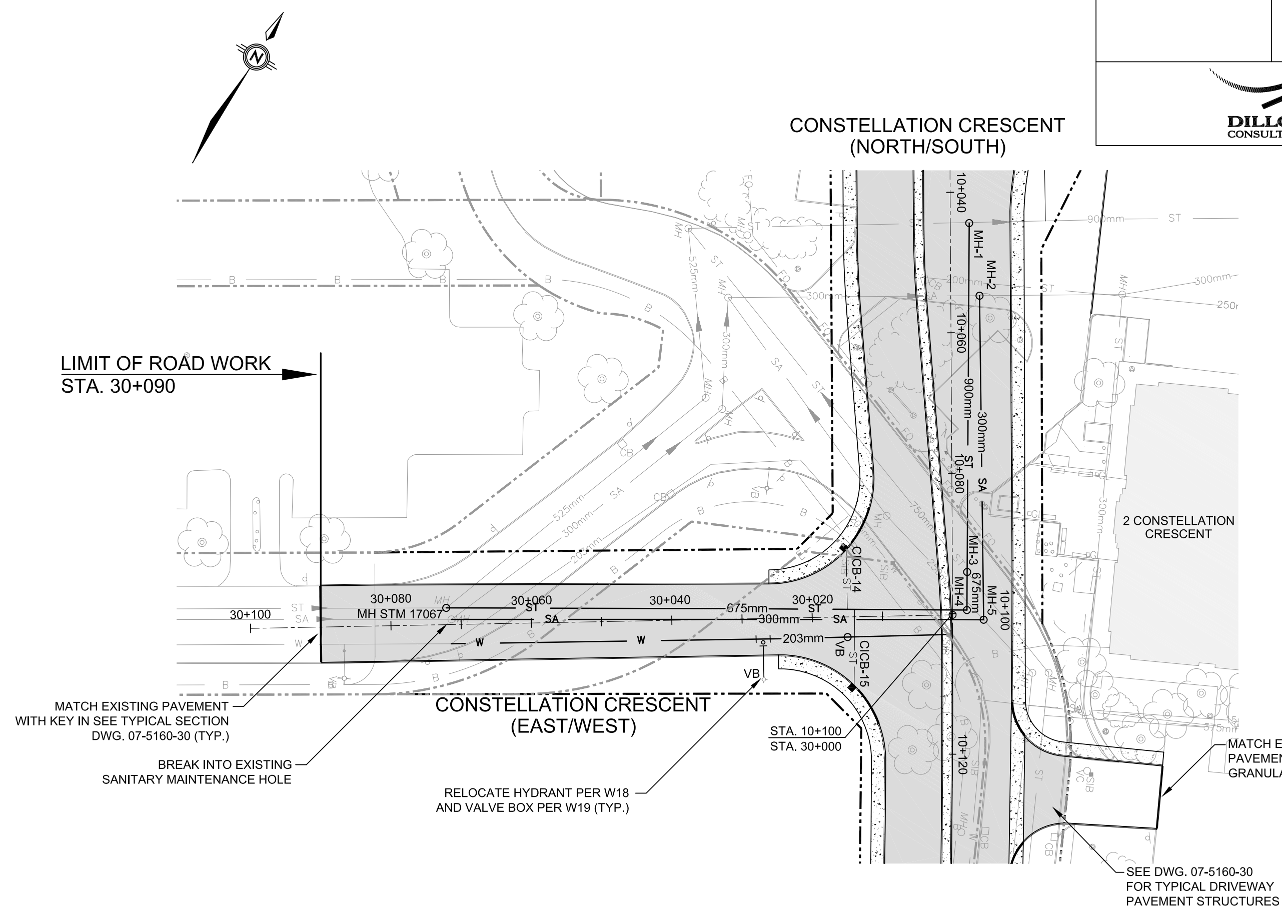
Date: January 2011

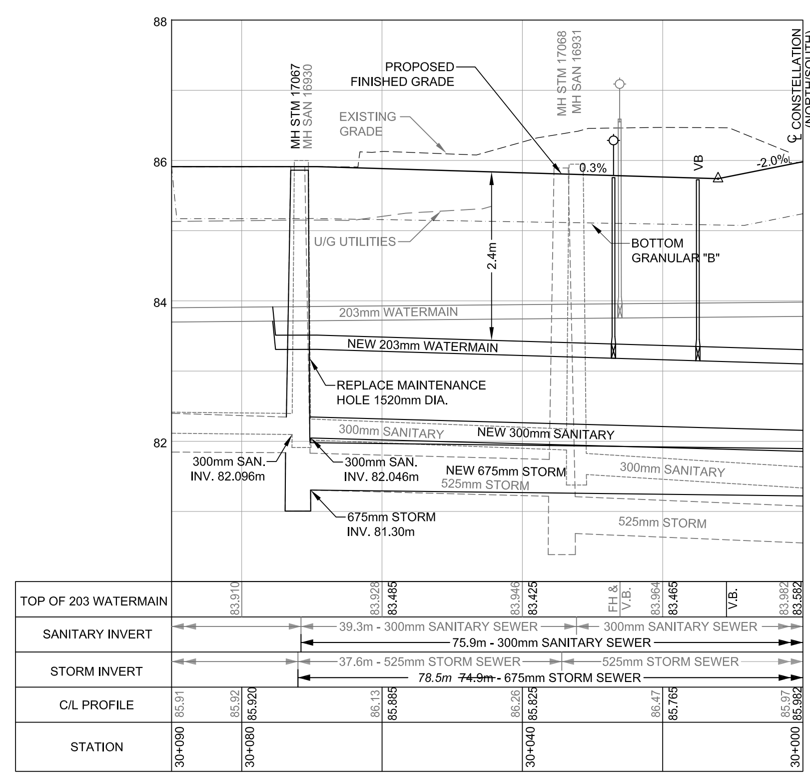
Scale: 0 5 10m 1:500

AS-BUILT









NO.	REVISIONS	BY	D-M-Y
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DILLON CONSULTING

BASELINE ROAD AND CONSTELLATION CRESCENT INTERSECTION MODIFICATION

PLAN/PROFILE
STA. 30+000 TO STA. 30+090
CONSTELLATION CRESCENT (EAST/WEST)

W. NEWELL, P.ENG.
Director Infrastructure Services

B. MASON, P.ENG.
Manager Construction Services West

Dwn: LDM | Chkd: GSH | Des: LDM | Chkd: GSH

Ottawa

CONTRACT NO.
ISB07-5160

DWG. NO.
07-5160-11

SHEET 11 OF 30

Date: January 2011

Scale: 0 5 10m
1:500

GENERAL NOTES:

1. ALL NUMERICAL VALUES THAT ARE NOT STROKED OUT AND REPLACED IN ITALICS ON AS-BUILT DRAWINGS ARE CONSIDERED TO BE DESIGN VALUES ONLY AND NOT MEASURED IN THE FIELD.

MAINTENANCE HOLE TABLE

NO.	STATION	OFFSET	TYPE			ELEVATION		
			TYPE	STRUCTURE	GRATE TYPE	GRATE	INVERT IN	INVERT OUT
MHST 17067	30+072.1	2.06(L)	STORM	701.011	S24.1	85.861	~~81.837~~ *81.35*	~~81.300~~ *81.32*
MH-1	10+044.4	2.69(L)	STORM	M-4	S24.1	~~85.587~~ *85.47*	~~80.860~~ *80.78*	~~80.830~~ *80.78*
MH-2	10+054.7	4.10(L)	SANITARY	701.010	S24	~~85.737~~ *85.47*	~~81.770~~ *81.64*	~~81.745~~ *81.65*
MH-3	10+094.1	2.10(L)	STORM	M-5	S24.1	~~85.989~~ *85.90*	~~81.150~~ *E 82.62* *S 81.08*	~~80.920~~ *80.88*
MH-4	10+099.5	2.04(L)	STORM	M-4	S24.1	~~85.984~~ *85.90*	~~81.170~~ *81.21*	~~81.155~~ *81.21*
MH-5	10+100.8	4.42(L)	SANITARY	701.010	S24	~~85.977~~ *85.86*	~~81.830~~ *W 81.89* *S 82.02*	~~81.810~~ *81.88*

CATCH BASIN TABLE

NO.	STATION	OFFSET	TYPE		ELEVATION	
			STRUCTURE	GRATE TYPE	GRATE	INVERT OUT
CICB-14	30+015.0	9.61m (R)	705.010	S23	85.686m	83.49m
CICB-15	30+014.1	9.66m (L)	705.010	S23	85.663m	83.31m

AS-BUILT

15 December 2010 9:27:11 AM G:\cad\06-6492 Constellation at Baseline\As-Built\ISB07-5160-11-pp4.dwg

Table 3.1: SWM Guidelines for the Pinecrest Creek / Westboro Study Area

	Development Type	Runoff Volume Reduction	Water Quality	Water Quantity	
			TSS Removal	Flood Flow Management	Erosion Control
All Locations					
Residential Development *Not* Requiring Site Plan Control Approval					
1	all soil infiltration rates	Provision of a minimum depth of 300mm of amended topsoil over all front yard landscaped areas; and Direction/redirection of downspouts/roof drainage to landscaped areas to minimize runoff.	Inherent TSS removal from on-site retention in landscaped areas.	Not applicable	Not applicable
Draining to the Ottawa River					
Commercial/Institutional and Industrial Developments - <u>discharging directly to the Ottawa River</u> *					
2	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	On-site removal of 80% of TSS.	As per City's Sewer Design Guideline(Section 8.3.7.3, revised Sept. 2008).	Not applicable
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS.	As per City's Sewer Design Guideline(Section 8.3.7.3, revised Sept. 2008).	Not applicable
Residential Development Requiring Site Plan Control Approval - <u>discharging directly to the Ottawa River</u>					
3	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	Inherent TSS removal due to on-site retention of the first 10 mm rainfall.	As per City's Sewer Design Guideline(Section 8.3.7.3, revised Sept. 2008).	Not applicable
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	Inherent TSS removal from on-site retention in landscaped areas.	As per City's Sewer Design Guideline(Section 8.3.7.3, revised Sept. 2008).	Not applicable
Draining to Pinecrest Creek					
Commercial/Institutional and Industrial Developments - <u>discharging upstream of the Ottawa River Parkway (ORP) pipe inlet</u> *					
4	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	On-site removal of 80% of TSS.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	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.
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	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.

Table 3.1: SWM Guidelines for the Pinecrest Creek / Westboro Study Area

Development Type		Runoff Volume Reduction	Water Quality	Water Quantity	
			TSS Removal	Flood Flow Management	Erosion Control
Commercial/Institutional and Industrial Developments - discharging directly to Ottawa River Parkway (ORP) pipe *					
5	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	On-site removal of 80% of TSS.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	Not applicable
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	On-site removal of 80% of TSS.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	Not applicable
Residential Development Requiring Site Plan Control Approval - discharging upstream of Ottawa River Parkway (ORP) pipe inlet					
6	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	Inherent TSS removal due to on-site retention of the 10 mm and detention of the 25 mm design storms.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	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.
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	Inherent TSS removal due to on-site retention in landscaped areas 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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	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.
Residential Development Requiring Site Plan Control Approval - discharging directly to Ottawa River Parkway (ORP) pipe					
7	a) sites with soil infiltration rates ≥ 1 mm/hour	Minimum on-site retention of the 10 mm design storm.	Inherent TSS removal due to on-site retention of the 10 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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	Not applicable
	b) site's soil infiltration rates < 1 mm/hour	If the entire property is underlain by native soils with infiltration rates less than 1 mm/hr, no infiltrating SWM measures may be used. A minimum depth of 300 mm of amended soil shall be provided below all front yard landscaped areas. A green roof and/or rain harvesting measures could be implemented to provide further runoff volume reduction.	Inherent TSS removal from on-site retention in landscaped areas.	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's Sewer Design Guideline (Section 8.3.7.3, revised Sept. 2008).	Not applicable

*Infiltration measures should not be used on sites or source areas where the land use or activity could generate higher concentrations of hydrocarbons, trace metals or toxicants than are found in typical stormwater runoff (e.g., vehicle refueling, handling areas for hazardous materials, etc.). This would include retail gasoline outlet sites due to the potential for spills. In addition, these measures should be sited so that they will not receive runoff from high traffic areas where large amounts of de-icing salts are used. The design of these systems shall be in accordance with the guidance in the Stormwater Management Planning and Design Manual (MOE, 2003) and the Low Impact Development Stormwater Management Planning and Design Guide (CVC & TRCA, 2010).

Note: For a mixed use property, if surface parking has been provided the site will be considered commercial. If surface parking has not been provided, the site will be considered residential for the purposes of applying the SWM criteria in this table.

3.3.5 Flood Control Requirements

Flood control criteria are specified based upon the catchment's receiving watercourse (Pinecrest Creek or the Ottawa River) or storm sewer (the Ottawa River Parkway (ORP) pipe or local storm sewer outlet). For example, there are no flood control requirements for discharge directly to the Ottawa River, whereas the limited capacity of the ORP pipe requires a higher level of control to avoid increasing flood risk. (Pinecrest Creek flows are conveyed by the ORP pipe from just south of Carling Avenue to the Ottawa River.)

Note: Flood control requirements are applied only to those developments requiring Site Plan Control**.**

3.3.5.1 Draining Directly to the Ottawa River:

Developments requiring Site Plan Control that are serviced by outfalls draining directly to the Ottawa River (shown in Figures 3.2 and 3.3) shall provide sufficient flood control storage to meet the most limiting downstream storm sewer capacity. Per the City's Sewer Design Guideline, the capacity of the downstream receiving system shall be assessed when connecting to an existing storm sewer. The allowable release rate to the existing system is to be confirmed with the City.

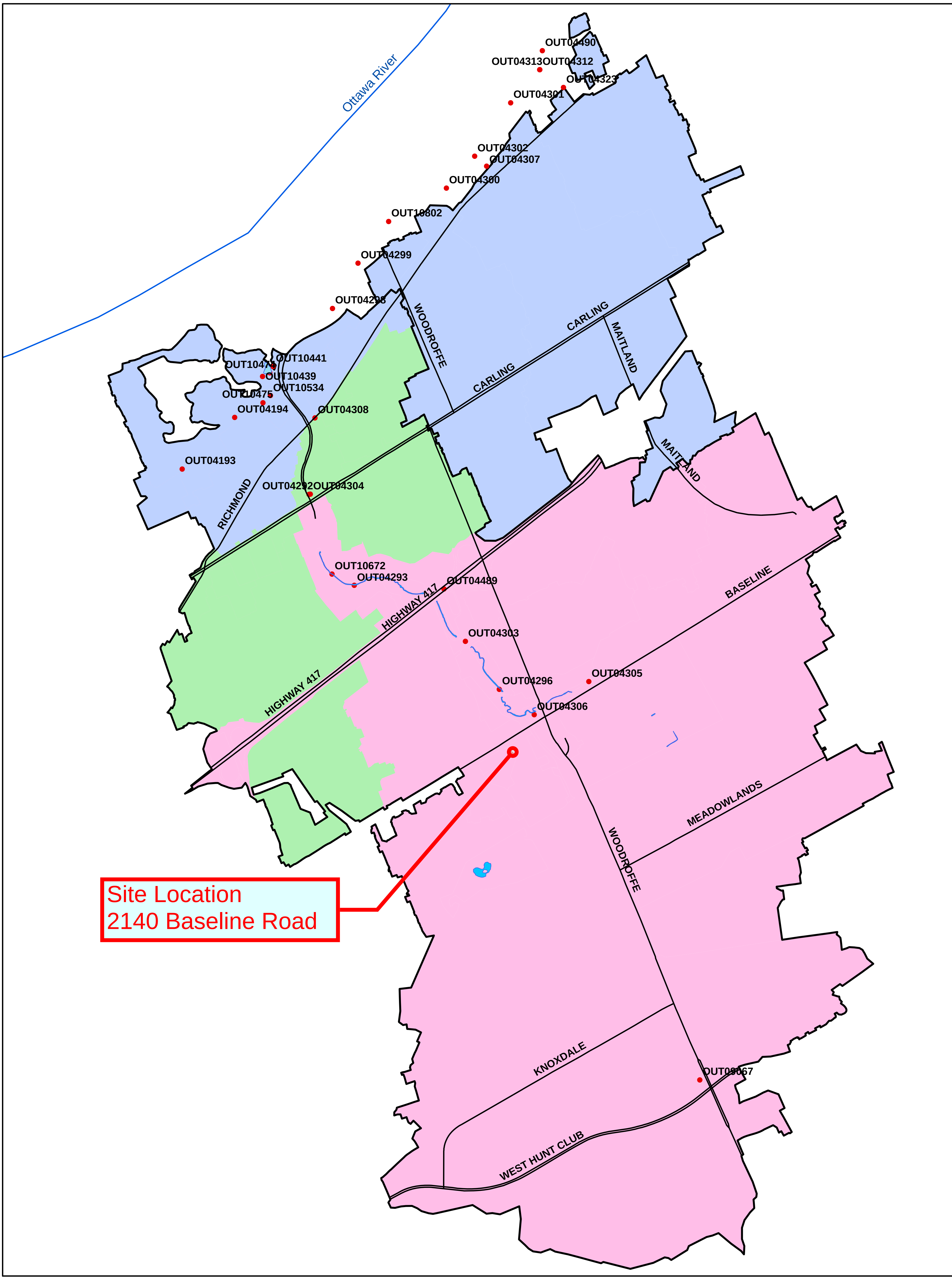
3.3.5.2 Draining to Pinecrest Creek:

Developments draining to Pinecrest Creek (either upstream of or directly into the ORP pipe) that require Site Plan Control shall provide sufficient flood control storage to address the most limiting downstream capacity (either the local sewer or the inlet to the ORP). The catchments that discharge to Pinecrest Creek upstream or directly into the ORP are identified in Figures 3.2 and 3.3.

To maintain existing peak flow and headwater conditions up to and including the 1:100 year storm at the inlet of the ORP pipe, all future development projects that require Site Plan Control approval shall control the 1:100-year discharge from the site to a maximum rate of 33.5 L/s/ha. This unit flow target has been set based on the hydrologic (SWMHYMO) modelling conducted for the Pinecrest Creek/Westboro Stormwater Management Retrofit Study (May 2011). From that modelling, the existing unit flow rate, at the ORP, for the critical design storm (24-hour 100-year SCS Type II) was found to be 33.5 L/s/ha.

Other flow restrictions, such as limiting storm sewer capacities, may also exist and should be identified by the proponent in consultation with the City.

The proponent shall, at the design stage, demonstrate that the proposed design can achieve the target release flow rates. For planning purposes, approximate on-site storage volumes to achieve the required control are provided below in Tables 3.2a and 3.2b. These approximate on-site storage volumes listed in Tables 3.2a and 3.2b were calculated using the SCS loss procedure and the Horton's Infiltration procedure, respectively. Designers should use the Horton's infiltration procedure for urban developments, unless otherwise directed by the City of Ottawa.



LEGEND:

- Ottawa Storm Sewer Outlets
- Arterial Roads
- OttawaRiver
- Areas Draining to the Ottawa River
- Areas Draining to the Ottawa River Parkway (ORP) Pipe
- Areas Draining to Pinecrest Creek

CLIENT: Ottawa

NOTES:

- The following background data were provided by the City of Ottawa

0 150 300 600 900 1,200 Meters

N

NOV 2011

REV. 1

BY: JFSA Water Resources and Environmental Consultants

PROJECT: SWM GUIDELINES FOR THE PINECREST CREEK/WESTBORO AREA

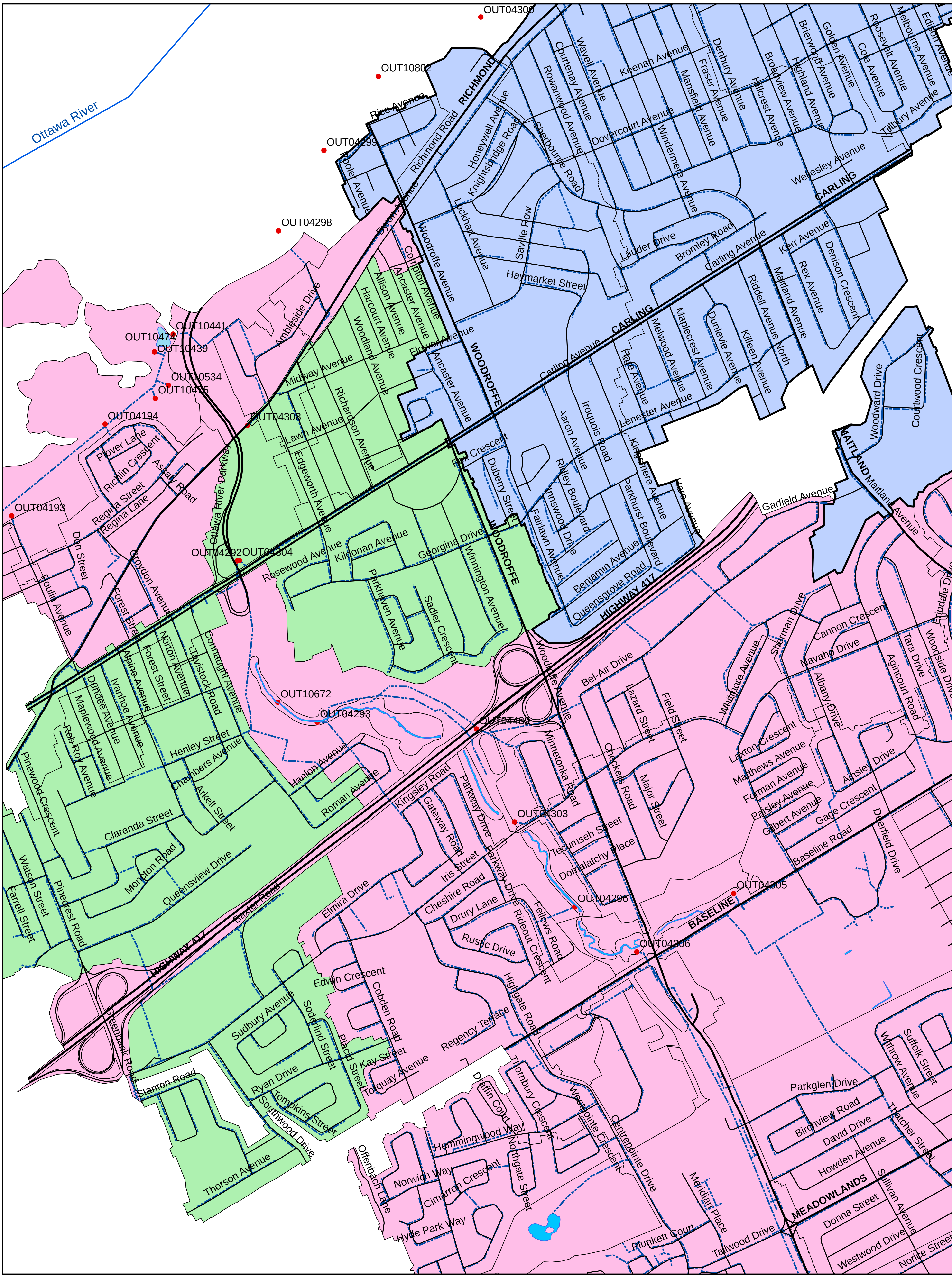
TITLE: Total Drainage Area and Divides for Pinecrest Creek, Ottawa River Parkway Pipe & the Ottawa River

PROJECT No. 741(02)

DESIGN	KM
GIS	KM
CHECK	JFS
REVIEW	JFS

FIGURE 3.2

MAP REF.: 741(02)\Design\Figures\DrainageAreas.mxd



LEGEND:	CLIENT: Ottawa	BY: JFSA Water Resources and Environmental Consultants
Ottawa Storm Sewer Outlets	NOTES:	PROJECT:
Storm Sewers	- The following background data were provided by the City of Ottawa	SWM GUIDELINES FOR THE PINECREST CREEK/WESTBORO AREA
Roads		TITLE:
Arterial Roads		Close-up of Drainage Divides for Pinecrest Creek, Ottawa River Parkway Pipe & the Ottawa River
OttawaRiver		
Areas Draining to the Ottawa River		
Areas Draining to the Ottawa River Parkway (ORP) Pipe		
Areas Draining to Pinecrest Creek or the Ottawa River		

N

0 75 150 300 450 600 Meters

JUNE 2012

REV. 0

PROJECT No. 741(02)		FIGURE 3.3
DESIGN	KM	
GIS	KM	
CHECK	JFS	MAP REF.: 741(02)\Design\Figures\DrainageAreas_Close-up.mxd
REVIEW	JFS	

Table 3.2a: Approximate On-Site Storage Volume Requirements (SCS)

To control flows to 33.5 L/s/ha

Imperviousness		
50%	75%	95%
310 m^3/ha	420 m^3/ha	530 m^3/ha

Parameters: Ximp = 40 %, 65 % & 95% respectively
CN = 74, CN* = 63.9
SLPP = 1.0 %, SLPPI = 0.75%
All other parameters as per the City of Ottawa Sewer Design Guidelines (2004).

Table 3.2b: Approximate On-Site Storage Volume Requirements (Horton's)

To control flows to 33.5 L/s/ha

Imperviousness		
50%	75%	95%
380 m^3/ha	455 m^3/ha	540 m^3/ha

Parameters: Same as for Table 3.2a except for infiltration parameters.
Horton's infiltration parameters (f_0, fc and DCAY and F)
as per the City of Ottawa Sewer Design Guidelines (2004).

Note that the volume provided on-site to meet other design criteria (i.e., runoff volume control and/or erosion control) can provide a portion of the volume required to attenuate the 100-year storm as well. The designer will need to provide detailed calculations showing how the different storage volumes and control structures (typically orifices or weirs) will interact so that the volume that is being accounted for will act as effective storage during the 100-year storm. Furthermore, the storage volumes accounted for must be provided by permanent structures that will not be removed or modified over time. Refer to Appendix D for examples of these types of calculations within the sample approaches.

3.3.6 Runoff Volume and Erosion Control Requirements

Runoff volume control requirements are specified for the purposes of erosion mitigation only for those catchments that drain to the open portion of Pinecrest Creek located upstream of the ORP pipe.

3.3.6.1 Draining to Pinecrest Creek Upstream of the ORP Pipe (Erosion Mitigation):

The following runoff volume control criteria were determined from hydrologic and hydraulic analyses completed during the preparation of the Pinecrest/Centrepointe Stormwater Management Criteria Study (February 2010) and further analyses completed for the Pinecrest Creek/Westboro Stormwater Management Retrofit Study (May 2011). Catchments draining to Pinecrest Creek upstream of the ORP pipe are shown on Figures 3.2 and 3.3.

1) To mitigate the cumulative impacts of infill and redevelopment and not aggravate existing erosion within the creek corridor, future developments that require Site Plan Control approval shall retain,

capture or infiltrate the first 10 mm of rainfall. This 10 mm target can be partially achieved by the default initial abstraction (IA) values applicable in urban areas. The City of Ottawa Sewer Design Guidelines allows a designer to account for a 4.67 mm IA on all soft landscaped surfaces and a 1.57 mm IA on all hardscaped surfaces. A wide range of measures may be used to achieve this criterion, many of which are described in Appendix C.

2) In addition to the above, future developments that require Site Plan Control approval shall control site runoff from the 25 mm 4-hour Chicago design storm to a maximum peak flow of 5.8 L/s/ha. This peak flow target is based on releasing 25 mm of runoff over a 24 hour time period, using a peaking factor of 2 (i.e. assuming that the peak outflow is equal to twice the average outflow). A wide range of measures can be considered to achieve this criterion, many of which are described in Appendix C.

Note that, as outlined in Table 3.1, all developments draining to Pinecrest Creek upstream of the ORP pipe shall control site runoff from the 25 mm 4-hour Chicago storm to a peak unit outflow rate of 5.8 L/s/ha regardless of whether or not the first 10 mm of runoff volume will be retained on-site. The required on-site storage volume, to control the runoff of the 25mm storm, will vary from site to site based on the amount of volume retained or infiltrated.

3.3.7 Quality Control

The water quality control requirements noted here are based on the receiving watercourse and MOE guidelines with some qualifications as described below.

The equivalent of an enhanced level of treatment (TSS removal of 80%) is required for water quality control on ICI sites. While this requirement could, in some cases, be accomplished by means of conventional measures (i.e., end-of-pipe facilities such as oil and grit separators), it is anticipated that SWM measures that can provide runoff volume control for the first 10mm of rainfall will also contribute to achieving an enhanced level of treatment. Although an accepted equivalency for enhanced treatment is not available for volume control measures as of yet, the water quality benefit of such measures is demonstrated by local rainfall statistics which indicate that rainfalls of 10 mm or less occur comprise on average 61% of all events (these data were derived by the City of Ottawa based on the percent rank of consecutive day rainfall events recorded at the Experimental Farm from 1890 through 2008). It is therefore considered that the capture and retention of the 10 mm storm will provide a water quality control benefit.

- Future developments that require Site Plan Control approval shall capture, retain or infiltrate the first 10 mm of rainfall. This 10 mm target can be partially achieved by the default initial abstraction (IA) values applicable in urban areas. The City of Ottawa Sewer Design Guidelines allows a designer to account for a 4.67 mm IA on all soft landscaped surfaces and a 1.57 mm IA on all hardscaped surfaces.
- ICI developments will require measures over and above the retention of the first 10mm to achieve an enhanced level of treatment.
- Residential developments that require Site Plan Control approval will not require measures over and above the retention of the first 10 mm.

3.4 SWM Requirements for the Pinecrest Creek and Westboro Area: Development Requiring a Building Permit Only

In recognition of the relatively small scale of these types of developments and the need for a simple but effective means of achieving the benefits of reducing runoff volume, the minimum requirement for these sites is:

- Provision of a minimum depth of 0.30 m of amended topsoil over all landscaped areas; and
- Direction/redirection of downspouts/roof drainage to landscaped areas to minimize runoff.

Amended Topsoil:
Amended topsoil refers to topsoil with an organic content of 8 to 15% by weight, or 30 to 40% by volume (CVC & TRCA, 2010). To be most effective with regard to providing the optimal amount of infiltration on-site, the front-yard lot grading should be limited to a maximum of 2%, if possible while still meeting the surrounding existing grades.

Downspout Redirection:
Downspout redirection is the diversion of flow from rooftops (or impervious surfaces) to pervious areas. This prevents the routing of stormwater to impervious surfaces which drain directly to storm sewer systems. In order for downspout redirection to produce a measurable benefit, it requires a minimum flow path length of 5 m across a pervious surface before flowing onto an impervious surface, or into a storm sewer system. Discharge locations for roof downspouts should be a distance of at least 3 m away from building foundations and should be directed towards a pervious surface. If a pervious surface is not directly available around the immediate perimeter of the building, the downspout can run underground and discharge as a 'pop-up' outlet at the nearest pervious surface.

Appendix D provides further details on this approach and a specification to be included with building permit applications.

The above approach represents the minimum requirement for sites requiring a building permit application only. However, there are also many other measures that could be used to minimize runoff volume including: permeable paver driveways; infiltration trenches, rainwater harvesting, green roofs, rain gardens, etc. These measures necessarily require more information (e.g., site infiltration testing) and in some cases, considerable design effort by qualified professionals. ***While the use of these measures is not required to meet the minimum requirement, a sample design approach (refer to Appendix D) has been provided to illustrate how such measures could be applied to small scale/single lot development.***

3.5 Sample Approaches

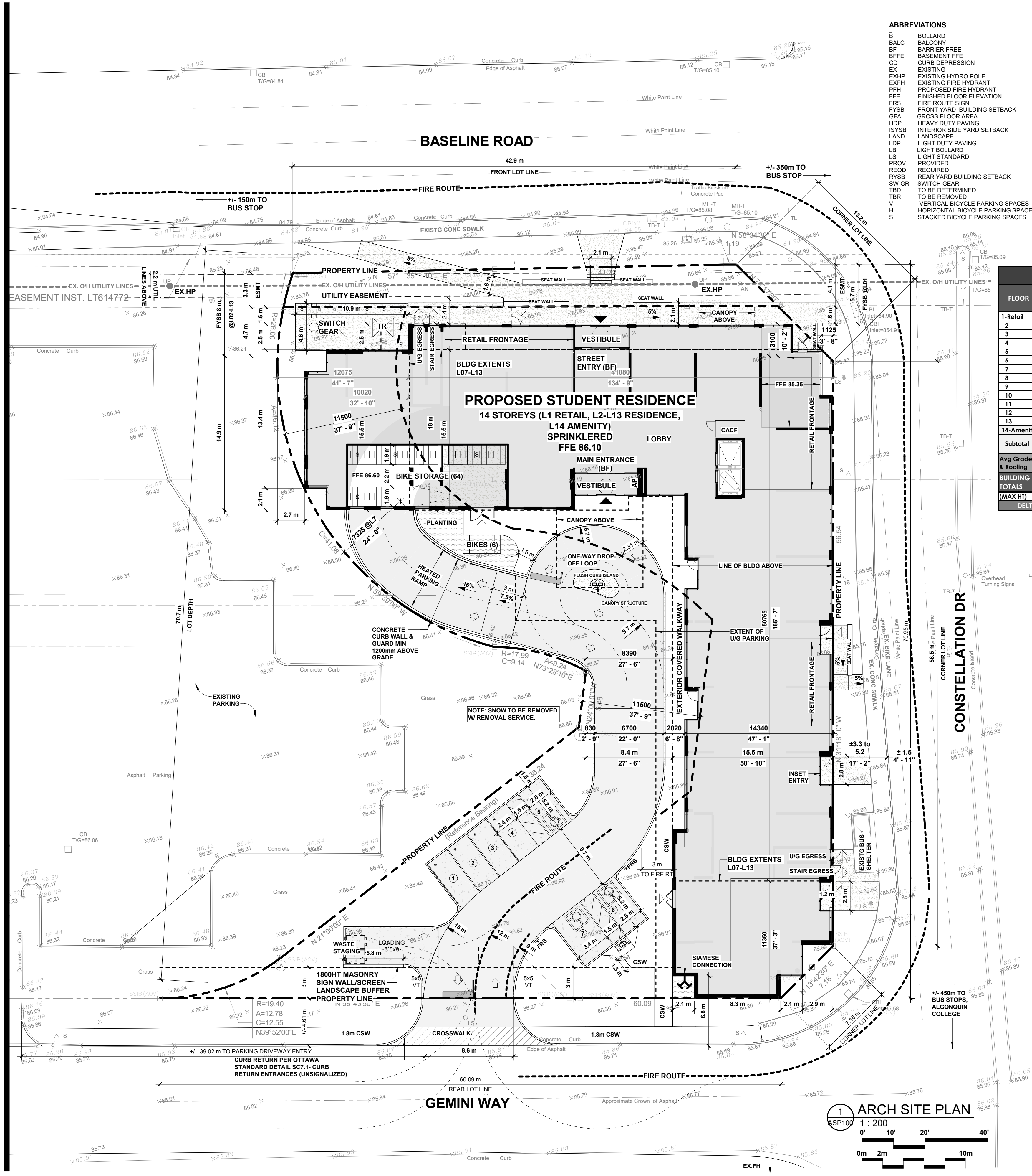
Appendix D contains sample design approaches that demonstrate how these criteria can be achieved for the following types of development:

i) Commercial;
ii) Residential (town homes requiring Site Plan Control approval);
iii) Residential (condominium requiring Site Plan Control approval); and
iv) Residential (single lot requiring building permit only).

Appendix I – Drawings

Project Drawings (All 11x17 Reduction, Scale: NTS)

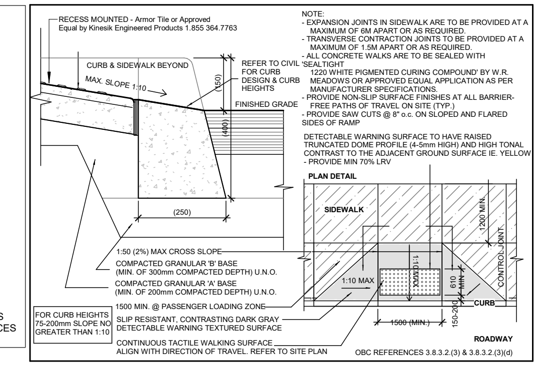
- **Site Plan. Drawing ASP100, Revision 2**
- **Topographic Survey, March 16, 2018**
- **Existing Conditions and Removals Plan, Drawing C0**
- **Site Servicing Plan, Drawing C1**
- **Grading Plan, Drawing C2**
- **Erosion & Sediment Control Plan, Drawing C3**



1 ARCH SITE PLAN
ASP100 1 : 200

ABBREVIATIONS

B	BOLLARD
BALC	BALCONY
BF	BARRIER FREE
BFFE	BASEMENT FFE
CD	CURB DEPRESSION
EX	EXISTING
EXHP	EXISTING HYDRO POLE
EXFH	EXISTING FIRE HYDRANT
PFH	PROPOSED FIRE HYDRANT
FFE	FINISHED FLOOR ELEVATION
FRS	FIRE ROUTE SIGN
FYSB	FRONT YARD BUILDING SETBACK
GFA	GROSS FLOOR AREA
HDP	HEAVY DUTY PAVING
ISYSB	INTERIOR SIDE YARD SETBACK
LAND.	LANDSCAPE
LDP	LIGHT DUTY PAVING
LB	LIGHT BOLLARD
LS	LIGHT STANDARD
PROV	PROVIDED
REQD	REQUIRED
RYSB	REAR YARD BUILDING SETBACK
SW GR	SWITCH GEAR
TBD	TO BE DETERMINED
TBR	TO BE REMOVED
V	VERTICAL BICYCLE PARKING SPACES
H	HORIZONTAL BICYCLE PARKING SPACES
S	STACKED BICYCLE PARKING SPACES



NOTE:
- EXPANSION JOINTS IN SIDEWALK ARE TO BE PROVIDED AT A MAXIMUM OF 6M APART OR AS REQUIRED.
- TRANSVERSE CONTRACTION JOINTS TO BE PROVIDED AT A MAXIMUM OF 1.5M APART OR AS REQUIRED.
- ALL CONCRETE WALKS ARE TO BE SEALED WITH 'SEALTIGHT 1220 WHITE PIGMENTED CURING COMPOUND' BY W.R. MEADOWS OR APPROVED EQUAL APPLICATION AS PER MANUFACTURER SPECIFICATIONS.
- PROVIDE NON-SLIP SURFACE FINISHES AT ALL BARRIER-FREE PATHS OF TRAVEL ON SITE (TYP.)
- PROVIDE SAW CUTS @ 8" o.c. ON SLOPED AND FLARED SIDES OF RAMP

DETECTABLE WARNING SURFACE TO HAVE RAISED TRUNCATED DOME PROFILE (4-5mm HIGH) AND HIGH TONAL CONTRAST TO THE ADJACENT GROUND SURFACE IE. YELLOW
- PROVIDE MIN 70% LRV

OBC REFERENCES 3.8.3.2.(3) & 3.8.3.2.(3)(d)

DRAWING LEGEND

- PROPERTY LINE
- FIRE ROUTE PATH
- SIAMESE CONNECTION
- LOCATION OF BLDG PRINCIPAL ENTRANCES FOR PUBLIC, FIRE FIGHTERS AND BF USE
- SERVICE EXITS / ENTRANCE POINTS
- OVERHEAD DOORS
- TRAFFIC FLOW
- PAINTED ISLAND - NO PARKING
- PARKING STALL COUNT PER ROW
- DESIGNATED ACCESSIBLE PARKING SPACE. REFER TO CITY STANDARD FOR PAINTED SYMBOL
- FREE-STANDING SIGN
- LIGHT STANDARD
- EX EXISTING ELEMENTS

CREDIT NOTES:

THIS SITE PLAN IS BASED UPON AND MUST BE READ IN CONJUNCTION WITH FILES TOPOGRAPHIC PLAN PREPARED BY FARLEY, SMITH & DENIS SURVEYING LTD. 2018 DATED MARCH 2nd, 2018. FABIANI ARCHITECT LTD. ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY, OR COMPLETENESS OF THE DATA SUPPLIED AND SUCH DATA IS NOT INCLUDED UNDER SEALS OF CERTIFICATION, IF ANY.

LEGAL LAND DESCRIPTION:

PART OF BLOCKS 41 AND 42 REGISTERED PLAN 4M-623 AND PART OF LOT 35
CONCESSION 2 (RIDEAU FRONT)
PIN:
04692-1308
04692-1310
04629-1317
04692-1312
04692-0454
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

SURVEYOR'S INFO:
FARLEY, SMITH & DENIS SURVEYING LTD. 2018
190 Colonnade Road Phone: (613) 727-8226
Ottawa, Ontario K2E 7J5 Fax: (613) 727-1826

APPROVED REFUSED

THIS ____ DAY OF ____________, 20____

____

DERRICK MOODIE
MANAGER, DEVELOPMENT REVIEW - WEST
PLANNING, INFRASTRUCTURE & ECONOMIC DEVELOPMENTDEPARTMENT, CITY OF OTTAWA

FLOOR STATISTICS- STUDENT RESIDENCE BLDG

FLOOR	HT (ft) FLR-FLR	HT (m) FLR-FLR	HT (ft) U/S SLAB	SUITES COUNTS	STUDIO 1 BD	DOUBLE 2	2 BD	TRIPLE 3	3 BD	QUAD 4	4 BD	FLOOR TOTALS RMS	BEDS	GFA (ft²/m²) (Zoning)		GFA (ft²/m²) (OBC)	
1-Retail	14' 9"	4.50	13' 11"	0	0	0		0		0		0	0	11,119	1033.0	16,285	1,512.9
2	9' 4"	2.85	8' 6"	14	0	6 (1 BF)		1(BF)		7 (1 BF)		43	43	12,645	1174.8	15,946	1,481.4
3	9' 4"	2.85	8' 6"	14	0	6 (1 BF)		1(BF)		7 (1 BF)		43	43	12,645	1174.8	15,946	1,481.4
4	9' 4"	2.85	8' 6"	14	0	6 (1 BF)		1(BF)		7 (1 BF)		43	43	12,645	1174.8	15,946	1,481.4
5	9' 4"	2.85	8' 6"	14	0	6 (1 BF)		1		7 (1 BF)		43	43	12,645	1174.8	15,946	1,481.4
6	9' 4"	2.85	8' 6"	14	0	6		1		7 (1 BF)		43	43	12,645	1174.8	15,946	1,481.4
7	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
8	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
9	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
10	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
11	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
12	9' 4"	2.85	8' 6"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
13	9' 10"	3.00	9' 0"	10	0	2		1		7 (1 BF)		35	35	9,739	904.8	12,738	1,183.4
14-Amenity	14' 9"	4.50	13' 11"	0	0	0		0		0		0	0	0	0.0	11,044	1,026.0
Subtotal	142' 3"	43.35	-	140	0	44		12		84		460	460	142,520	13,240.6	196,223	18,229.7
				RMS / BEDS	0	88	88	36	36	336	336	460	460				
Avg Grade & Roofing	1' 12"	0.60	-	SUITE AREA (ft²)	-	685		1195		1165		Avg Suite Area		GFA (ft²/m²) (Zoning)		GFA (ft²/m²) (OBC)	
				SUITE MIX %	0%	31%		9%		60%		1017 ft²					
BUILDING TOTALS	144' 2"	43.95		BARRIER FREE (BF) UNITS : MIN 15% @ 140 UNITS = 21 UNITS BF REQ'D PROPOSED: DOUBLE +3 TRIPLE +12 QUAD = 21 PROVIDED.										142,520	13,240.6	196,223	18,229.7
(MAX HT)	111' 7"	34.00															
DELTA	32' 8"	9.95															

NOT ISSUED FOR CONSTRUCTION

No.	BY	DESCRIPTION	DDMMMYY
2	ML	DRAFT FOR COORDINATION	12DEC18
1	ML	SITE PLAN APPROVAL	25MAY18

Revision / Issue Schedule

DEVELOPMENT STATISTICS - 2140 Baseline Rd, Ottawa

	SM	SF	ACRES	%
GROSS SITE AREA	3,049.3	32,822	0.753	-
BLDG FOOTPRINT	1,575.0	16,953	0.389	51.7%
1ST FLOOR- RETAIL, LOBBY, SERVICES	1033.0	11,119		
TYP. LOWER FLOOR	1174.8	12,645		
TYP. UPPER FLOOR	904.8	9,739		
AMENITY FLOOR (EXCLUDED)	0.0	0		
GROSS FLOOR AREA *(ZONING DEFINITION)*	13,240.6	142,521		

PARKING REQUIRED (By-law No. ___)

Table 101: MIN PARKING SPACE RATES - R22

ZONING REQUIREMENT (AREA B)	REQUIRED SPACES	PROVIDED SPACES	COMPLY
RETAIL (MIXED USE) (0 REQ'D <1500m²)	0	0	YES
STUDENT RES. - RATE PER DWELLING UNIT	*0.2*	*0.24*	YES
# OF PARKING SPACES	28	33	
VISITOR PARK'G (0(0-12)+0.1/UNIT (12-147)	14	14	YES
SURFACE PARKING	-	7	-
U/G PARKING		40	
TOTAL SPACES	42	47	*INCLUDES ACCESSIBLE SPACES
SURPLUS / DEFICIT	5	12%	YES
*ACCESSIBLE SPACES	**COUNTED AS PART OF TOTAL SPACES ABOVE*		
RATE = 2(1-30) +2(31-60) +2(61-100)+2(PER 30)	4	4	YES
SMALL CARS	MAX	PROVIDED	
SMALL CAR SPACES (2.4x4.6) 40% MAX	40%	11%	YES
	17	5	YES
BICYCLE PARKING - TABLE 111A			
1.0 PER DWELLING UNIT (TOTALS	140	148	YES
VERTICAL	-	30	-
HORIZONTAL		54	
STACKED		64	

ZONING INFORMATION - ZONING BY-LAW _
Official Plan _____

Permitted Use:		Yes		NO
MIXED USE		YES		
Part 10 - Mixed Use / Commercial Zones (Sections 185-198)		REQUIRED # / M² / M	PROVIDED M² / M	COMPLY
0.10	Lot Area	N/A	3049.3	YES
0.11	Floor Space Index	2.0	4.34	NO
0.12	Lot Frontage (Min)	N/A	53.8	YES
0.13	Lot Coverage (Max)(Combined)	N/A	52%	YES
0.14	Building Height (Max) - Sect 9	34m	43.95	NO
0.15	Bldg Height # of Storeys (Max)	N/A	14	YES
0.16	Front Yard Setback (Min)	N/A	3.3	YES
0.16a	Hydro Line Setback	5m	5m	YES
0.17	Side Yard Setback (Min)	N/A	0.0	YES
0.17a	Side Yard Setback (Highrise@L09)(min)	11.5m	8.4m	NO
0.18	Rear Yard Setback (Min)	N/A	0.0	YES
0.19	Lot Depth (Min)	-	70.7	YES
0.20	Landscaped Area Width (Min)	N/A	TBD	YES

DO NOT SCALE DRAWINGS. USE ONLY DRAWINGS MARKED "ISSUED FOR CONSTRUCTION". VERIFY CONFIGURATIONS & DIMENSIONS ON SITE BEFORE BEGINNING WORK. NOTIFY ARCHITECT IMMEDIATELY OF ANY ERRORS, OMISSIONS OR DISCREPANCIES.

DEVELOPMENT CONSULTANT:
1282 CORNWALL RD.
OAKVILLE, ONTARIO L6J 7W4
API ARCHITECTURE & PLANNING INITIATIVES

ARCHITECT:
1282 CORNWALL RD.
OAKVILLE, ONTARIO L6J 7W4
FABIANI ARCHITECT LTD

CLIENT:
Baseline Constellation Partnership Inc.

Theberge Homes
904 Lady Ellen Place
Ottawa, ON K1Z 5L5

Mastercraft Starwood
115 Champagne Avenue South
Ottawa, Ontario K1S 5V5 Canada

PROFESSIONAL CERTIFICATION

PROJECT
OTTAWA STUDENT RESIDENCE

2140 Baseline Rd, Nepean
(Ottawa) ON, K2G 6E2

DRAWING TITLE
SITE PLAN

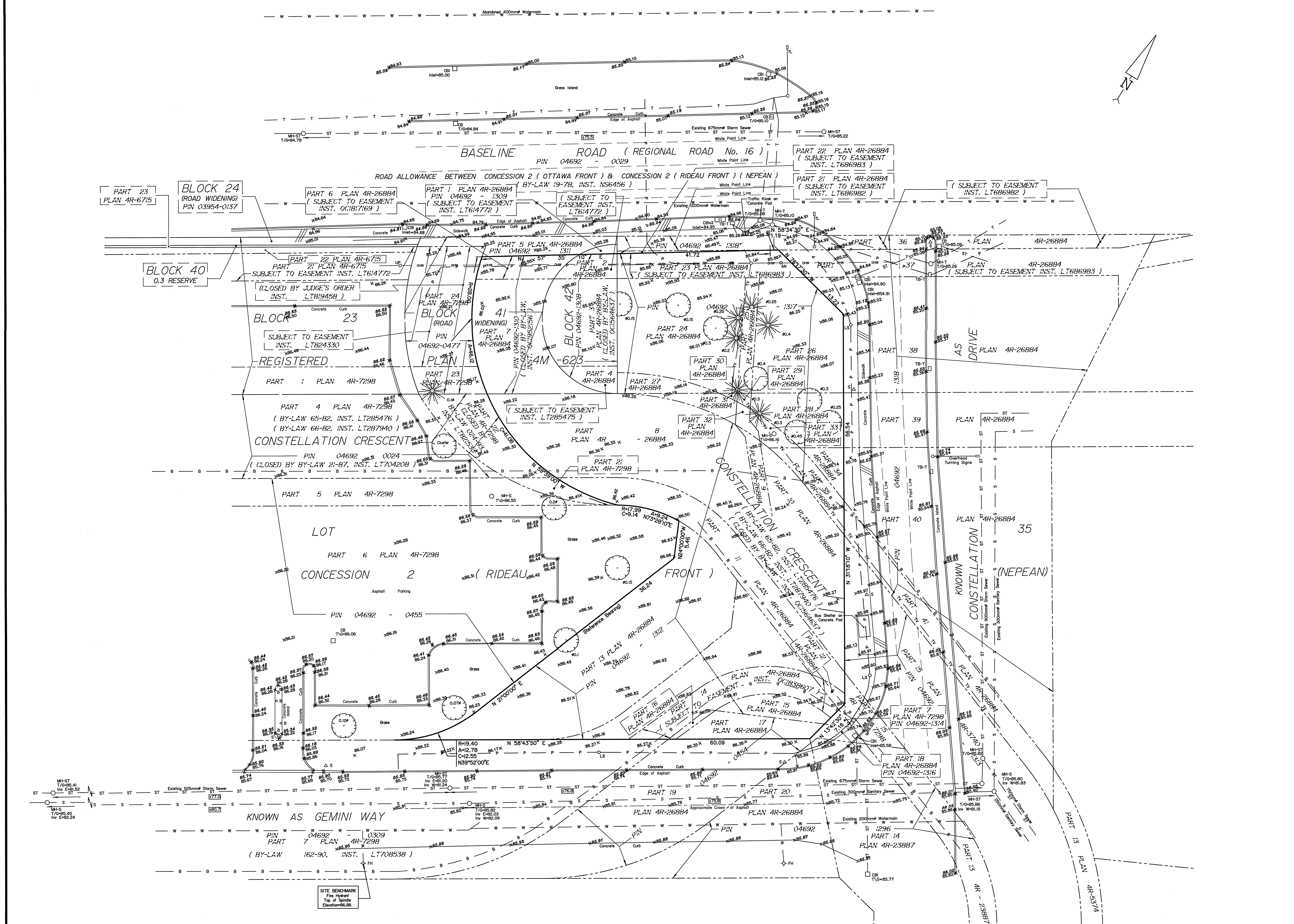
BY	CHECK	ISSUED FOR
ML	FF	DRAFT FOR COORDINATION

PROJECT NO.: 18-012
SHEET NO.: ASP100
SCALE: As indicated
ISSUE DATE: 12DEC18
2 SHEET REVISION
#17540

PLOT DATE: 2018-12-12 12:22:49 PM
DRAWING LOCATION: C:\Users\zkaranovic\Desktop\S18-012 OttawaSR rv19 ML 181212.rvt
D07-12-18-0084

362273.2, 5023570.5

March-16-18 9:37:45 AM



TOPOGRAPHIC PLAN OF

PART OF BLOCKS 41 and 42
REGISTERED PLAN 4M-623 and
PART OF LOT 35
CONCESSION 2 (RIDEAU FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

FARLEY, SMITH & DENIS SURVEYING LTD. 2018

Scale 1: 250

0 2.5 5 7.5 10 12.5 15 20 25 metres

Metric Note

Distances and coordinates on this plan are in metres and can be converted to feet by dividing by 0.3048.

Distance Note

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.99993.

Bearing Note

Bearings are MTM grid, are referred to the Westerly limit of Part 13 on plan 4R-26884 having a bearing of N 21° 00' 00" E, and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) Nad-83 (Original).

Elevation Notes

1. Elevations shown are geodetic and are referred to Geodetic Datum CGVD-1928 :1978.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

Utility Notes

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. Underground utility data derived from City of Ottawa utility sheet reference: *11151, 14868* (pp8, pp10 & pp11) *I-01-06, I-01-09, I-01-18 & I-01-20.*
4. Sanitary and storm sewer grades and inverts were compiled from: Field measurement and City of Ottawa plans.
5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

Notes & Legend

MH-ST	Denotes	Maintenance Hole (Storm)
MH-S	"	Maintenance Hole (Sanitary)
MH-T	"	Maintenance Hole (Traffic)
ST	"	Underground Storm Sewer
S	"	Underground Sanitary Sewer
W	"	Underground Water
B	"	Underground Bell
T	"	Underground Traffic
TV	"	Telecom Ottawa
P	"	Street Lighting
OHW	"	Overhead Wires
UP	"	Utility Pole
AN	"	Anchor
LS	"	Light Standard
CB	"	Catch Basin
CBI	"	Catch Basin Inlet
FH	"	Fire Hydrant
TB-T	"	Traffic Terminal Box
Inv.	"	Invert
T/G	"	Top of Grate
B	"	Bollard
TSL	"	Traffic Light
S	"	Sign
Ø	"	Diameter
C/L	"	Centreline
+ 65.00	"	Location of Elevations
+ *65.00*	"	Top of Concrete Curb Elevation
	"	Property Line
	"	Deciduous Tree
	"	Coniferous Tree

Boundary information compiled from field survey and Plan 4R-26884.

Field work completed on March 2nd, 2018.

March 16, 2018
Date

Jamie Leslie
Ontario Land Surveyor

TOPOGRAPHIC DATA WAS COLLECTED UNDER WINTER CONDITIONS. SNOW COVER AND ICE PRECLUDE DETERMINING LOCATION AND ELEVATION OF SOME TOPOGRAPHICAL DATA THAT IS OTHERWISE VISIBLE.

FILE No. : 59-18

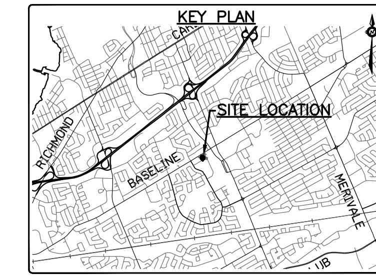
FARLEY, SMITH & DENIS SURVEYING LTD.

ONTARIO LAND SURVEYORS
CANADA LAND SURVEYORS

190 COLONNADE ROAD, OTTAWA, ONTARIO K2E 7J5
TEL. (613) 727-8226 FAX. (613) 727-1826

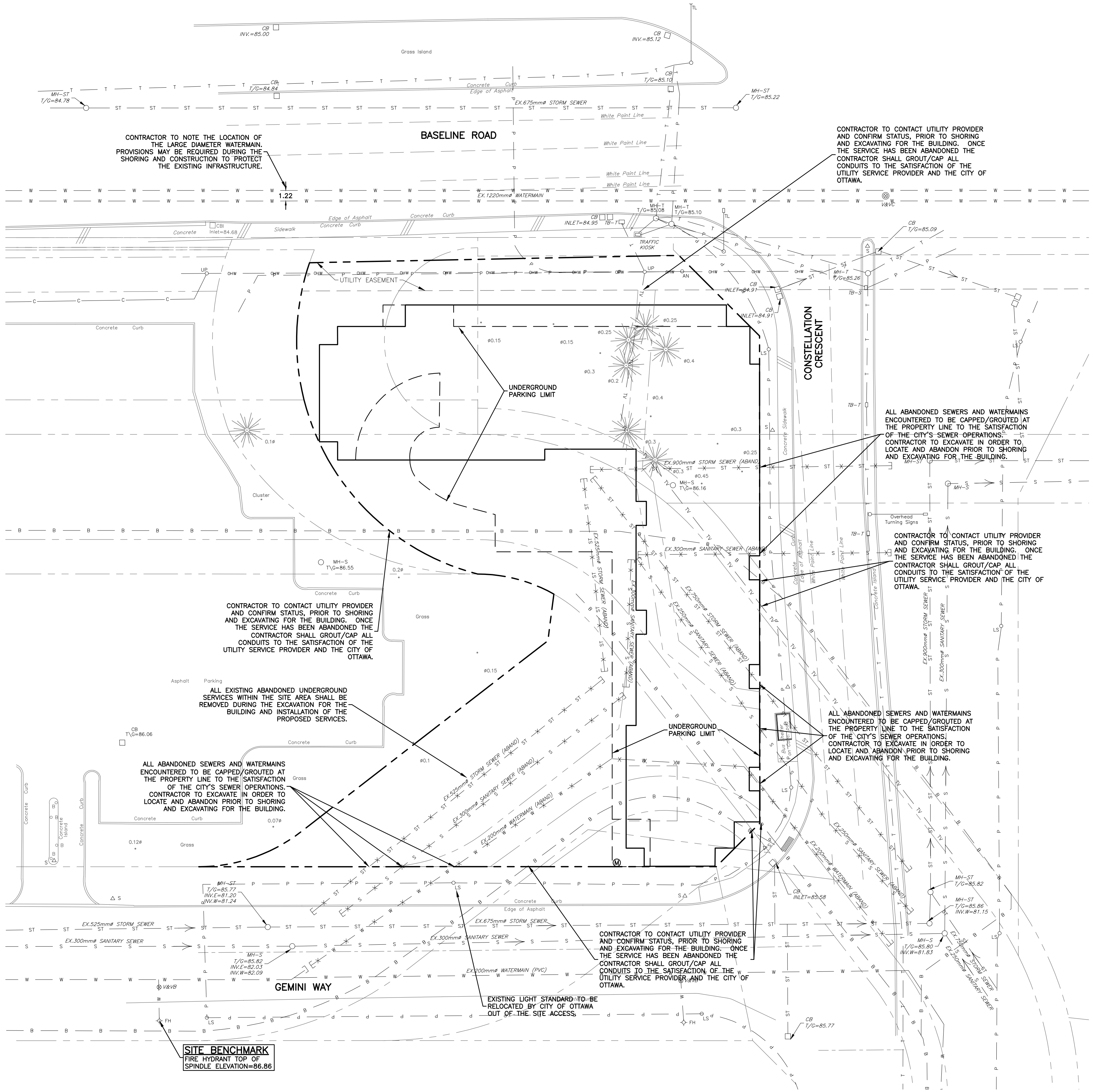
TOPO 24X36

I:\2018\59-18 2140 Baseline Rd, Constellation Dr Topo\Final\59-18 2140 Baseline Rd PtBl 41&42 RP4M-623 T F.dwg



EXISTING LEGEND

	SURVEY MONUMENT PLANTED
	SURVEY MONUMENT FOUND
OHW	OVERHEAD WIRES
UP	UTILITY POLE
LS	LIGHT STANDARD
CB	CATCH BASIN
T/G	TOP OF GRATE
GM	GAS METER
TB-T	TRAFFIC CONTROL BOX
GAS — GAS	GAS MAIN
C	COMMUNICATIONS
TV — TV — TV	TELEVISION
B — B — B	BELL TELEPHONE
P — P — P	POWER
T — MH-T — T	TRAFFIC AND MANHOLE
ST — MH-ST — ST	STORM SEWER AND MANHOLE
S — MH-S — S	SANITARY SEWER AND MANHOLE
W — V&VB — W	WATERMAIN AND VALVE AND VALVE BOX
FH	FIRE HYDRANT
ST	ABANDONED STORM SEWER
S	ABANDONED SANITARY SEWER
W	ABANDONED WATERMAIN
	EXISTING TREES/SHRUBS
B	BOLLARD
BF	BOARD FENCE
WRW	WOODEN RETAINING WALL
C/L	CENTRELINE



SITE BENCHMARK
FIRE HYDRANT TOP OF SPINDLE ELEVATION=86.86

NOTES:

1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE LOCATION AND STATUS OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF PLANT AND EQUIPMENT FROM DAMAGE UNTIL SUCH TIME AS THE SERVICE PROVIDER HAS CONFIRMED IN WRITING THE SERVICE IS ABANDONED AND CAN BE REMOVED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF EXISTING SERVICES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR SHALL CONFIRM LOCATIONS AND ELEVATIONS OF EXISTING SERVICES PRIOR TO SHORING AND EXCAVATING FOR THE BUILDING. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THESE DRAWINGS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS. DO NOT CONTINUE CONSTRUCTION IN AREAS WHERE DISCREPANCIES APPEAR UNTIL SUCH DISCREPANCIES HAVE BEEN RESOLVED.
3. FOR ADDITIONAL PROJECT NOTES REFER TO DRAWING C1.

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

REV	REVISION DESCRIPTION	DATE	BY	APPD
1	RE-ISSUED FOR SITE PLAN APPROVAL	18/12/18	SAB	BMT

SCALE: HORIZONTAL 1:250

CLIENT: BASELINE CONSTELLATION PARTNERSHIP INC.
THEBERGE HOMES, 904 LADY ELLEN PLACE, OTTAWA, ON. K1Z 5L5
MASTERCRAFT STARWOOD, 115 CHAMPAGNE AVE. SOUTH, OTTAWA, ON. K1S 5V5

exp Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7330
2650 Queensview Drive, Unit 100
Ottawa, ON K2B 8H6
Canada
www.exp.com
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BASEPLAN	DESIGN	CHECKED	CAD	PROJECT MANAGER	APPROVED
SAB	JLF	BMT	SAB	BMT	BMT

PROJECT: OTTAWA STUDENT RESIDENCE
2140 BASELINE ROAD
OTTAWA, ONTARIO.

TITLE: EXISTING CONDITIONS AND REMOVALS PLAN

PROJECT No.: OTT-00245012-A0
SURVEY: FSD
DATE: APRIL 2018
DRAWING No.: C0

D07-12-18-0084

#17709

GENERAL NOTES:

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), WHERE APPLICABLE.
2. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE LOCATION AND STATUS OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION OF PLANT AND EQUIPMENT FROM DAMAGE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF EXISTING SERVICES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR SHALL CONFIRM LOCATIONS AND ELEVATIONS OF EXISTING SERVICES AND STRUCTURES TO BE CONNECTED TO AND EXISTING SERVICES THAT MAY BE DAMAGED OR CAUSE CONFLICTS PRIOR TO CONSTRUCTION OF ANY NEW SEWER, WATER AND/OR STORM WATER WORKS. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THESE DRAWINGS MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS. DO NOT CONTINUE CONSTRUCTION IN AREAS WHERE DISCREPANCIES APPEAR UNTIL SUCH DISCREPANCIES HAVE BEEN RESOLVED.
4. ALL ELEVATIONS ARE GEODETIC AND UTILIZE METRIC UNITS. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED. ALL DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED WITH THE ENGINEER IN WRITING.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF THE SAME.
6. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS", THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION, BACKFILL AND REINSTATEMENT OF ALL AREAS DISTURBED DURING CONSTRUCTION TO THE SATISFACTION OF THE ENGINEER, THE CITY OF OTTAWA AND THE AUTHORITY HAVING JURSIDICTION.
8. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
9. THE CONTRACTOR SHALL COMPLY WITH THE CITY OF OTTAWA REQUIREMENTS FOR TRAFFIC CONTROL WHEN WORKING ON CITY STREETS. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
10. THE SUPPORT OF ALL UTILITIES SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION.
11. THERE WILL BE NO SUBSTITUTION OF MATERIALS UNLESS WRITTEN APPROVAL BY THE ENGINEER HAS BEEN OBTAINED.
12. EXCESS EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
13. THE SITE LAYOUT IS THE RESPONSIBILITY OF THE CONTRACTOR. AS-BUILT SITE SERVICING & GRADING DRAWINGS SHALL BE MAINTAINED ON SITE BY THE CONTRACTOR.
14. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW PAVEMENT.
15. FOR GEOTECHNICAL INFORMATION REFER TO GEOTECHNICAL INVESTIGATION REPORT PREPARED BY PATERSON GROUP, DATED JULY 18, 2017, REPORT NO. PG 4184-1.
16. THE CONTRACTOR SHALL APPRAISE HIS/HER SELF OF ALL SURFACE AND SUBSURFACE CONDITIONS TO BE ENCOUNTERED AND SHALL CARRY OUT THEIR OWN TEST PITS AS REQUIRED TO MAKE THEIR OWN INDEPENDENT ASSESSMENT OF GROUND CONDITIONS. THE CONTRACTOR SHALL NOT MAKE ANY CLAIM FOR ANY EXTRA COST DUE TO ANY SUCH GROUND CONDITIONS VARYING FROM THOSE ANTICIPATED BY THE CONTRACTOR.
17. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
18. FOR TOPOGRAPHICAL INFORMATION REFER TO PLAN PREPARED BY FARLEY, SMITH & DENIS SURVEYING LTD. DATED MARCH 16, 2018.
19. CIVIL DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, ELECTRICAL, STRUCTURAL, LANDSCAPE AND LEGAL DRAWINGS.

SANITARY SEWER NOTES:

1. ALL SANITARY SEWER MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. ALL SANITARY SEWERS SHALL BE PVC SDR 35, IPEX "RING-TITE" (OR EQUIVALENT), AS PER CSA STANDARD 8182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE NOTED.
3. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B BEDDING UNLESS OTHERWISE NOTED.
4. THE CONTRACTOR SHALL CONDUCT CCTV INSPECTION OF ALL NEWLY INSTALLED SANITARY SEWERS AND EXISTING SEWERS CONNECTED TO. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWERS INSTALLED.
5. THE CONTRACTOR SHALL CONSTRUCT FLEXIBLE SANITARY SEWERS IN ACCORDANCE WITH OPSD 802.010 AND 802.013. DURING CONSTRUCTION, THE CONTRACTOR SHALL PROTECT THE PIPES FROM HEAVY CONSTRUCTION EQUIPMENT. BEDDING AND BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% SPMDD.
6. ALL ABANDONED EXISTING SEWERS TO BE CAPPED AT THE PROPERTY LINE TO THE SATISFACTION OF THE CITY OF OTTAWA'S SEWER OPERATIONS.
7. ALL SANITARY BUILDING CONNECTIONS TO BE EQUIPPED WITH A SANITARY BACKWATER VALVE. REFER TO MECHANICAL DRAWINGS.
8. WITHIN THE FROST ZONE, THE BACKFILL IN THE SERVICE TRENCHES SHOULD MATCH THE SOIL ON SIDES TO MINIMIZE DIFFERENTIAL FROST HEAVING IN THE SUBGRADE.
9. ALL UNDERGROUND PARKING FLOOR DRAINAGE IS TO BE DIRECTED TO THE SANITARY SEWER AS PER THE CITY OF OTTAWA SEWER DESIGN GUIDE LINES, CLAUSE 6.1.10.

STORM SEWER NOTES:

1. ALL STORM SEWER MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
3. THE CONTRACTOR SHALL CONSTRUCT FLEXIBLE STORM SEWERS IN ACCORDANCE WITH OPSD 802.010 AND 802.013. DURING CONSTRUCTION THE CONTRACTOR SHALL PROTECT THE PIPES FROM HEAVY CONSTRUCTION EQUIPMENT. BEDDING AND BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% SPMDD.
4. SEWER BEDDING AS PER CITY STANDARD S6 & S7..
5. ALL ABANDONED EXISTING SEWERS TO BE CAPPED AT THE PROPERTY LINE TO THE SATISFACTION OF THE CITY OF OTTAWA'S SEWER OPERATIONS.
6. WITHIN THE FROST ZONE, THE BACKFILL IN THE SERVICE TRENCHES SHOULD MATCH THE SOIL ON SIDES TO MINIMIZE DIFFERENTIAL FROST HEAVING IN THE SUBGRADE.
7. ALL STORM SERVICES TO BE EQUIPPED WITH APPROVED BACKWATER VALVES. REFER TO MECHANICAL DRAWINGS.
8. THE CONTRACTOR SHALL CONDUCT CCTV INSPECTION OF ALL NEWLY INSTALLED STORM SEWERS AND EXISTING SEWERS CONNECTED TO. THE TEST SHALL BE PERFORMED IMMEDIATELY AFTER SEWERS INSTALLED.

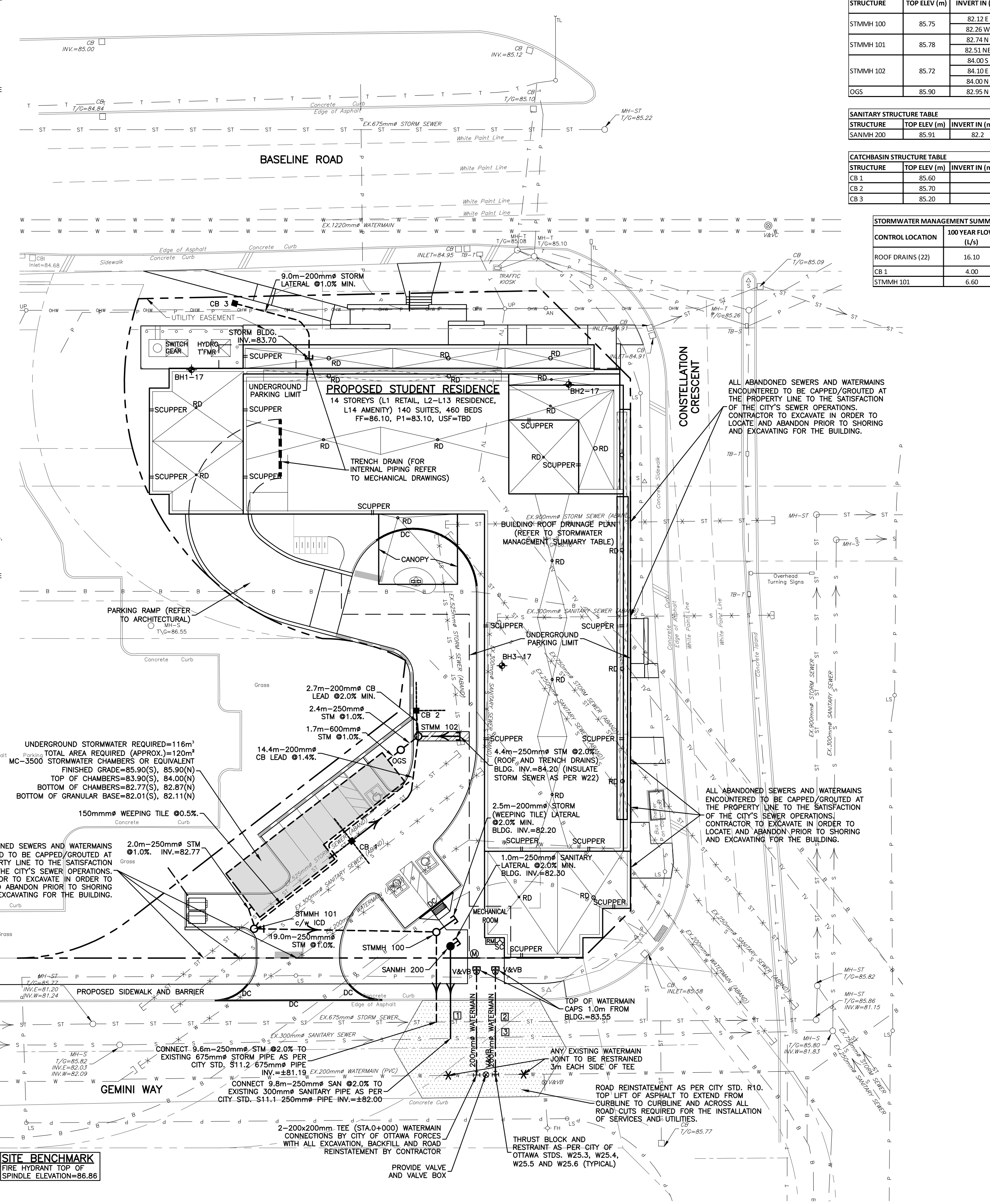
WATERMAIN NOTES:

1. ALL WATERMAIN MATERIALS AND INSTALLATION SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA, ONTARIO PROVICIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS).
2. NO WORK SHALL COMMENCE UNLESS A CITY WATER WORKS INSPECTOR IS ON SITE. WATERMAIN CONNECTIONS BY CITY OF OTTAWA FORCES WITH ALL EXCAVATION BACKFILL AND ROAD REINSTATEMENT BY CONTRACTOR.
3. WATERMAINS TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40 AND W42.
5. ALL WATERMAINS TO BE INSTALLED AT MINIMUM COVER OF 2.4m.
6. IF WATERMAIN MUST BE DEFLECTED TO MEET ALIGNMENT, ENSURE THAT THE AMOUNT OF DEFLECTION USED IS LESS THAN HALF THAT RECOMMENDED BY THE MANUFACTURER.
7. DISINFECTION AND TESTING OF WATERMAIN TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
8. WATER METER TO BE INSTALLED AS PER W32.
9. INSULATION FOR WATERMAIN CROSSING OVER AND BELOW SEWER SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2 AND W25, RESPECTIVELY, WHERE WATERMAN COVER IS LESS THAN 2.4m.

ROAD NOTES:

1. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. R10 AND OPSD 509.010, OPSS 310.
2. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
3. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR MAXIMUM DRY DENSITY.
4. PAVEMENT STRUCTURE:
   PARKING AREAS;
   - 50mm SUPERPAVE 12.5 ASPHALTIC CONCRETE
   - 150mm GRANULAR "A" CRUSHED LIMESTONE (OPSS 1010)
   - 300mm GRANULAR "B" TYPE II (OPSS 1010)

   PAVEMENT DESIGN TYPE;
   ACCESS LANES AND HEAVY DUTY AREA:
   - 40mm SUPERPAVE 12.5 ASPHALTIC CONCRETE
   - 50mm SUPERPAVE 19.0 ASPHALTIC CONCRETE
   - 150mm GRANULAR "A" CRUSHED LIMESTONE (OPSS 1010)
   - 450mm GRANULAR "B" TYPE II (OPSS 1010)



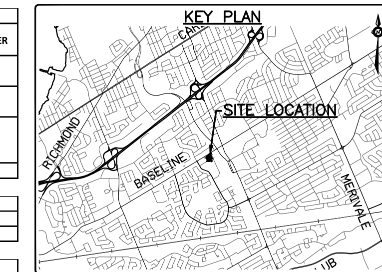
STORM STRUCTURE TABLE					
STRUCTURE	TOP ELEV (m)	INVERT IN (m)	INVERT OUT (m)	STRUCTURE TYPE	FRAME & COVER
STMMH 100	85.75	82.12 E		1200mmø, OPSD.701.010	S24.1
		82.26 W	82.06 S		
STMMH 101	85.78	82.74 N		1200mmø, OPSD.701.010	S24.1
		82.51 NE	82.45 S		
STMMH 102	85.72	84.00 S		1200mmø, OPSD.701.010	S24.1
		84.10 E			
		84.00 N	83.00SW		
OGS	85.90	82.95 N	82.92 E	STC 750 or Approved Equal	S24.1

SANITARY STRUCTURE TABLE					
STRUCTURE	TOP ELEV (m)	INVERT IN (m)	INVERT OUT (m)	STRUCTURE TYPE	FRAME & COVER
SANMH 200	85.91	82.2	82.26	1200mmø, OPSD.701.010	S24

CATCHBASIN STRUCTURE TABLE					
STRUCTURE	TOP ELEV (m)	INVERT IN (m)	INVERT OUT (m)	STRUCTURE TYPE	FRAME & COVER
CB 1	85.60		84.20	600x600, OPSD.705.010	S19.1
CB 2	85.70		84.30	600x600, OPSD.705.010	S19.1
CB 3	85.20		83.80	600x600, OPSD.705.010	S19

STORMWATER MANAGEMENT SUMMARY				
CONTROL LOCATION	100 YEAR FLOW (L/s)	100 YEAR STORAGE REQUIRED (m³)	MAX HEAD (m)	ICD MANUFACTURER
ROOF DRAINS (22)	16.10	37.40	0.15	1 WEIR PER DRAIN. ALL SET AT 50% OPEN
CB 1	4.00		0.25	
STMMH 101	6.60	116.00	1.13	IPEX TEMPEST LMF-85

KEY PLAN



EXISTING LEGEND

- SURVEY MONUMENT PLANTED
- SURVEY MONUMENT FOUND
- OHW — OVERHEAD WIRES
- UP — UTILITY POLE
- LS — LIGHT STANDARD
- CB — CATCH BASIN
- T/G — TOP OF GRATE
- GM — GAS METER
- TB-T — TRAFFIC CONTROL BOX
- GAS — GAS MAIN
- C — COMMUNICATIONS
- TV — TELEVISION
- B — BELL TELEPHONE
- P — POWER
- T, MH-T — TRAFFIC AND MANHOLE
- ST, MH-ST — STORM SEWER AND MANHOLE
- S, MH-S — SANITARY SEWER AND MANHOLE
- W, V&VB — WATERMAIN AND VALVE AND VALVE BOX
- FH — FIRE HYDRANT
- ST — ABANDONED STORM SEWER
- S — ABANDONED SANITARY SEWER
- W — ABANDONED WATERMAIN
- EXISTING TREES/SHRUBS
- B — BOLLARD
- BF — BOARD FENCE
- WRW — WOODEN RETAINING WALL
- C/L — CENTRELINE

PROPOSED LEGEND

- PROPERTY LINE
- 250mmø SAN — PROPOSED SANITARY SEWER
- 250mmø STM — PROPOSED STORM SEWER
- SANMH 200 — PROPOSED SANITARY MANHOLE
- STMMH 100 — PROPOSED STORM MANHOLE
- OGS — PROPOSED OIL GRIT SEPARATOR
- CB1 — PROPOSED CATCHBASIN c/w 150mmø SUBDRAIN (3.0m EACH DIRECTION)
- RD — PROPOSED ROOF DRAIN
- WATERMAIN — PROPOSED WATERMAIN
- V&VB — PROPOSED WATER VALVE & VALVE BOX
- M — PROPOSED WATER METER
- RM — PROPOSED REMOTE WATER METER
- SC — PROPOSED SIAMESE CONNECTION
- FF USF — FINISHED FLOOR ELEVATION UNDERSIDE OF FOOTING ELEVATION
- P1 — PARKING LEVEL 1
- T/G= — TOP OF GRATE
- ICD — INLET CONTROL DEVICE
- PROPOSED BUILDING ENTRY/EXIT
- BH1-17 — BOREHOLE LOCATION AND NUMBER

WATERMAIN TABLE				
STATION	DESCRIPTION	FINSIHED GRADE (m)	TOP OF WATERMAIN ELEVATION (m)	AS-BUILT ELEVATION (m)
0+00	2-200x200 TEE CONNECTION TO EXISTING C/W 200mm VALVE & VALVE BOX IN BETWEEN	85.73	83.33	
0+004	CROSSING SANITARY SEWER	85.74	83.34	
0+005.5	CROSSING STORM SEWER	85.74	83.34	
0+011	2- VALVE AND VALVE BOXES	85.95	83.55	
0+011.5	CAP	85.95	83.55	

WATERMAIN / SEWER CROSSING TABLE											
LOCATION	FINISHED GRADE	SANITARY SEWER			STORM SEWER			WATERMAIN			CLEARANCES, COMMENTS (mm)
		Invert Elev	Dia. (mm)	Obvert Elev	Invert Elev	Dia. (mm)	Obvert Elev	Invert Elev	Dia. (mm)	Obvert Elev	
1	85.73	82.02	250	82.28	81.18	ex. 675	81.86				160mm (Sanitary Above)
2	85.73				81.18	ex. 675	81.86	83.24	200	83.45	1380mm (Watermain Above)
3	89.43	81.93	ex. 300	82.24				83.24	200	83.45	1000mm (Watermain Above)

CAUTION
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REV	REVISION DESCRIPTION	DATE	BY	APPD
3	RE-ISSUED FOR SITE PLAN APPROVAL	18/12/18	SAB	BMT
2	ISSUED FOR SITE PLAN APPROVAL	24/05/18	SAB	BMT
1	ISSUED FOR CLIENT REVIEW	23/05/18	SAB	BMT

SCALE: 0 2m 4m 10m HORIZONTAL 1:250
NORTH
DESIGNED BY
REVIEWED BY

CLIENT: BASELINE CONSTELLATION PARTNERSHIP INC.
THEBERGE HOMES, 904 LADY ELLEN PLACE, OTTAWA, ON. K1Z 5L5
MASTERCRAFT STARWOOD, 115 CHAMPAGNE AVE. SOUTH, OTTAWA, ON. K1S 5V5

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BASEPLAN: SAB
DESIGN: JLF
CHECKED: BMT
CAD: SAB
PROJECT MANAGER: BMT
APPROVED: BMT

PROJECT: OTTAWA STUDENT RESIDENCE
2140 BASELINE ROAD
OTTAWA, ONTARIO.

TITLE: SITE SERVICING PLAN

PROJECT No.: OTT-00245012-A0
SURVEY: FSD
DATE: APRIL 2018
DRAWING No.: C1

D07-12-18-0084
#17709

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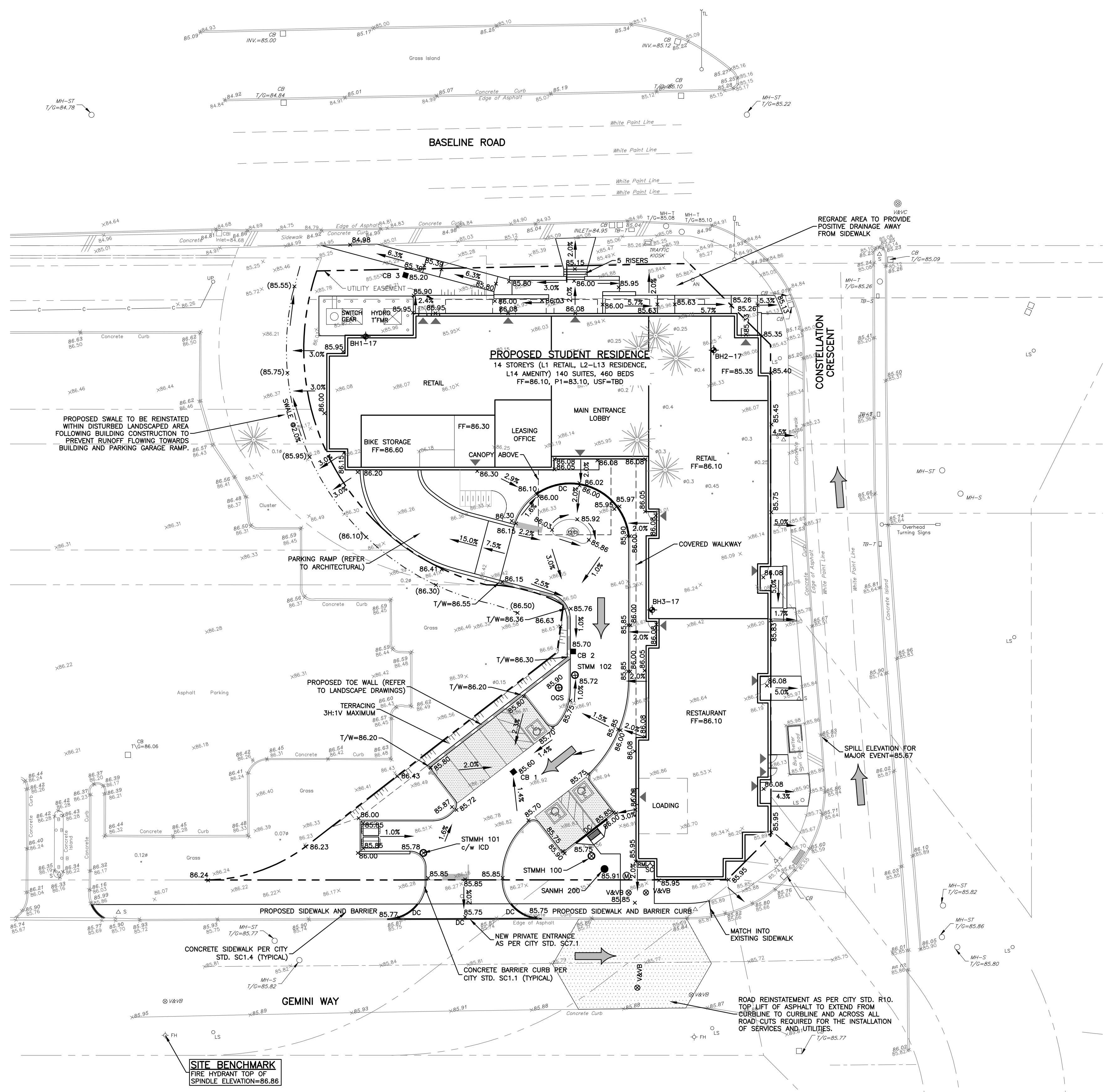
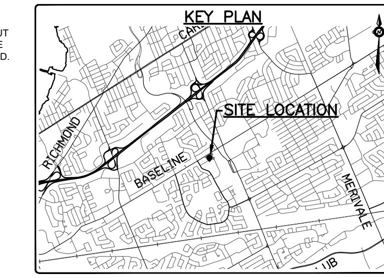


GENERAL NOTES FOR GRADING

1. ALL GROUND SURFACES SHALL BE EVENLY GRADED WITHOUT PONDING AREAS AND WITHOUT LOW POINTS EXCEPT WHERE APPROVED SWALE OR CATCH BASIN OUTLETS ARE PROVIDED.
2. GRADING IN GRASSED AREAS WILL BE BETWEEN 2% TO 7%. GRADES IN EXCESS OF 7% WILL REQUIRE A MAXIMUM 3:1 TERRACING.
3. SNOW IS NOT PERMITTED TO BE PLACED IN THE RIGHT-OF-WAY UNDER ANY SITUATION. SNOW TO BE REMOVED WITH HIRED SNOW REMOVAL SERVICE.

KEY PLAN



EXISTING LEGEND

	SURVEY MONUMENT PLANTED
	SURVEY MONUMENT FOUND
OHW	OVERHEAD WIRES
UP	UTILITY POLE
LS	LIGHT STANDARD
CB	CATCH BASIN
T/G	TOP OF GRATE
GM	GAS METER
TB-T	TRAFFIC CONTROL BOX
MH-T	TRAFFIC MANHOLE
MH-ST	STORM SEWER MANHOLE
MH-S	SANITARY SEWER MANHOLE
V&VB	WATER VALVE AND VALVE BOX
FH	FIRE HYDRANT
	EXISTING TREES/SHRUBS
B	BOLLARD
BF	BOARD FENCE
+65.00	LOCATION OF ELEVATIONS
+65.00	TOP OF CURB ELEVATION
WRW	WOODEN RETAINING WALL
C/L	CENTRELINE

PROPOSED LEGEND

	PROPERTY LINE
SANMH 200	PROPOSED SANITARY MANHOLE
STMMH 100	PROPOSED STORM MANHOLE
OGS	PROPOSED OIL GRIT SEPARATOR
CB1	PROPOSED CATCHBASIN
RD	PROPOSED ROOF DRAIN
V&VB	PROPOSED WATER VALVE & VALVE BOX
M	PROPOSED WATER METER
RM	PROPOSED REMOTE WATER METER
SC	PROPOSED SIAMESE CONNECTION
FF USF	FINISHED FLOOR ELEVATION UNDERSIDE OF FOOTING ELEVATION
P1	PARKING LEVEL 1
3.0%	PROPOSED SLOPE & DIRECTION OF FLOW
+ 86.66	PROPOSED GRADE
+ (86.36)	PROPOSED SWALE GRADE
	PROPOSED SWALE
T/W=	PROPOSED TOP OF WALL GRADE
T/G=	TOP OF GRATE
ICD	INLET CONTROL DEVICE
	OVERLAND FLOW ROUTE
	PROPOSED BUILDING ENTRY/EXIT
DC	DEPRESSED CURB/SIDEWALK
BH1-17	BOREHOLE LOCATION AND NUMBER

PAVEMENT STRUCTURES

LIGHT DUTY PAVEMENT STRUCTURE
50mm HL3 OR SUPERPAVE 12.5mm
150mm GRANULAR 'A'
300mm GRANULAR 'B' TYPE II

HEAVY DUTY PAVEMENT STRUCTURE
40mm HL3 OR SUPERPAVE 12.5mm
50mm HL8 OR SUPERPAVE 19.0mm
150mm GRANULAR 'A'
450mm GRANULAR 'B' TYPE II

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Pen Table: exp-64.ctb
References: xref-Keyplan.dwg; xref-TOPO-FSD.dwg; xref-ARCH.dwg; xref-GINO.dwg

CAUTION

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REV	REVISION DESCRIPTION	DATE	BY	APPD
4	RE-ISSUED FOR SITE PLAN APPROVAL	18/12/18	SAB	BMT
3	ISSUED FOR REVIEW	20/11/18	AO	BMT
2	ISSUED FOR SITE PLAN APPROVAL	24/05/18	SAB	BMT
1	ISSUED FOR CLIENT REVIEW	23/05/18	SAB	BMT

SCALE: 0 2m 4m 10m HORIZONTAL 1:250

NORTH

DESIGNED BY

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CLIENT
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BASEPLAN SAB
DESIGN JLF
CHECKED BMT
CAD SAB
PROJECT MANAGER BMT
APPROVED BMT

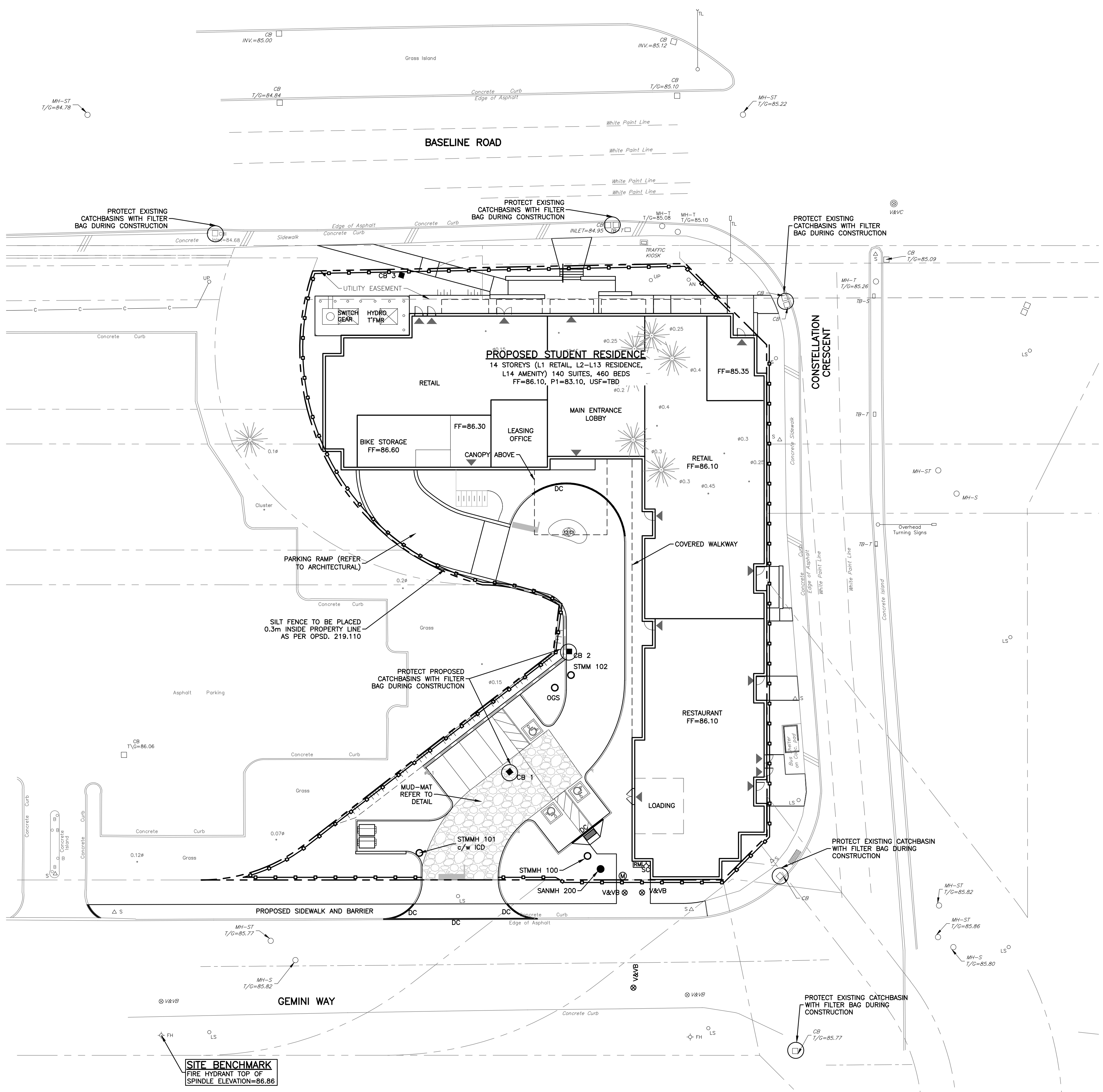
PROJECT
OTTAWA STUDENT RESIDENCE
2140 BASELINE ROAD
OTTAWA, ONTARIO.

TITLE
GRADING PLAN

PROJECT No. OTT-00245012-A0
SURVEY FSD
DATE APRIL 2018
DRAWING No. C2

D07-12-18-0084

#17709

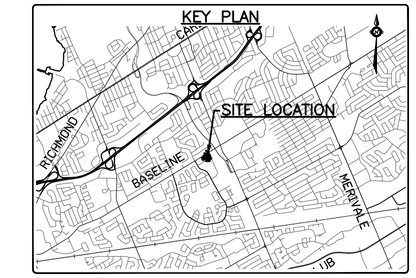


SITE BENCHMARK
FIRE HYDRANT TOP OF SPINDLE ELEVATION=86.86

EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION.

DURING ALL CONSTRUCTION ACTIVITIES, EROSION AND SEDIMENTATION SHALL BE CONTROLLED BY THE FOLLOWING TECHNIQUES:

1. LIMITING THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
2. REVEGETATION OF EXPOSED AREAS AS SOON AS POSSIBLE.
3. MINIMIZATION OF AREA TO BE CLEARED AND DISRUPTION TO ADJACENT AREAS.
4. INSTALLATION OF FILTER CLOTH BETWEEN FRAME AND COVER ON ALL PROPOSED CATCH BASINS AND CATCH BASIN MANHOLES.
5. A SILT FENCE TO BE INSTALLED 0.3m INSIDE THE SITE PROPERTY LINE TO LOCATIONS SHOWN ON THIS DRAWING.
6. A VISUAL INSPECTION SHALL BE COMPLETED DAILY ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY. CARE WILL BE TAKEN TO PREVENT DAMAGE DURING CONSTRUCTION OPERATIONS.
7. IN SOME CASES SOME BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS WILL BE REINSTATED AT NIGHT WHEN CONSTRUCTION IS COMPLETED.
8. THE SEDIMENT CONTROL DEVICES WILL BE CLEANED OF ACCUMULATED SILT AS REQUIRED. THE DEPOSITS WILL BE DISPOSED OF AS PER THE REQUIREMENTS OF THE CONTRACT.
9. DURING THE COURSE OF CONSTRUCTION IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR WILL INSTALL ADDITONAL SILT FENCES OR OTHER METHODS AS REQUIRED TO THE SATISFACTION OF THE ENGINEER.
10. CONSTRUCTION AND MAINTENANCE REQUIRMENTS FOR EROSION AND SEDIMENT CONTROLS TO COMPLY WITH ONTARIO PROVINCIAL STANDARD SPECIFICATION (OPSS) OPSS 805, AND CITY OF OTTAWA SPECIFICATIONS.
11. SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.

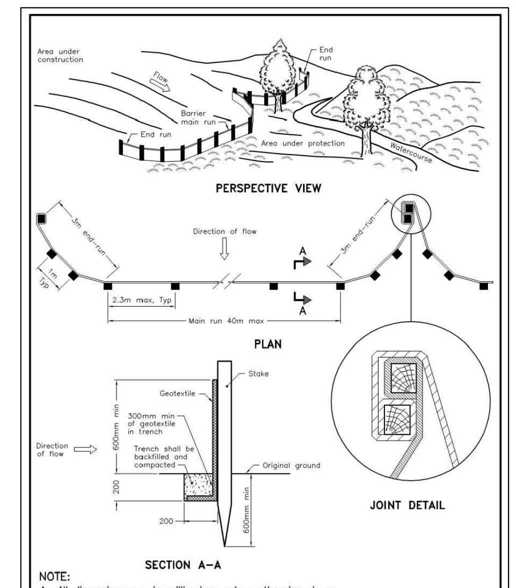


LEGEND

PROPERTY LINE

SILT FENCE

FOR FULL LEGEND REFER TO DRAWINGS C1 AND C2

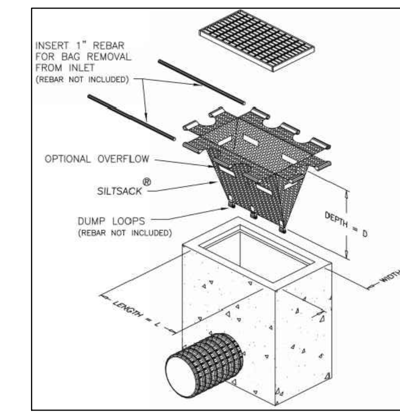


NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT-DUTY SILT FENCE BARRIER	OPSD 219.110	

NOTES:

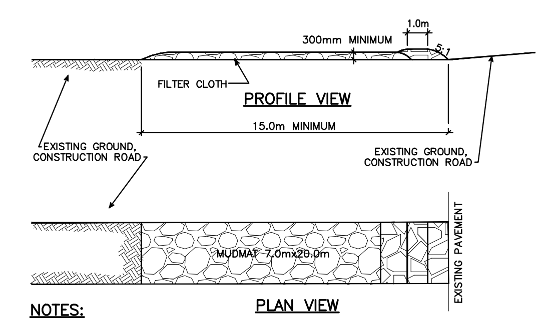
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO WOOD POSTS WITH WIRE TIES OR STAPLES.
2. POSTS TO BE SPACED AT 2.3 METRES CENTRE TO CENTRE.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY A MINIMUM OF 500mm.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. WOOD POSTS TO BE HARDWOOD TYPE (50mm x 50mm).
6. GEOTEXTILE TO BE EMBEDDED 200mm INTO GROUND.
7. GEOTEXTILE TO CONFORM TO OPSS 805 STANDARDS.
8. SILT FENCE MUST BE INSTALLED BEFORE COMMENCEMENT OF CONSTRUCTION AND IN ACCORDANCE WITH DETAIL. SILT FENCE CAN BE REMOVED AFTER LANDSCAPING IS COMPLETE.
9. SEDIMENTS MUST BE CLEARED AWAY WHEN THEY REACH HALF THE HEIGHT OF THE FENCE.



PROVIDE FILTER BAGS AS SHOWN (GEO-SYNTHETICS MANUFACTURER OR APPROVED EQUIVALENT)

FILTER BAG DETAIL

N.T.S



NOTES:

1. STONE – USE CLEAR CRUSHED 100mm STONE.
2. LENGTH – AS REQUIRED BUT NOT LESS THAN 15.0m.
3. THICKNESS – NOT LESS THAN 300mm.
4. WIDTH – 7.0m MINIMUM, NOT LESS THAN THE WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING STONE.
6. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRED PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED OR TRACKED ONTO THE PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

MUD MAT DETAIL

N.T.S

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1	RE-ISSUED FOR SITE PLAN APPROVAL	18/12/18	SAB	BMT

SCALE: 0 2m 4m 10m HORIZONTAL 1:250

NORTH

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CLIENT: BASELINE CONSTELLATION PARTNERSHIP INC. THEBERGE HOMES, 904 LADY ELLEN PLACE, OTTAWA, ON. K1Z 5L5 MASTERCRAFT STARWOOD, 115 CHAMPAGNE AVE. SOUTH, OTTAWA, ON. K1S 5V5	BASEPLAN SAB DESIGN JLF CHECKED BMT	PROJECT: OTTAWA STUDENT RESIDENCE 2140 BASELINE ROAD OTTAWA, ONTARIO.	PROJECT No. OTT-00245012-A0 SURVEY FSD DATE APRIL 2018
exp Services Inc. t: +1.613.688.1899 | f: +1.613.225.7330 2650 Queensview Drive, Unit 100 Ottawa, ON K2B 8H6 Canada www.exp.com • BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •	CAD SAB PROJECT MANAGER BMT APPROVED BMT	TITLE: EROSION AND SEDIMENT CONTROL PLAN	DRAWING No. C3

D07-12-18-0084

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