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SERVICING AND STORMWATER MANAGEMENT REPORT

257 McARTHUR AVENUE
OTTAWA, ONTARIO

Prepared For:
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PROJECT #: 180140

DISTRIBUTION
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180140 – DETAILS – Site Servicing Details

1 INTRODUCTION

Kollaard Associates was retained by Bergeron Construction to complete a Site Servicing and Stormwater Management Report for a new multi use development in Ottawa, Ontario.

This report will address the serviceability of the proposed site, specifically relating to the adequacy of the existing sanitary sewer, storm sewer, and watermains to hydraulically convey the necessary storm runoff, sanitary sewage and water demands that will be placed on the existing system. The report shall also summarize the stormwater management (SWM) design requirements and proposed works that will address stormwater flows arising from the site under post-development conditions and will identify any stormwater servicing concerns and also describe any measures to be taken during construction to minimize erosion and sedimentation.

The proposed development is located at 257 McArthur Avenue. The property is on the north side of McArthur Avenue between Olmstead Street and Lacasse Avenue.

The site has a total area of 0.07 hectares and is currently occupied by a vacant 3 -storey commercial building and detached garage. It is understood that the existing buildings will be removed and a new multi-use building with a 247 square meter footprint will be constructed. The proposed development is to consist of a 2 -storey building with associated surface parking and street access.

2 STORMWATER DESIGN

2.1 Stormwater Management Design Criteria

Design of the storm sewer system was completed in conformance with the City of Ottawa Sewer Design Guidelines (October 2012 as amended). In accordance with the SWM design criteria provided by the City (see attached email from the City) 100 year post development flow from the proposed development will be restricted to 5 year pre-development flow assuming a maximum pre-development runoff coefficient of C = 0.5.

A majority of the rain water from the existing property currently drains via overland flows from the north of the property to the south. Water drains from the entranceways south to McArthur Avenue.

2.1.1 Minor System Design Criteria

The storm sewers have been designed and sized based on the rational formula and the Manning's Equation under free flow conditions for the 5-year storm using a 10-minute inlet time.

The release rate from the proposed on-site detention will be further restricted by the use of a Tempest flow regulator such that the total potential flows during a 100 year event do not exceed the 5 year pre-development conditions.

2.1.2 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, exiting the driveway and ultimately flowing into the roadside catch basins along McArthur Avenue.

On site storage is provided and calculated for up to the 100-year design storm. Storage is provided at the rear (north) of the building on the parking area surface. Calculations of the required on-site storage volumes have been provided in Appendix A.

Calculations of the required storage volumes have been prepared based on the Rational Method as identified in Section 8.3.10.3 of the City's Sewer Guidelines. The depth and extent of surface storage will be illustrated on the site servicing and grading plan.

2.2 Stormwater Quantity Control

2.2.1 Methodology

Peak Flow for runoff quantities for the Pre-Development and Post-Development stages of the project were calculated using the rational method. The rational method is a common and straightforward calculation, which assumes that the entire drainage area is subject to uniformly distributed rainfall. The formula is:

$$Q = \frac{CiA}{360}$$

Where
Q is the Peak runoff measured in ***m³/s***
C is the Runoff Coefficient, **Dimensionless**
A is the runoff area in ***hectares***
i is the storm intensity measure in ***mm/hr***

All values for intensity, i, for this project were derived from IDF curves provided by the City of Ottawa for data collected at the Ottawa International airport. For this project two return periods were considered, 5 and 100-year events. The formulas for each are:

5-Year Event

$$i = \frac{998.071}{(t_c + 6.053)^{0.814}}$$

100-Year Event

$$i = \frac{1735.688}{(t_c + 6.014)^{0.82}}$$

where t_c is time of concentration

2.2.2 Runoff Coefficients

Runoff coefficients for impervious surfaces (roofs, asphalt, and concrete) were taken as 0.90, gravel areas were taken as 0.60, patio stones were taken as 0.7 and pervious surfaces (grass) were taken as 0.20.

A 25% increase for the post development 100-year runoff coefficients was used as per City of Ottawa guidelines. Refer to Appendix A for pre-development and post development runoff coefficients.

2.2.3 Time of Concentration

In keeping with the City of Ottawa Storm Sewer Guidelines, a minimum time of concentration of 10 minutes is to be used for urban development. As such a time of concentration of 10 minutes was used for both pre- and post-development conditions.

2.2.4 Pre-development Site Conditions

As previously indicated, the site is located at 257 McArthur Avenue. The property has a total area of about 0.07 hectares and is currently occupied by a vacant 3 -storey commercial building and detached garage. A chain link fence is present on the adjacent property at 235 McArthur Avenue. Based on the topographic survey, the land slopes downward from the bottom of the fence to 257 McArthur Avenue. For calculation purposes a total area of 0.08 hectares was used to account for runoff from the adjacent property between the chain link fence and the property line.

The existing commercial building has a foot print of about 80 square metres (0.008 hectares). The detached garage has a footprint of about 60 square metres (0.006 hectares). The buildings are currently serviced by an asphalt surfaced parking area of 0.046 hectares. Drawing 180140-PRE shows the pre-development conditions and pre-development areas determined to be directing runoff to McArthur Avenue.

2.2.5 Pre-development Runoff Coefficient

Pre-development site condition are summarised for the site in the following Table 2-1.

Table 2-1 – Summary of Pre-Development Site Conditions

PRE-DEVELOPMENT

Description	Runoff Coefficient 5-year	Area (ha)
		0.080
Roof/ Concrete/ Asphalt	0.90	0.060
Grass	0.20	0.012
Gravel	0.60	0.008
Weighted Average C	0.76	

It is understood that pre-development conditions will be considered as the lesser of current conditions or conditions resulting in a runoff coefficient of 0.5.

Based on the existing ground cover the pre-development runoff coefficient was calculated to be 0.76. However, the predevelopment runoff coefficient used for the purpose of this stormwater management design was C = 0.5.

2.2.6 Pre-development Flow Rate

Using the Rational Method with a time of concentration of 10 minutes, the previously calculated runoff coefficients and a storm intensity of 104.19 mm/hr, The pre-development runoff rate for the 5-year storm is:

5 year = 2.78 x 0.5 x 104.19 x 0.08= 11.6 L/s

2.2.7 Post-Development Controlled and Uncontrolled Areas

The land between the chain link fence and the property line was still included in the post development calculations as the runoff would flow into the catchment areas of the property.

For the purposes of this storm water management design, the site has been divided into uncontrolled and controlled areas as outlined on drawing 170598-POST. The site has one controlled area which includes the proposed building and parking area and is labeled as CA1. Stormwater storage will be provided in CA1.

Run-off from all of the roof drains will be directed without restriction to the catch basins (CB-MH3 and CB4) in the parking area at the rear of the building.

The uncontrolled area includes the driveways to the west and east of the building as well as the front of the building. The following table provides a summary of the post development conditions.

Table 2-2 – Summary of Post-Development Site Conditions

POST-DEVELOPMENT

Description	Runoff Coefficient	Area (ha)
	5-year	
		0.080
Controlled	0.83	0.060
Uncontrolled	0.72	0.020
Weighted Average C	0.80	

2.2.8 Uncontrolled Runoff

Flow from the uncontrolled area will be directed without restriction towards McArthur Street. The maximum allowable release rate from the controlled area equals the allowable post development runoff rate minus the 100-year runoff rate from the uncontrolled portion of the site.

A post-development time of concentration of 10 minutes corresponds to a storm intensity of 104.19 mm/hr and 178.56 mm/hr on the 5-year and 100-year storm IDF curves respectively. The runoff rate from the uncontrolled areas was therefore calculated using the Rational Method.

$$Q = \frac{CiA}{360}$$

The uncontrolled runoff for the 100 year design storm event is as follows (calculations are provided in Appendix A):

The runoff rate from the uncontrolled areas was therefore calculated to be 3.6L/s and 7.7 L/s for the 5 year and 100 year storm events, respectively.

2.2.9 Allowable Release Rate

The City of Ottawa requires that storm runoff be released in a controlled manner. To control runoff from the site it will be necessary to limit post-development flows for all storm return periods up to the 100-year event using onsite inlet controls. The allowable release rate was determined based on 5 Year predevelopment flows, as per the design criteria provided by the City of Ottawa. Calculations are summarized in Appendix A.

The remaining allowable release rate from the controlled areas of the site is equal to the total allowable release rate from the site less the uncontrolled runoff.

$\mathbf{Q_{controlled} = Q_{total\ allowable} - Q_{uncontrolled}}$

For the 5-year Storm event
$\mathbf{Q_{controlled}}$ = 11.6 – 3.6L/s = 8 L/s

For the 100-year Storm event
$\mathbf{Q_{controlled}}$ = 11.6 – 7.7/s = 3.9 L/s

The allowable controlled area release rate for the site is summarized in Appendix A.

The allowable release rate is 3.9 L/s for a 100 year storm event.

2.2.10 Post Development Restricted Flow and Storage

In order to meet the stormwater quantity control restriction, the post development runoff rate cannot exceed the 5 year predevelopment runoff rate. Runoff generated on site in excess of the allowable release rate will be temporarily stored on the parking area surface and is to be released at a controlled rate following the storm event.

In order to achieve the allowable controlled area storm water release rate, storm water runoff will be controlled by an inlet control device (ICD) that is to be installed in STm-MH3. The ICD will be designed to achieve a maximum allowable release rate of 3 L/s for the 100 year rainfall event. Total storage volume required to restrict flows to 3 L/s is 21.9 m^3 for the 100 year rainfall event.

The storage depth on the parking surface during a 100 year storm event will be about 0.23metres. The storage depth on the parking surface during a 5 year storm event will be about 0.16 metres.

The ICD will limit the flow into the municipal system and back up any excess into underground pipes. The ICD will continue to release water after the storm event has passed until levels are lowered to pre event conditions. A Tempest Low, Medium Flow (LMF) ICD or approved alternative will be used. The Tempest LMF ICD should be ordered to correspond with pre-set flow curve , as shown in the selection chart in Appendix B. The following parameters should be noted when ordering:

- Tempest LMF
- Outlet pipe specification: 200mm diameter PVC SDR35
- Discharge: 3 L/s
- Upstream Head: 1.75m
- Catchbasin Dimensions: 1200 mm diameter
- 300 mm sump

The following tables present a summary of the controlled and uncontrolled runoff and the required storage resulting from the restriction in flow rate.

Table 2-3 – Summary of Runoff Rates and Storage

Return period	Total Allowable Runoff Rate	Uncontrolled Area Runoff	Allowable Controlled Area Release	Actual Controlled Area Release rate	Ponding Level	Required Storage	Available Storage
(years)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(m^3)	(m^3)
5	11.6	3.6	8.0	2.9	63.86	8.9	
100	11.6	7.7	3.9	3.0	63.93	21.9	28.3

The total allowable runoff rate from the site was 11.6 L/s. The total actual runoff rate during a 100 year storm event is 10.7L/s which is less than the total allowable runoff rate.

Refer to Appendix A for a detailed summary of the stormwater management.

2.3 Stormwater System Operation and Maintenance

2.3.1 Inlet Control Device (ICD)

The inlet control device (ICD) should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. If surface ponding on the parking area does not recede in a normal manner, the ICD should be inspected and cleaned.

2.3.2 Catch basins and Manhole

The catch basins and manholes should be cleaned with a hydrovac excavation truck following completion of construction, paving of the asphaltic concrete surface and establishment of adequate grass cover on the landscaped areas.

Following the initial cleaning the catch basins and manholes should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. Once the sediment accumulation in the catch basins and manhole has reached a level equal to 0.15 metres below the outlet invert of the structure, the sediment should be removed by hydro excavation.

2.4 Storm Sewer Design

The on-site storm sewers were designed to be in general conformance with the City of Ottawa Sewer Design Guidelines (October 2012 as amended). Specifically, storm sewers were sized

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using Manning's Equation, assuming a roughness coefficient N = 0.013, to accommodate the uncontrolled runoff from the 5-year storm, under 'open-channel' conditions. Refer to Storm Sewer Design Sheet in Appendix A.

3 SANITARY SEWER DESIGN

The sanitary service laterals from the proposed development will be connected to the existing 375 mm diameter sanitary sewer along McArthur Avenue.

Sewage discharges will be domestic in type and in compliance with the City of Ottawa Sewer Use By-law. The anticipated peak sanitary flow will be a total of approximately 0.10 L/s.

The sanitary sewage flow for the building was calculated based on the City of Ottawa Sewer Design Guidelines (Section 4.4.1.2).

3.1 Design Flows

The proposed building is a mixed use building with office space and workshop space in the basement and 1st floor. The second floor is comprised of two residential units. The design flows for the multi uses are based on the Ottawa Sewer Design Guidelines – APPENDIX 4-A

Commercial

Office Space	*(6 persons) x 75L/day:*	*450 L/day*
Factory workers – no showers	*(6 persons) x 75L/day:*	*450L/day*
Floor Drain in Garage for cleaning vehicle		*200 L/day*
Total Average Demand:		1100 L/day

$Q_{Domestic}$ = 1100L/day x (1/86,400 sec/day) = 0.013 L/sec

Peaking Factor = 1.5

$Q_{Peak\ Domestic}$ = 1.5 x 0.013 L/sec = 0.019L/sec

Residential

Total domestic pop:		
Bachelor units	*(0) x 1.4 ppu:*	*0*
One Bedroom units	*(0) x 1.4 ppu:*	*0*
Two Bedroom units	*(2) x 2.1 ppu:*	*4.2*
Total:		4.2

$Q_{Domestic}$ = 5x 280 L/person/day x (1/86,400 sec/day) = 0.016 L/sec

Peaking Factor $= 1 + \left(\frac{14}{4+\left(\frac{P}{1000}\right)}\right) * 0.8$ = 3.75 (4 maximum)

$Q_{Peak\ Domestic}$ = 0.016 L/sec x 3.75 = 0.060 L/sec

Infiltration

$Q_{Infiltration}$ = 0.33 L/ha/sec x 0.07ha = 0.023 L/sec

Total Peak Sanitary Flow = 0.019 + 0.060 + 0.023 = 0.10 L/sec

3.2 Sanitary Service Lateral

3.2.1 Sanitary Service Lateral Requirements

The maximum peak sanitary flow for total residential and commercial use of the building is 0.01 L/sec. The Ontario Building Code specifies minimum pipe size and maximum hydraulic loading for sanitary sewer pipe. OBC 7.4.10.8 (2) states "Horizontal sanitary drainage pipe shall be designed to carry no more than 65% of its full capacity." The capacity of the proposed 135 mm diameter PVC sanitary sewer lateral at a 1% slope is 11.24/sec. Since 0.65 x 11.24 = 7.3 L/s is much greater than 0.01L/sec, a single sanitary sewer service lateral of 135 mm diameter at a 1% slope will be sufficient.

3.2.2 Proposed Sanitary Service Laterals

The existing sewer lateral is to be capped at the property line. The new lateral is to be installed at the location indicated on the Site Servicing drawing 180140– SER.

4 WATERMAIN DESIGN

The existing water lateral is to be blanked at the watermain to the satisfaction of the City of Ottawa Services. The new lateral is to be installed at the location indicated on the Site Servicing drawing 180140 – SER.

The proposed 38mm diameter water service is to be used for the proposed building. The service lateral will be connected to the municipal watermain on McArthur Avenue as indicated on the Site Servicing drawing 180140- SER.

Fire flow protection requirements were calculated as per the Fire Underwriter's Survey (FUS) Calculations of the fire flow required for the building are provided in Appendix C.

From Appendix C, the maximum fire flow requirement is 7438 L/min or 124 L/sec.

4.1 Water Demand

The water demand for the proposed development was calculated based on the City of Ottawa Water Distribution Design Guidelines (as amended) as follows:

<u>Commercial</u>

28000 L/gross ha/day x 0.07ha x (1/86,400 sec/day)

- Average daily demand 0.023 L/s
- Maximum daily demand (factor of 1.5) is 0.023 L/s x 1.5 = 0.034 L/s
- Peak hourly demand (factor of 1.8) = 0.034 L/s x 1.8 = 0.061L/s

<u>Residential</u>

5 persons x 350 L/person/day x (1/86,400 sec/day)

- Average daily demand 0.020 L/s
- Maximum daily demand (factor of 2.5) is 0.020 L/s x 2.5 = 0.051 L/s
- Peak hourly demand (factor of 2.2) = 0.051 L/s x 2.2= 0.111L/s

<u>Total</u>

- Average daily demand 0.043L/s
- Maximum daily demand 0.085 L/s
- Peak hourly demand 0.172L/s

4.2 Boundary Conditions

The water demand due to occupancy together with the fire flow requirements were provided to the City of Ottawa in 2018 as follows:

- Average daily water demand 0.05L/s
- Maximum daily water demand 0.12 L/s
- Peak hourly water demand 0.26L/s
- Fire Flow required 124L/s

It is assumed that the water services will be connected to the 406 mm water main along McArthur Avenue.

The following are the boundary conditions, HGL, for hydraulic analysis that were provided in 2018 for the above indicated peak hourly demand and fire flow demand.

Minimum HGL = 109.8
Maximum HGL = 118.3
MaxDay + FireFlow = 113m

Since the actual the water demand is decreased due to less residential occupancy and building footprint than original demand submitted for boundary conditions, it is expected that the Minimum HGL will be between 109.8 and 118.3 m.

In accordance with MOE Guidelines, the distribution system shall be sized so that under maximum hourly demand conditions the pressures are not less than 276 kPa (40 psi.)

The above minimum and maximum HGL provide a water pressure of between 387kPa and 471kPa at the proposed building. Since these values are between 276 kPa and 480kPa, no pumps or pressure reducing apparatuses are required.

Where fire flow has been provided; during periods of maximum day and fire flow demand the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi.)

4.3 Water Service Requirements

Based on the proposed occupancy through the City of Ottawa Water Distribution Design Guidelines (as amended) and the Ontario Building Code requirements with respect to water service size based on number of fixture units served, a minimum water service size of 38mm is required.

4.4 Existing Fire Hydrants

The fire hydrants within the vicinity of the site are located as follows: 36m west of the site on the south side of McArthur Avenue and 144 metres north of the site at the intersection of McArthur Avenue and Allen Boulevard.

City of Ottawa Technical Bulletin ISTB-2018-02 Appendix I Table 1 provides guidance with respect to maximum flow from to be considered from a given hydrant. From this table, a Class AA hydrant can contribute a maximum flow of 5,700 L/min when located less than 75 metres from the building and 3,800 L/min when located between 75 and 150 metres from the building.

Since one hydrant is less than 75 metres from the building and the other hydrant less than 150 metres from the proposed building, these hydrants can be expected to provide a total combined contribution of 9500 L/min to the required fire. As previously indicated, the required fire flow is 116.7 L/sec x 60 sec/min = 7002 L/min. The existing hydrants are considered to be sufficient to meet the required fire flow without needing an additional hydrant at the site.

5 EROSION AND SEDIMENT CONTROL

The owner (and/or contractor) agrees to prepare and implement an erosion and sediment control plan at least equal to the stated minimum requirements and to the satisfaction of the the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current best management practices for erosion and sediment control. It is considered to be the owners and/or contractors responsibility to ensure that the erosion control measures are implemented and maintained.

In order to limit the amount of sediment carried in stormwater runoff from the site during construction, it is recommended to install a silt fence along the property, as shown in Kollaard Associates Inc. Drawing #180140 - GEC. The silt fence may be polypropylene, nylon, and polyester or ethylene yarn.

If a standard filter fabric is used, it must be backed by a wire fence supported on posts not over 2.0 m apart. Extra strength filter fabric may be used without a wire fence backing if posts are not over 1.0 m apart. Fabric joints should be lapped at least 150 mm (6") and stapled. The bottom edge of the filter fabric should be anchored in a 300 mm (1 ft) deep trench, to prevent flow under the fence. Sections of fence should be cleaned, if blocked with sediment and replaced if torn.

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Filter socks should be installed across existing storm manhole and catch basin lids. As well, filter socks should be installed across the proposed catch basin and manhole lids immediately after the structures are placed. The filter socks should only be removed once the asphaltic concrete is installed and the site is cleaned.

The proposed landscaping works should be completed as soon as possible. The proposed granular and asphaltic concrete surfaced areas should be surfaced as soon as possible.

The silt fences should only be removed once the site is stabilized and landscaping is completed.

These measures will reduce the amount of sediment carried from the site during storm events that may occur during construction.

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6 CONCLUSIONS

This report addresses the adequacy of the existing municipal storm and sanitary sewer system and watermain to service the proposed development of the multi use building on McArthur Avenue. Based on the analysis provided in this report, the conclusions are as follows:

SWM for the proposed development will be achieved by restricting the 100 year post development flow to the 5 year pre-development flow.

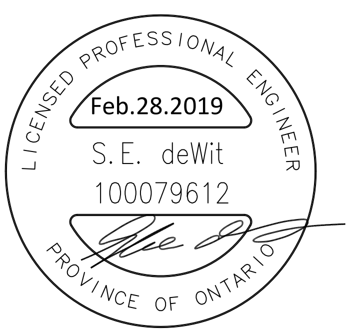
The peak sewage flow rate from the proposed development will be 0.10 L/sec. The existing municipal sanitary sewer should have adequate capacity to accommodate the increase in peak flow. The City has not identified any capacity issues in the existing sanitary sewer system.

The existing municipal watermain along McArthur Avenue will have adequate capacity to service the proposed development for both domestic and fire protection.

During all construction activities, erosion and sedimentation shall be controlled.

We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates, Inc.



Steven deWit, P.Eng.

Appendix A: Storm Design Information

- Pre Development Flows and STM Summary
- Uncontrolled Runoff Rate and Allowable Release Rate
- Storage Volume Requirements
- Storage Volume Provided

APPENDIX A: STORMWATER MANAGEMENT MODEL
ALLOWABLE RELEASE RATE AND SWM SUMMARY

Client: Bergeron Construction
Job No.: 180140
Location: 257 McArthur Avenue, Ottawa
Date: February 26, 2019

PRE DEVELOPMENT FLOW

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2 + A_{gravel} \times 0.6)/A_{tot}$

Area	Surface	Ha	"C"	C_{avg}
Total	Gravel	0.008	0.60	**0.76**
0.080	Roof/Asphalt/Concrete	0.060	0.90	
	Patio Stones	0.000	0.70	
	Grass	0.012	0.20	

5 Year Event			
Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.50	104.19	0.080
2.78CIA=	11.60		
	11.6 L/s		

**Use a 10 minute time of concentration for 5 year

Total Allowable Release: **11.6 L/s**

STORMWATER MANAGEMENT SUMMARY

Sub Area I.D.	Sub Area (ha)	5 year C	100 year 'C'	Outlet Location	5 Year Controlled Release (L/s)	Required 5 year Storage (m^3)	100 Year Controlled Release (L/s)	Required 100 year Storage (m^3)	100 year Storage Level (m)
UA1	0.017	0.72	0.90	OFFSITE	3.6	N/A	7.7	N/A	N/A
CA1	0.063	0.83	0.92	Street	2.9	8.7	3.0	21.2	28.1
TOTAL	**0.080**				**6.5**	**8.7**	**10.7**	**21.2**	**28.1**

APPENDIX A: STORMWATER MANAGEMENT MODEL

STORAGE VOLUME REQUIRED

Client: Bergeron Construction
Job No.: 180140
Location: 257 McArthur Avenue, Ottawa
Date: February 26, 2019

UA1 - UNCONTROLLED AREA

Post Dev run-off Coefficient "C"

			5 Year Event		5 Year Event	
Area	**Surface**	**Ha**	**"C"**	**C_{avg}**	**"C"**	**C_{avg}**
Total	Gravel	0.000	0.60	**0.72**	0.99	**0.90**
0.017	Roof/ Asphalt/ Concrete	0.011	0.90		0.99	
	Patio Stones/Rip rap	0.002	0.70		0.88	
	Grass	0.004	0.20		0.25	

Runoff Coefficient Equation

$C = (A_{hard} \times 0.9 + A_{soft} \times 0.2)/A_{tot}$

Post Dev Free Flow

5 Year Event

Pre Dev.	**C**	**Intensity**	**Area**
5 Year	0.72	104.19	0.017
2.78CIA= 3.59			
3.6 L/S			

**Use a 10 minute time of concentration for 5 year

100 Year Event

Pre Dev.	**C***	**Intensity**	**Area**
100 Year	0.90	178.56	0.017
2.78CIA= 7.68			
7.7 L/S			

**Use a 10 minute time of concentration for 100 year
*C value multiplied by 1.25 for 100 year event

Equations:

Flow Equation

$Q = 2.78 \times C \times I \times A$

Where:
C is the runoff coefficient
I is the intensity of rainfall, City of Ottawa IDF
A is the total drainage area

APPENDIX A: STORMWATER MANAGEMENT MODEL

ACTUAL DISCHARGE RATE AND STORAGE VOLUME REQUIREMENTS

Client: **Bergeron Construction**
Job No.: **180140**
Location: **257 McArthur Avenue, Ottawa**
Date: **February 26, 2019**

**Use a 10 minute time of concentration

(CA1)

Area ha	Surface	Ha	5 Year Event "C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)	100 Year Event "C"	C_{avg}	Intensity (mm/hr)	Runoff Rate (L/s)
	Asphalt/ Concrete/Roof	0.057	0.90	**0.83**	104.19	15.11	1.00	**0.93**	178.56	29.02
	Gravel	0.000	0.60				1.00			
	Patio Stone/Semipermeable block	0.000	0.70				0.88			
0.063	Grass	0.006	0.20				0.25			

Total Allowable Release Rate	5 year	8.00 L/s
	100 year	3.90 L/s

Storage Requirements for Roof Area (CA1)

Area = 0.063 hectares
5-year Runoff Coefficient = 0.83 post development
100-year Runoff Coefficient = 0.93 post development

Return Period	Time (min)	Intensity (mm/hr)	Flow Q (L/s)	Release Rate L/s: 0.5	1	1.5	2	2.5	3	3.5
				Storage Required (m^3)						
5 Year	10	104.19	15.11	8.8	8.5	8.2	7.9	7.6	7.3	7.0
	20	70.25	10.19	11.6	11.0	10.4	9.8	9.2	8.6	8.0
	30	53.93	7.82	13.2	12.3	11.4	10.5	9.6	8.7	7.8
	40	44.18	6.41	14.2	13.0	11.8	10.6	9.4	8.2	7.0
	50	37.65	5.46	14.9	13.4	11.9	10.4	8.9	7.4	5.9
	60	32.94	4.78	15.4	13.6	11.8	10.0	8.2	6.4	4.6
	70	29.37	4.26	15.8	13.7	11.6	9.5	7.4	5.3	3.2
Maximum 5 year storage rate				15.8	13.7	11.9	10.6	9.6	8.7	8.0
			Release Rate L/s	0.5	1	1.5	2	2.5	3	3.5
100 Year	10	178.56	29.02	17.1	16.8	16.5	16.2	15.9	15.6	15.3
	20	119.95	19.50	22.8	22.2	21.6	21.0	20.4	19.8	19.2
	30	91.87	14.93	26.0	25.1	24.2	23.3	22.4	21.5	20.6
	40	75.15	12.21	28.1	26.9	25.7	24.5	23.3	22.1	20.9
	50	63.95	10.40	29.7	28.2	26.7	25.2	23.7	22.2	20.7
	60	55.89	9.09	30.9	29.1	27.3	25.5	23.7	21.9	20.1
	70	49.79	8.09	31.9	29.8	27.7	25.6	23.5	21.4	19.3
	80	44.99	7.31	32.7	30.3	27.9	25.5	23.1	20.7	18.3
Maximum 100 year storage rate				32.7	30.3	27.9	25.6	23.7	22.2	20.9

Kollaard Associates
Engineers
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil ●
Geotechnical ●
Hydrogeological ●
Inspection Testing ●
Septic Systems Grading ●
Structural ● Environmental ●

APPENDIX A: STORMWATER MANAGEMENT MODEL
OUTLET CONTROL STRUCTURE DESIGN SHEET

Client: Bergeron Construction
Job No.: 180140
Location: 257 McArthur Avenue, Ottawa
Date: February 26, 2019

Stage, WSE Elev (m)	Comments	Layer Thickness (m)	Top Layer Area (m²)	Bottom Layer Area (m²)	Layer Volume (m^3)	Cummulative Storage Volume (m^3)	Outflow ICD (L/sec)	Outflow Weir (L/sec)	Total Outflow (L/sec)
63.95		0.050	282.4	221.5	12.6	28.1	3.0		3.0
63.90		0.050	221.5	135.4	8.8	15.6	2.9		2.9
63.85		0.050	135.4	56.3	4.6	6.7	2.9		2.9
63.80		0.050	56.3	18.6	1.8	2.1	2.9		2.9
63.75		0.050	18.6	0.0	0.3	0.3	2.8		2.8
63.70	Bottom of Surface Ponding	0.000	0.0	0.0	0.0	0.0	2.8		2.8

TEMPEST SELECTION INFORMATION

Model No:	LMF
Oulet pipe Spec:	200 mm PVC SDR 35
Discharge	3 L/s
Upstream Head:	1.75 m
Manhole Diameter	1200 mm
Sump depth:	300 mm

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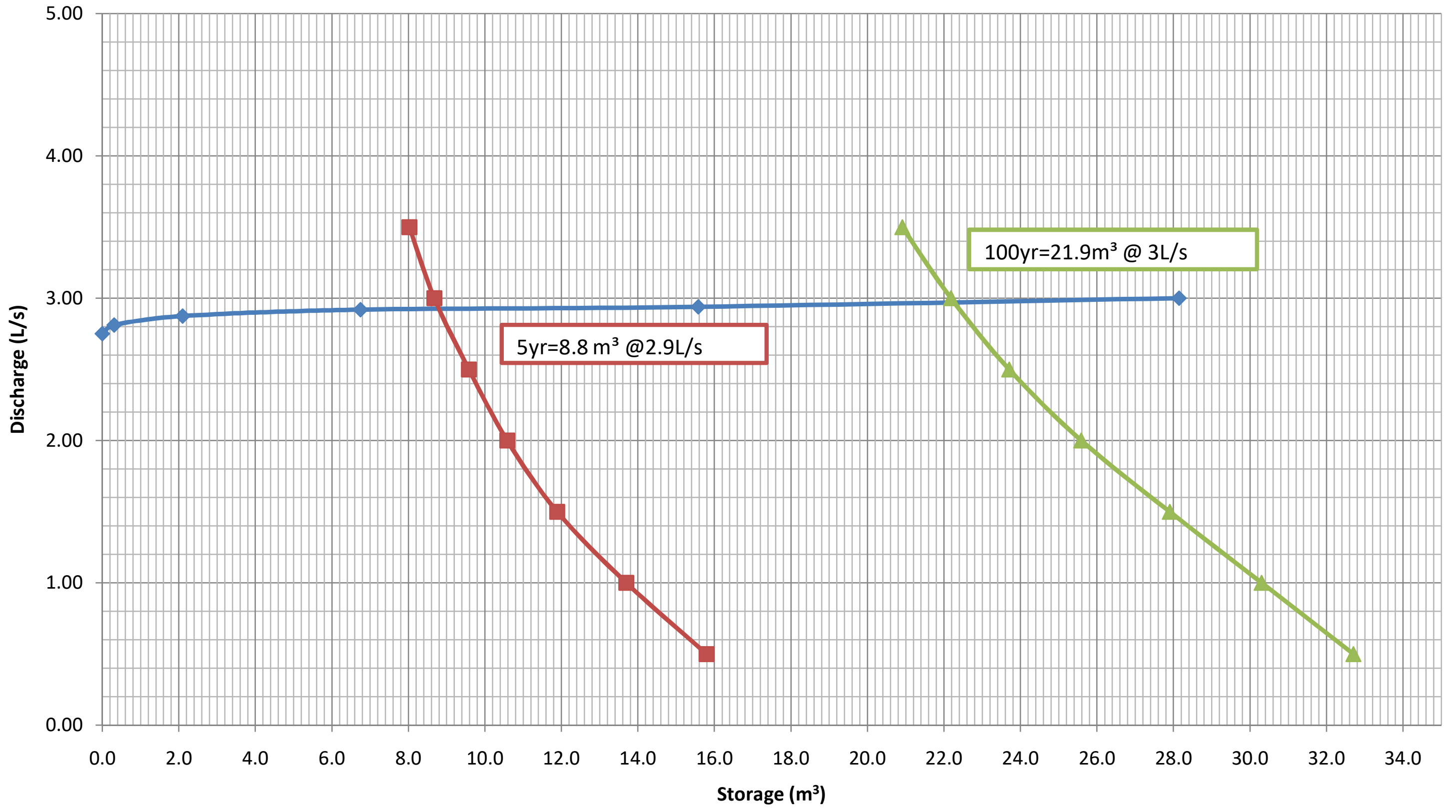
APPENDIX A: STORMWATER MANAGEMENT MODEL
Stage-Storage Curve

Client: Bergeron Construction
Job No.: 180140
Location: 257 McArthur Avenue, Ottawa
Date: February 26, 2019



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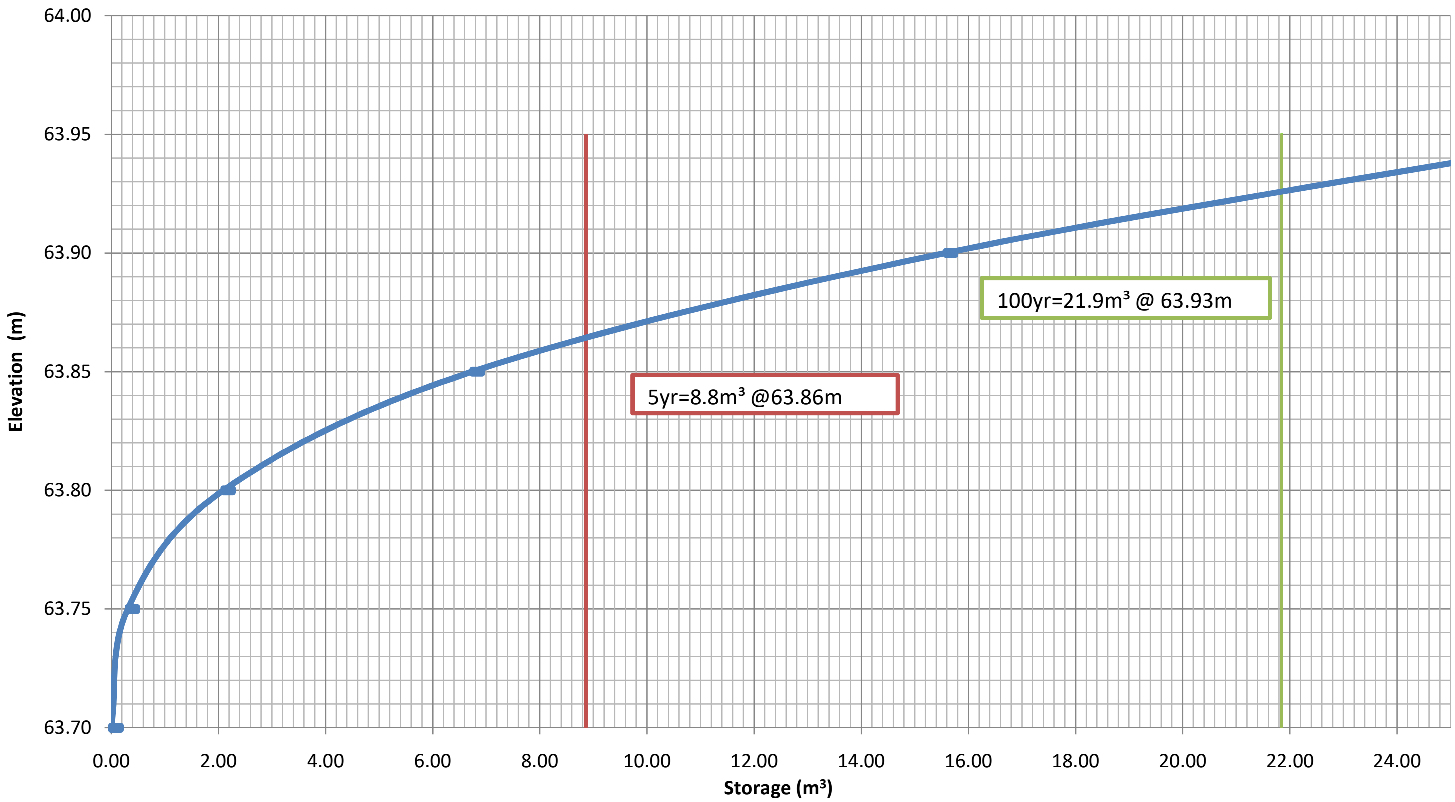
APPENDIX A: STORMWATER MANAGEMENT MODEL
Stage-Storage Curve

Client: Bergeron Construction
Job No.: 180140
Location: 257 McArthur Avenue, Ottawa
Date: February 26, 2019



Appendix B: Product Information

- Tempest ICD Flow Curves

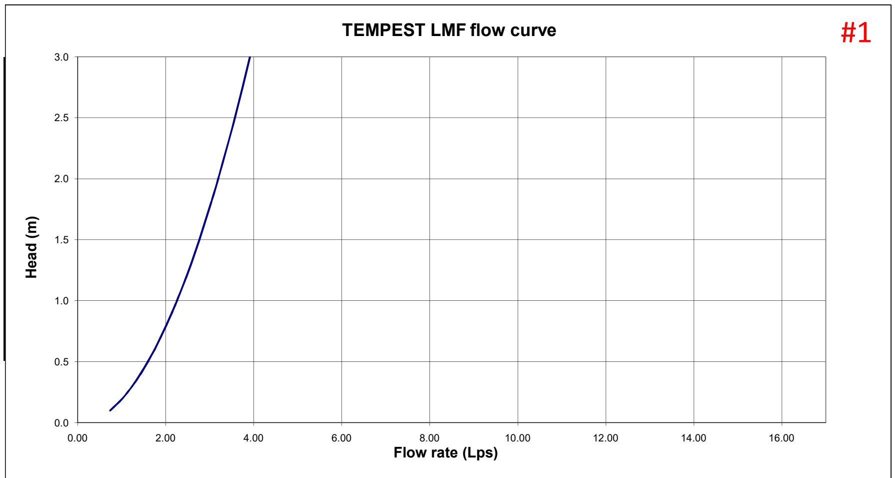
IPEX

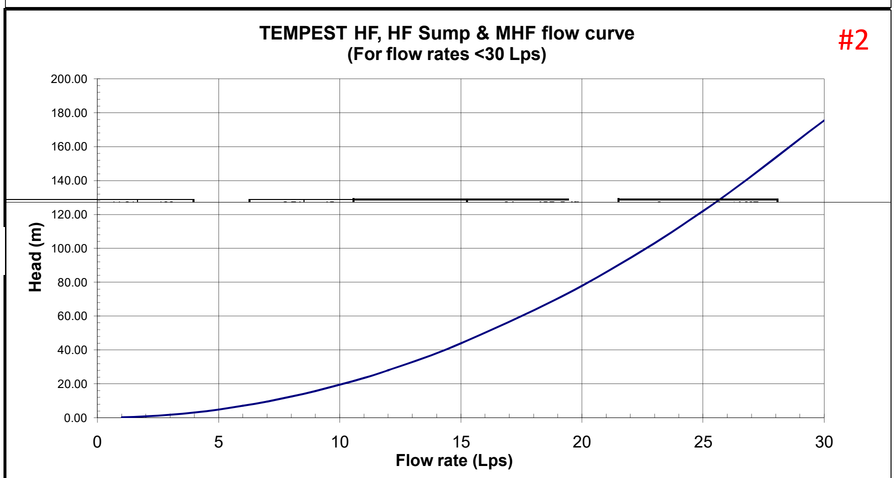
TEMPEST INLET CONTROL DEVICES

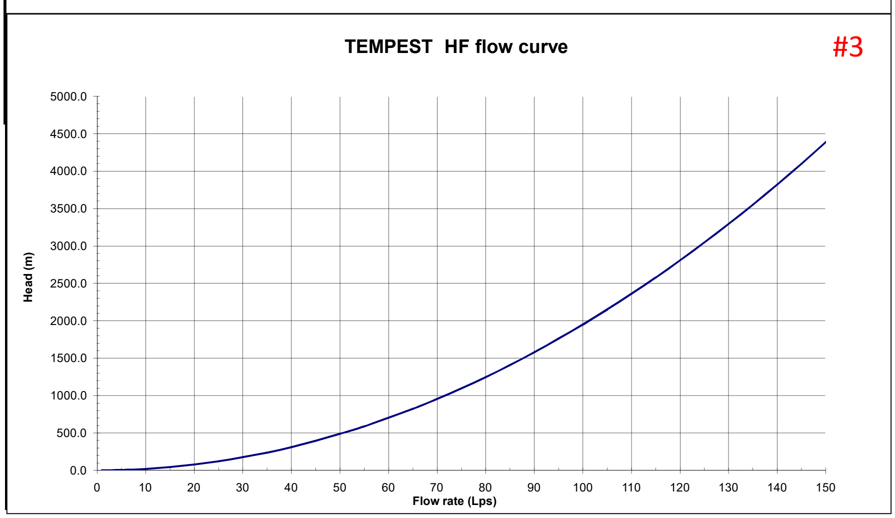
Flow Parameters

Head (m)	1.75
Flow (Lps)	3

Input desired parameters in green boxes at left and then refer to graphs below for corresponding flow curves. If your design criteria fall outside the maximum parameters of this flow curve calculator please contact your IPEX representative for your TEMPEST design.





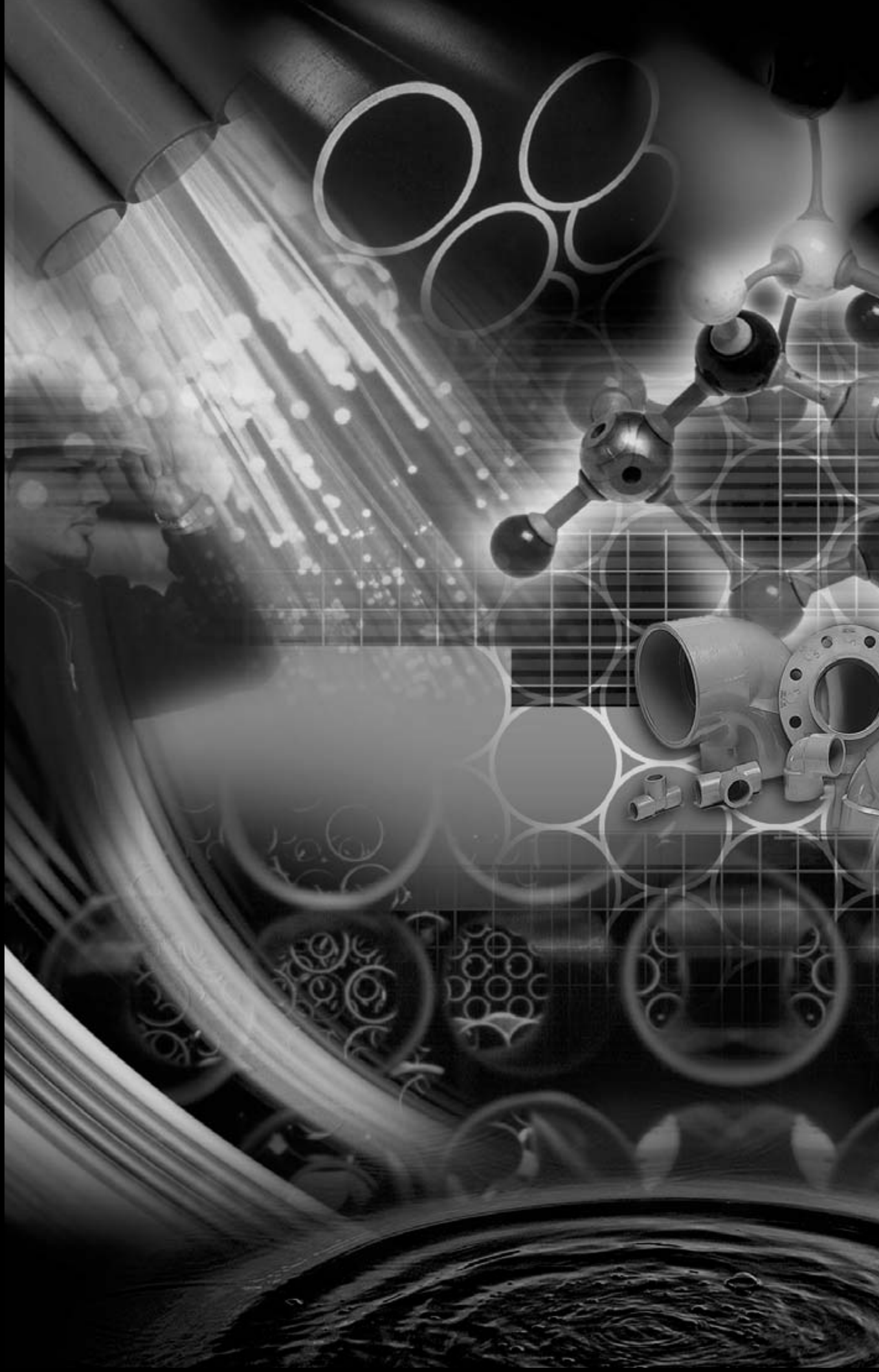


NOTE: GRAPH #3 IS AN EXPANDED VERSION OF GRAPH #2 TO BE USED FOR FLOW RATES ABOVE 30 Lps.

The following results are best estimates and subject to change upon review by an IPEX design representative.

Volume III: TEMPEST™ INLET CONTROL DEVICES

Municipal Technical Manual Series



SECOND EDITION

LMF (Low to Medium Flow) ICD

HF (High Flow) ICD

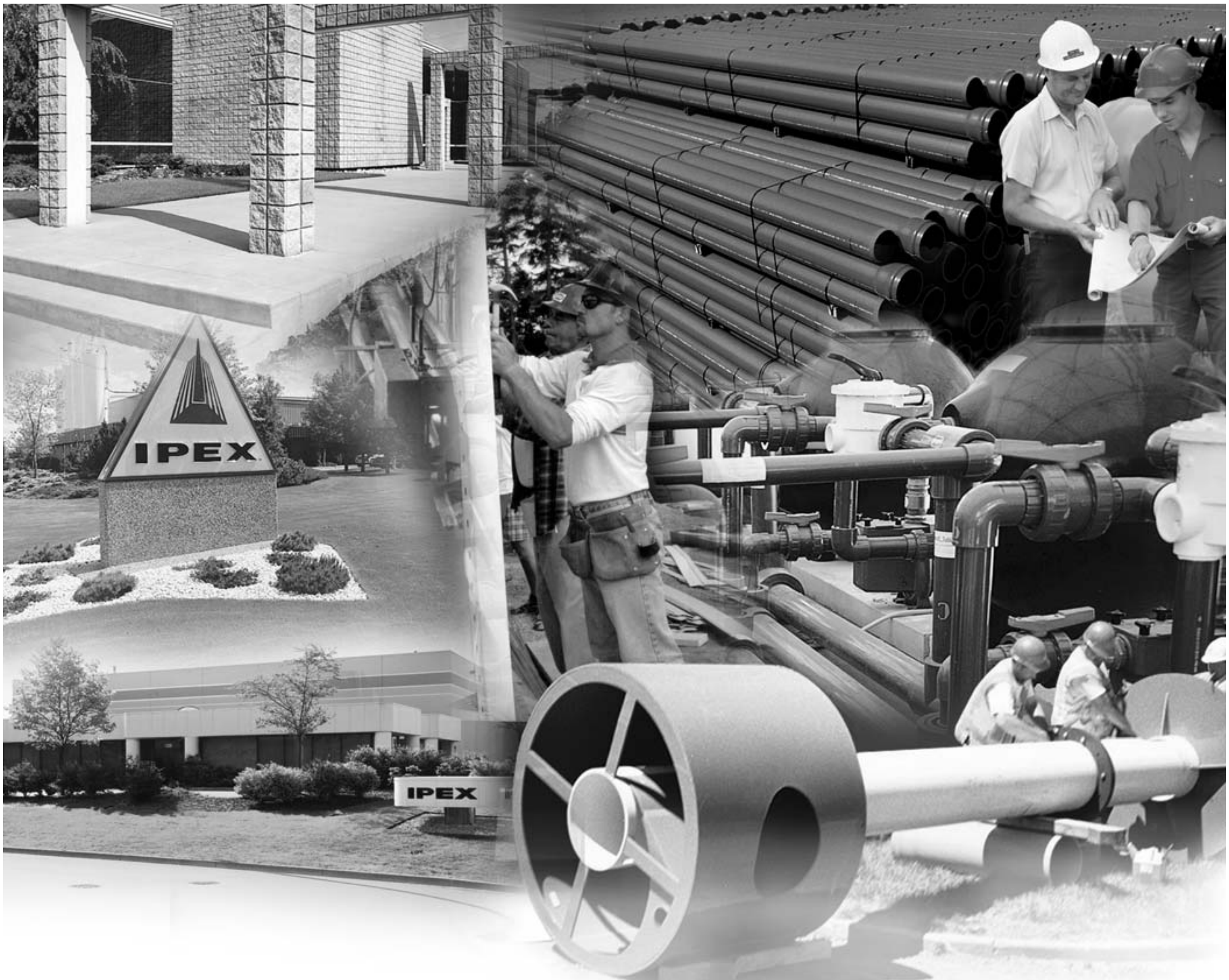
MHF (Medium to High Flow) ICD

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.

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TEMPEST INLET CONTROL DEVICES Technical Manual

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Product Installation

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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

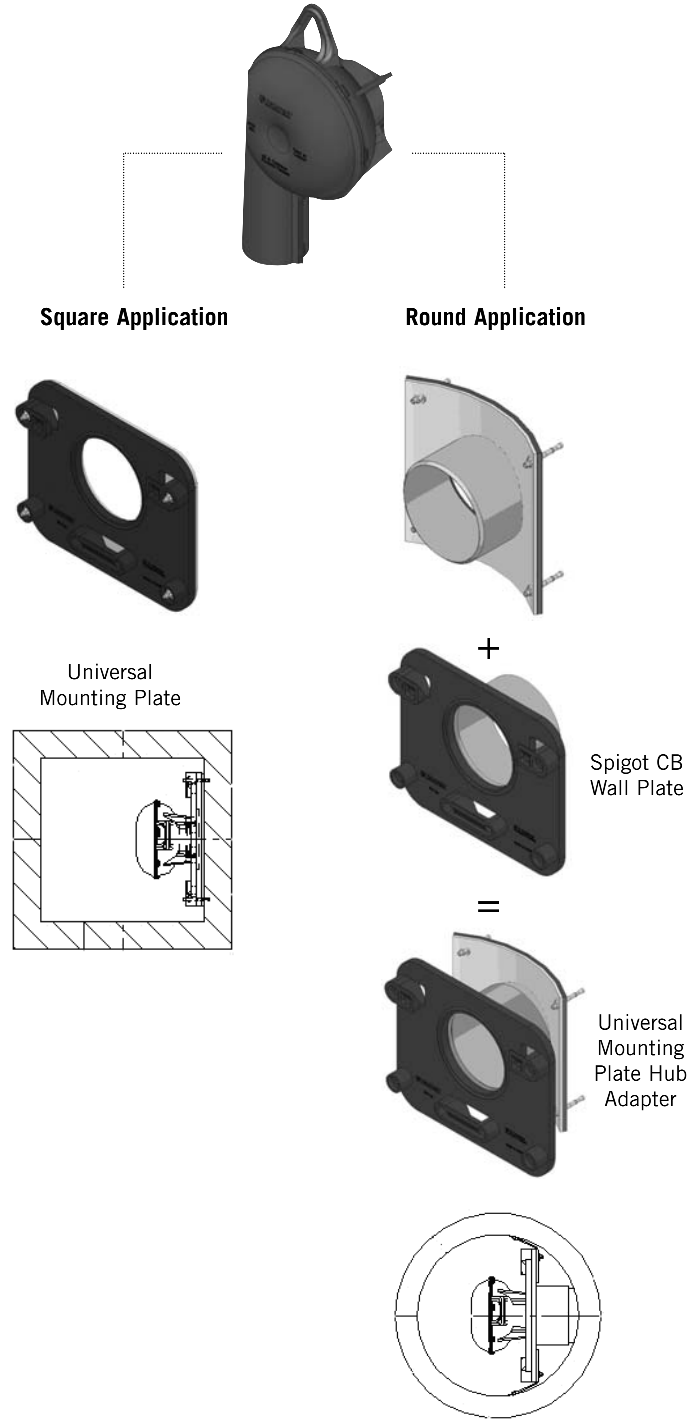
The LMF ICD vortex flow action allows the LMF ICD to provide a narrower flow curve using a larger orifice than a conventional orifice plate ICD, making it less likely to clog. When comparing flows at the same head level, the LMF ICD has the ability to restrict more flow than a conventional ICD during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

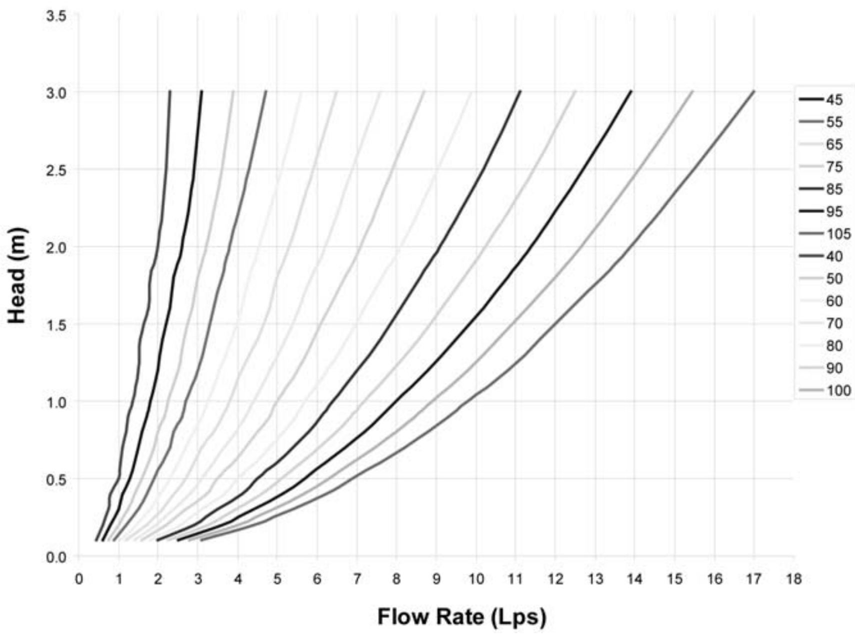
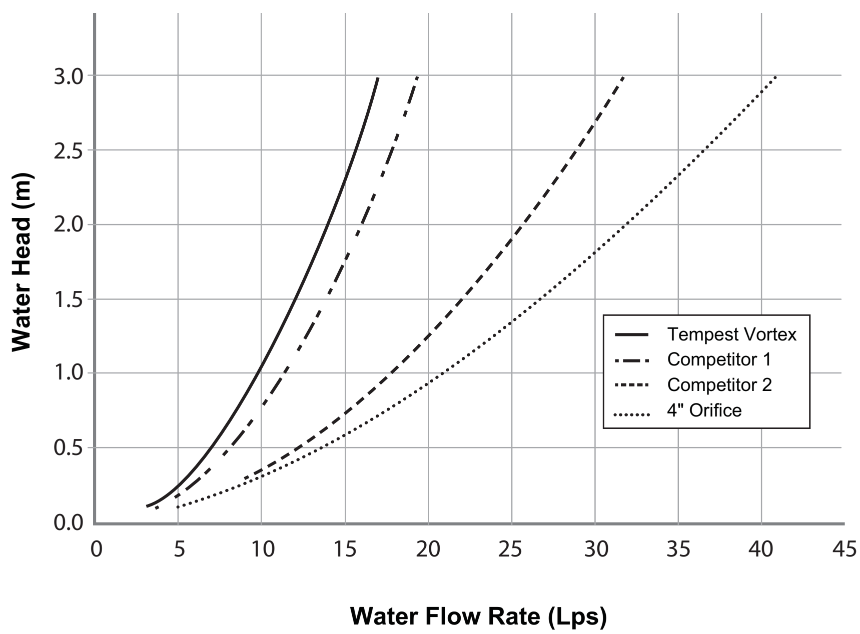


Chart 2: LMF Flow vs. ICD Alternatives



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

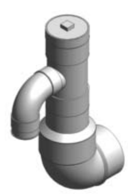
Product Description

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.

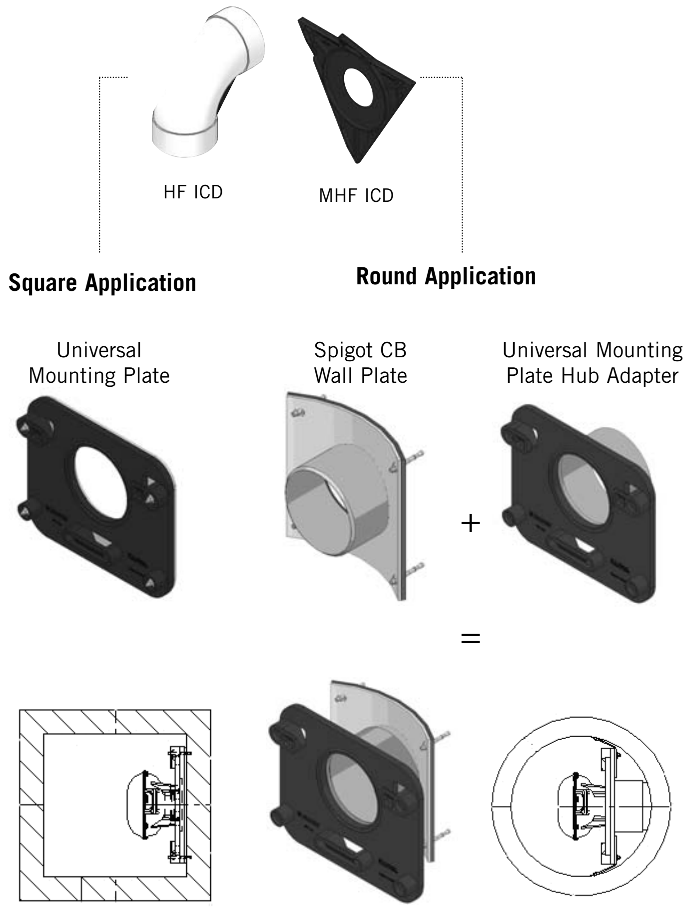
TEMPEST MHF (Medium to High Flow):
The MHF plate or plug is designed to control flow rates 9 L/s (143 gpm) or greater. It is not designed to prevent the propagation of odour and floatables.

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:

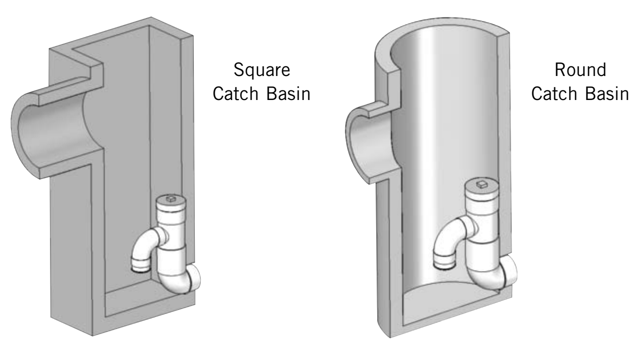
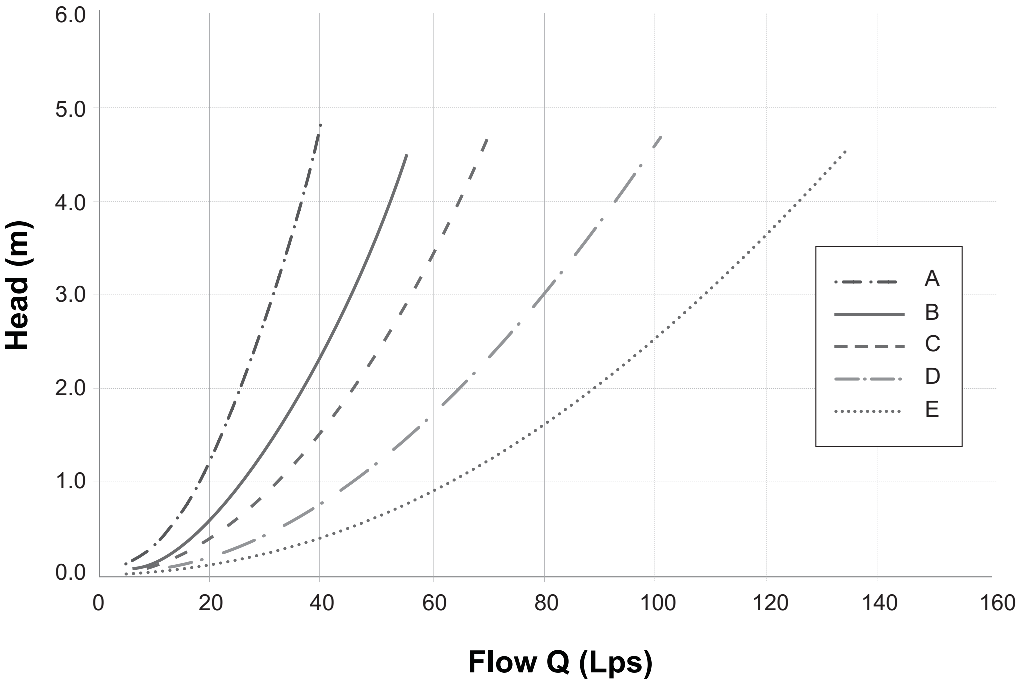


Chart 3: HF & MHF Preset Flow Curves



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

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.

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.

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.

MNMNTPIP110817

IPEX

Appendix C: Fire Flow Calculations and Boundary Conditions

Kollaard Associates
Engineers
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario K0G 1J0

Civil • Geotechnical •
Structural • Environmental •
Hydrogeology

(613) 860-0923
FAX: (613) 258-0475

APPENDIX C: CALCULATION OF FIRE FLOW REQURIEMENTS - 257 McArthur

Calculation Based on Fire Underwriters Survey, 1999

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

$$F = 220 \quad x \ C \ x \ \sqrt{A}$$

where F = required fire flow in litres per minute
A = Consider area of largest floor (2nd) plus 100% of 1st floor

C = coefficient related to the type of construction:

1.5	for wood construction (structure essentially combustible)
1.0	for ordinary construction (brick or other masonry walls, combustible floor and interior)
0.8	for noncombustible construction (unprotected metal structural components, masonary or metal walls)
0.6	for fire-resistive construction (fully protected frame, floors, roof)

Area of floor 2 = 247.0 m^2 100% of 1st Floor = 247 m^2

A = 494.0 m^2 (Ordinary Construction)
C = 1.0
F = 4,890 L/min -----------------------> Rounded to nearest 1000 = **5,000** L/min

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

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

Reduction due to low occupancy hazard = -15% x 5,000 = = **4,250** L/min

3) The value above my be reduced by up to 50% for automatic sprinlker system

Reduction due to automatic sprinker system = 0% x 5,000 = **0**

4) The value obtained in 2. may be increased for structures exposed within 45 metres by the fire

Separation (metres)	Condtion	Charge
0m to 3.0m	1	25%
3.1m to 10.0m	2	20%
10.1m to 20.0m	3	15%
20.1m to 30.0m	4	10%
30.1m to 45.0m	5	5%
45.1m to	6	0%

Exposures	Distance(m)	Condtion		Charge
Side 1	3.0	1	-------->	25%
Side 2	3.0	1	-------->	25%
Front	12.0	3	-------->	15%
Back	13.8	3	-------->	15%
				75%

Increase due to separation = 75% x 4,250 = **3,188** L/min

The fire flow requirement is = **4,250**
Reduction due to Sprinkler = **0**
Increase due to Separation = 3,188

The Total fire flow requirement is = 7,438
or **124.0** **L/sec**

Subject: FW: 257 McArthur Avenue
From: "Buchanan, Richard" <Richard.Buchanan@ottawa.ca>
Date: 2018-05-23 2:58 PM
To: "'amanda@kollaard.ca'" <amanda@kollaard.ca>

Hello Amanda

The following are boundary conditions, HGL, for hydraulic analysis at 257 McArthur (zone 1E) assumed to be connected to the 406 mm on McArthur (see attached PDF for location).

Minimum HGL = 109.8 m

Maximum HGL = 118.3 m

Max Day (0.12 L/s) + Fire Flow (124 L/s) = 113.0 m

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.

Richard Buchanan, CET

Project Manager, Development Approvals
Planning, Infrastructure and Economic Development Department
Planning & Growth Management Branch
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 27801
ottawa.ca/planning / ottawa.ca/urbanisme

From: Amanda VanBruggen <amanda@kollaard.ca>
Sent: Friday, May 18, 2018 10:44 AM
To: Buchanan, Richard <Richard.Buchanan@ottawa.ca>
Cc: Malou Leblanc <malou@kollaard.ca>
Subject: 257 McArthur Avenue

Hello Richard,
I am working on the servicing and stormwater management report for the proposed development on 257 McArthur Avenue. I was wondering if you could provide us with the boundary conditions for the property based on the following information:

- Type of Development: multi-use development
- Location of services: 257 McArthur Avenue
- Amount of fire flow required: 124 L/s: See attached fire flow requirements
- Average daily water demand = 0.05 L/s
- Maximum daily water demand = 0.12 L/s
- Maximum hourly water demand = 0.26 L/s
- Peak sanitary flow = 0.15 L/s

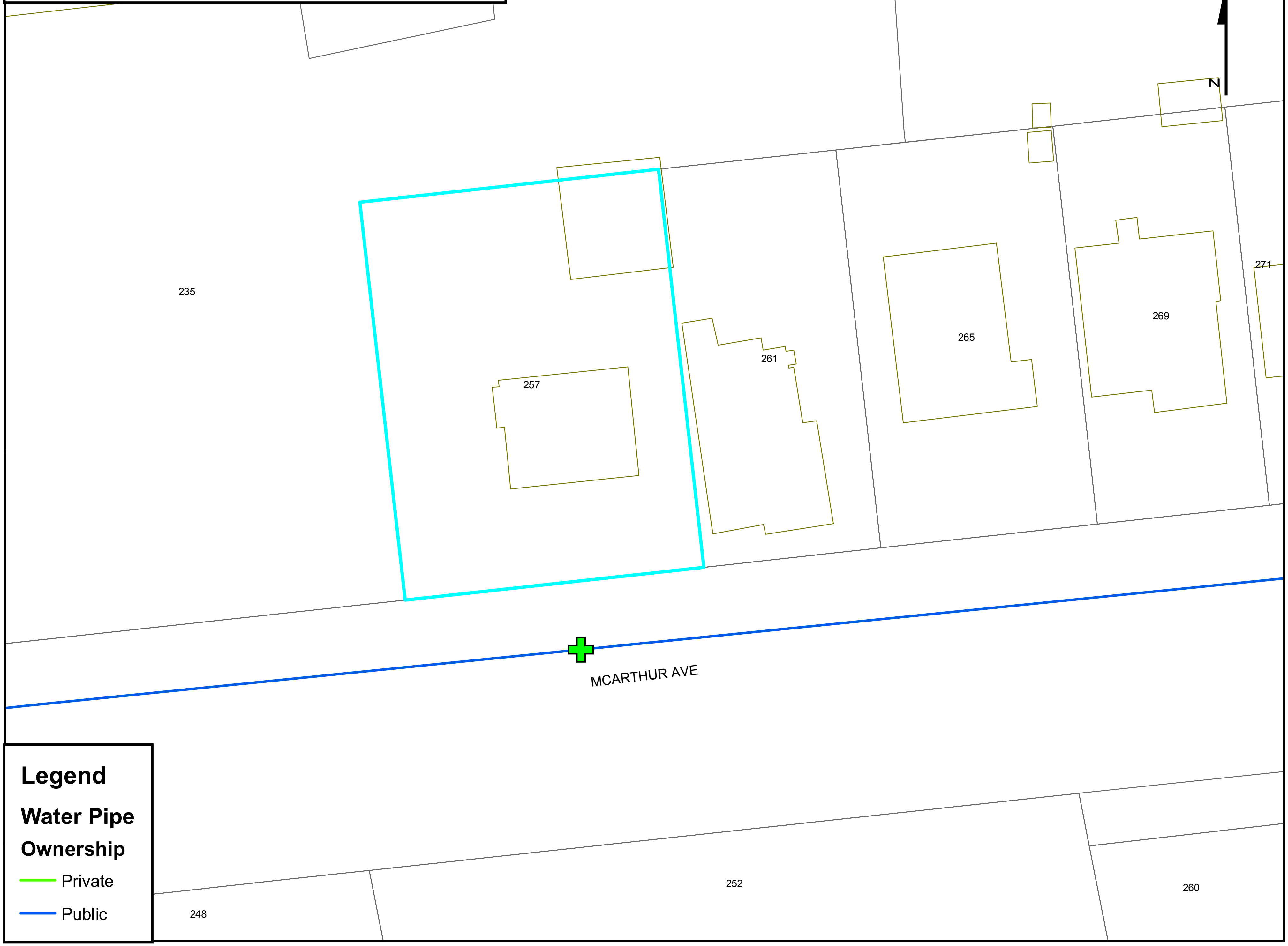
Kind Regards,
Amanda Van Bruggen
--

Kollaard Associates
Engineers
210 Prescott Street, Unit 1
P.O. Box 189
Kemptville, Ontario
K0G 1J0
tel: 613-860-0923
www.kollaard.ca

Attachments:

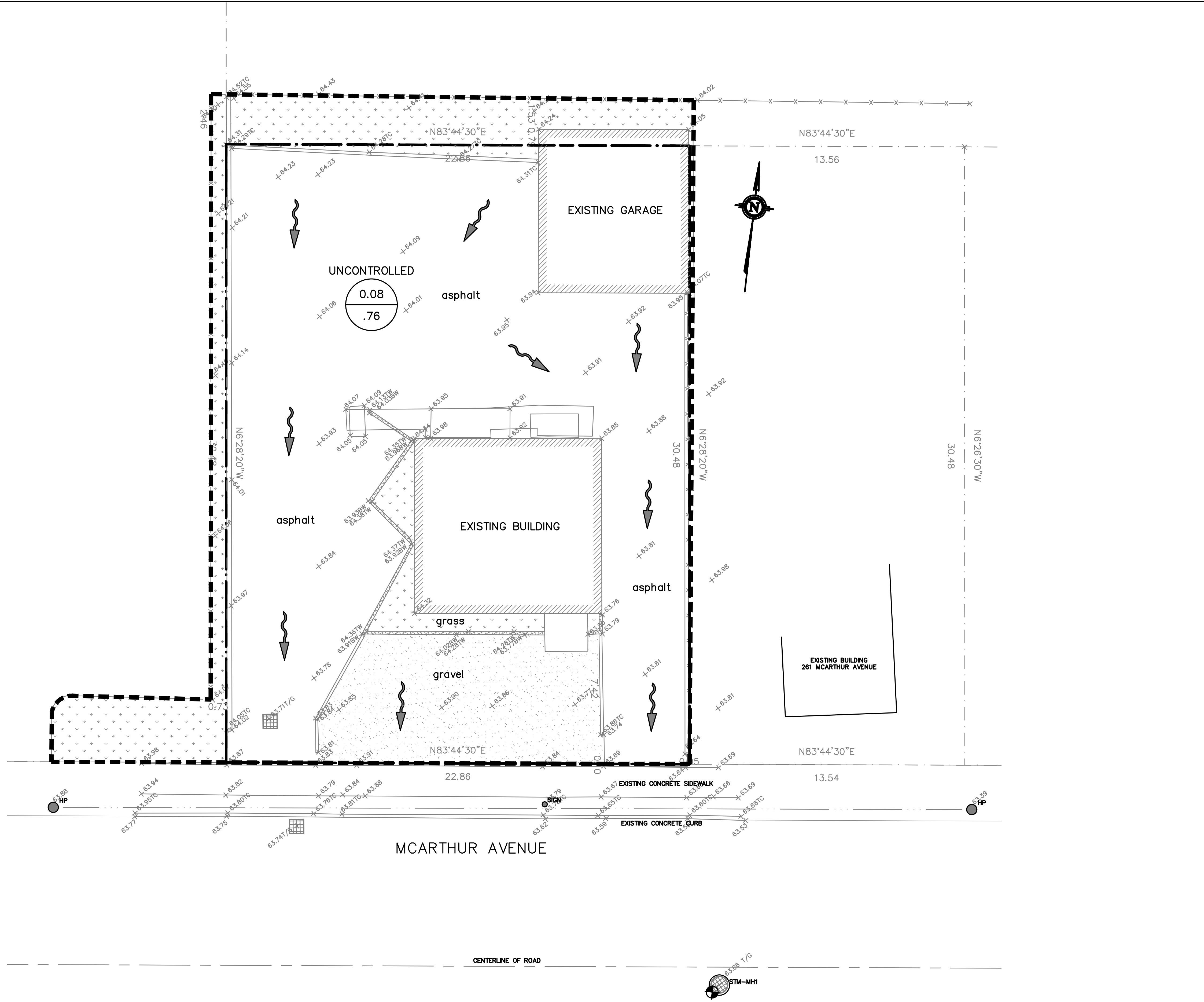
257 McArthur May 2018.pdf 99.7 KB

Boundary Condition for 257 McArthur



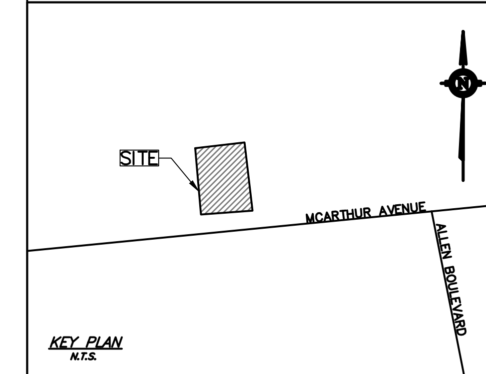
Appendix D: Drawings

- 180140– PRE – Pre-Development Water Flows
- 180140 – POST – Controlled and Uncontrolled Areas
- 180140 – GEC – Grading & Erosion Control Plan
- 180140 – SER – Site Servicing Plan
- 180140 – DETAILS – Site Servicing Details



DRAWING NUMBER:
180140–PRE

PRE–DEVELOPMENT CATCHMENT AREAS



LEGEND (STORM WATER MANAGEMENT)

CONTROLLED	CATCHMENT LABEL
0.39	CATCHMENT AREA (HECTARES)
0.34	IMPERVIOUS RATIO
	CATCHMENT AREA BOUNDARY
	DIRECTION OF FLOW
	PROPERTY LINE
	TOP OF SLOPE
	CONTROLLED AREA
	UNCONTROLLED AREA
	PRE–DEVELOPMENT DRAINAGE PATTERN
	OVERLAND FLOW ROUTE

REV	BY	DATE	DESCRIPTION
0	AVB	02/28/2019	ISSUED FOR SITE PLAN CONTROL

Kollaard Associates
Engineers

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KEMPTVILLE, ONTARIO
K0G 1J0 FAX (613) 258–0475
http://www.kollaard.ca
(613) 860–0923
info@kollaard.ca

CLIENT:
BERGERON CONSTRUCTION

PROJECT:
PROPOSED MULTI–USE BUILDING

LOCATION:
257 MCARTHUR AVENUE
OTTAWA ONTARIO
K1L 6P3

DESIGNED BY:	DATE:
--	JAN 28, 2019
DRAWN BY:	SCALE:
AVB	1:200

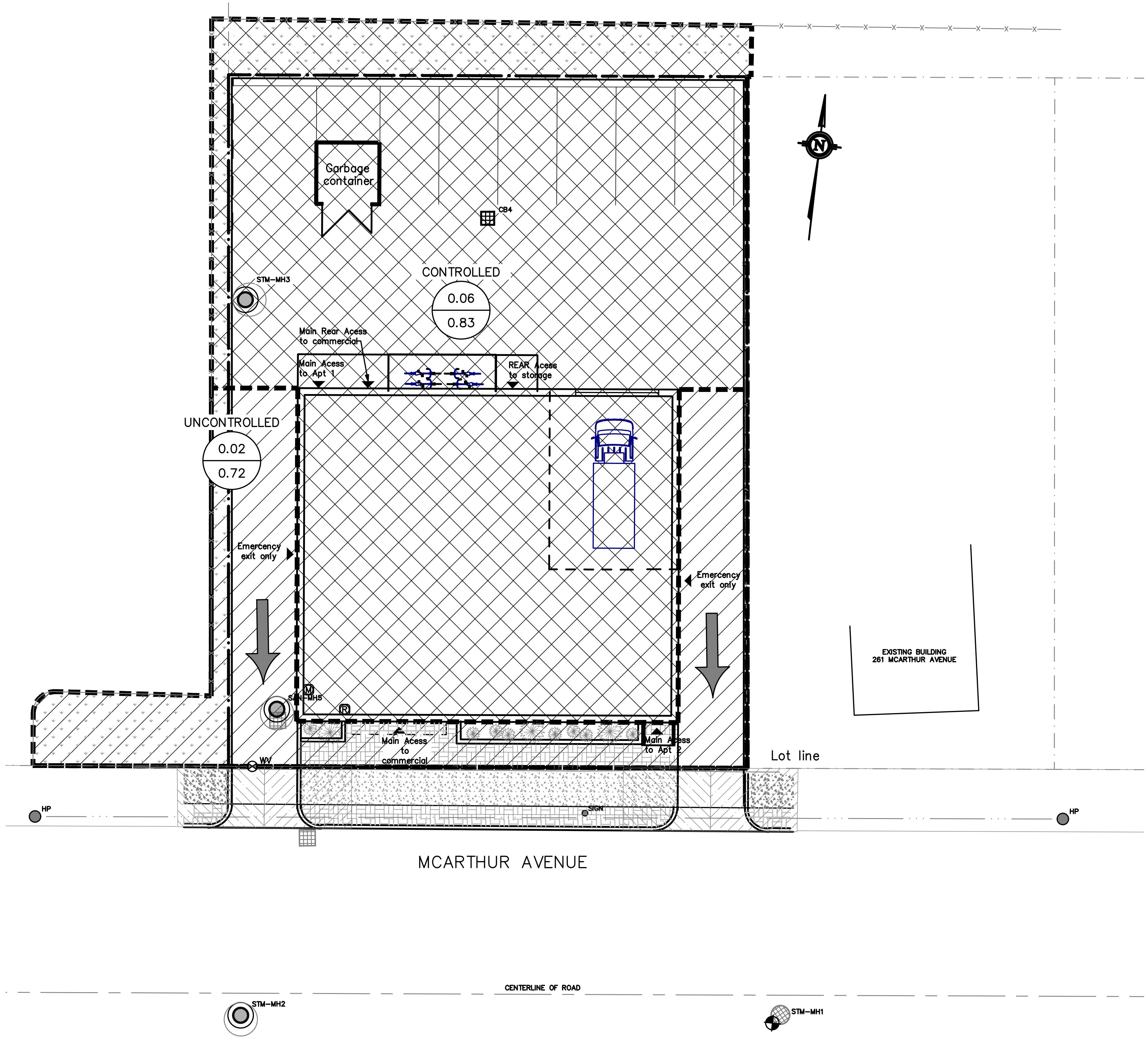
KOLLAARD FILE NUMBER:
180140

DRAWING NUMBER:
180140–POST

POST–DEVELOPMENT CATCHMENT AREAS

KEY PLAN
N.T.S.

SITE
MCARTHUR AVENUE
ALLEN BOULEVARD



LEGEND (STORM WATER MANAGEMENT)

CONTROLLED — CATCHMENT LABEL
0.39 — CATCHMENT AREA (HECTARES)
0.34 — IMPERVIOUS RATIO

CATCHMENT AREA BOUNDARY
DIRECTION OF FLOW
PROPERTY LINE
TOP OF SLOPE
CONTROLLED AREA
UNCONTROLLED AREA
PRE–DEVELOPMENT DRAINAGE PATTERN
OVERLAND FLOW ROUTE

REV	BY	DATE	DESCRIPTION
0	AVB	02/28/2019	ISSUED FOR SITE PLAN CONTROL

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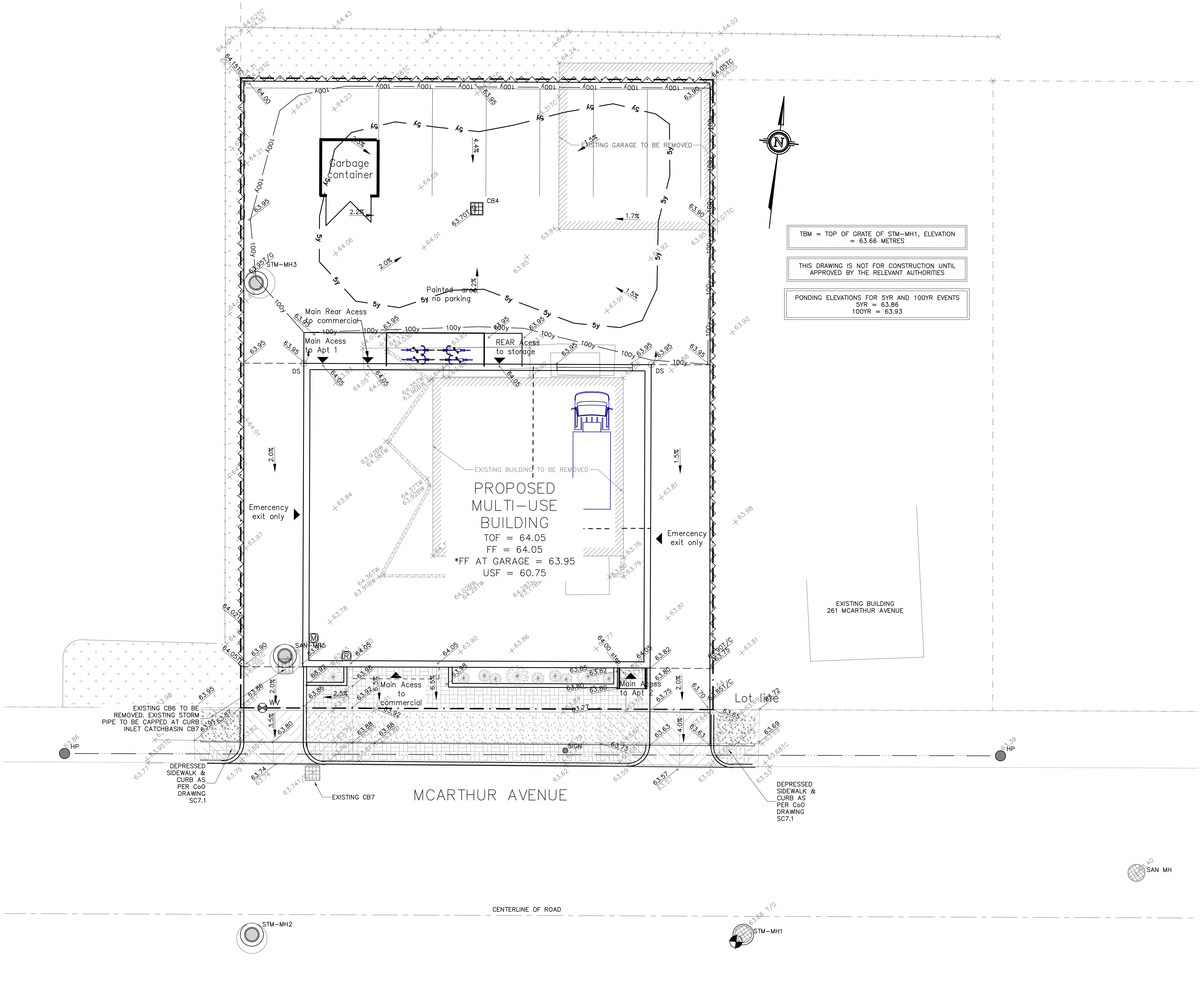
LOCATION:
257 MCARTHUR AVENUE
OTTAWA ONTARIO
K1L 6P3

DESIGNED BY: --
DATE: JAN 28, 2019
DRAWN BY: AVB
SCALE: 1:200
KOLLAARD FILE NUMBER: 180140



TBM = TOP OF GRATE OF STM-MH1, ELEVATION = 63.66 METRES

THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL APPROVED BY THE RELEVANT AUTHORITIES

PONDING ELEVATIONS FOR 5YR AND 100YR EVENTS
5YR = 63.86
100YR = 63.93

GRADING AND EROSION CONTROL PLAN

SCALE = 1:100

LEGEND

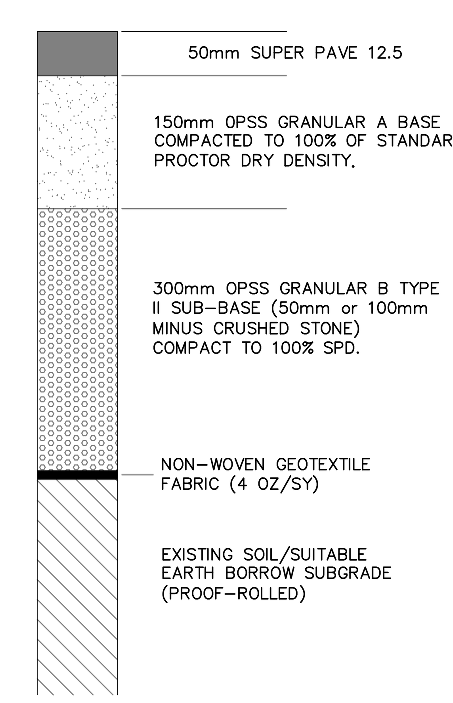
x68.75	EXISTING ELEVATION	HP	EXISTING HYDRO POLE
68.75 / 68.75	PROPOSED/EXISTING ELEVATIONS		EXISTING HYDRO GUY WIRE ANCHOR
68.75TC	PROPOSED TOP OF CURB ELEVATION	FH	EXISTING FIRE HYDRANT
68.75T/G	PROPOSED TOP OF GRATE ELEVATION	WV	EXISTING WATER VALVE
68.75	PROPOSED ELEVATION	M	WATER METER
0.0%	DRAINAGE SLOPE	R	REMOTE WATER METER
W	WATERMAIN	WV	PROPOSED WATER VALVE
STM	STORM SEWER	DS	PROPOSED DOWNSPOUT LOCATION
SAN	SANITARY SEWER	STM MH	EXISTING STORM MANHOLE
	CENTRELINE OF ROAD	SAN MH	EXISTING SANITARY MANHOLE
	EDGE OF ROAD		EXISTING CATCH BASIN
	TOP OF SLOPE		PROPOSED CATCH BASIN
	PROPERTY LINE	STM-MH	PROPOSED STORM MANHOLE
	SILT FENCE	SAN-MH	PROPOSED SANITARY MANHOLE
	OVERHEAD UTILITY WIRES		TEMPORARY BENCHMARK

EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. THE OWNER (AND/OR CONTRACTOR) AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN AT LEAST EQUAL TO THE STATED MINIMUM REQUIREMENTS AND TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL.
3. THE CONTRACTOR IS TO ENSURE THAT THE SITE ACCESS POINTS AND ADJACENT STREETS TO THE ACCESS POINTS ARE MAINTAINED AND KEPT CLEAN OF CONSTRUCTION MATERIALS SUCH AS, BUT NOT LIMITED TO MUD, DIRT, CLAY AND GRANULARS ON A DAILY BASIS OR AS NECESSARY, TO THE SATISFACTION OF THE CITY OF OTTAWA.
4. EVERY EFFORT WILL BE MADE TO ENSURE THAT ALL DISTURBED AREAS ARE TOPSOILED AND SEEDED AS SOON AS REASONABLY POSSIBLE.
5. THE SEDIMENT AND EROSION CONTROL PLAN IS A LIVING DOCUMENT WHICH MAY BE AMENDED BY ONSITE REQUIREMENTS AT THE APPROVAL OF THE MUNICIPALITY AND THE CONSERVATION AUTHORITY.

MINIMUM EROSION AND SEDIMENT CONTROL PLAN REQUIREMENTS:

- TIME THE DEMOLITION AND EXCAVATION ACTIVITIES SO THAT THEY OCCUR NO SOONER THAN IS NECESSARY FOR SUBSEQUENT CONSTRUCTION ACTIVITIES.
- LANDSCAPE THE SITE AS SOON AS PRACTICALLY POSSIBLE.
- USE SILT FENCES AROUND ANY STOCKPILES OF SOIL.
- PRIOR TO CONSTRUCTION, SILT FENCE BARRIERS (OPSD 219.110) WILL BE PLACED ALONG THE PROPERTY LINES AS ON THE DRAWING.
- THE SILT FENCE SHOULD BE REMOVED ONLY WHEN THE SITE IS STABILIZED.
- INSTALL FILTER CLOTH ACROSS ALL EXISTING AND PROPOSED CATCH BASINS AND CATCH BASIN MANHOLES PRIOR TO CONSTRUCTION.



LIGHT PAVEMENT STRUCTURE DETAIL

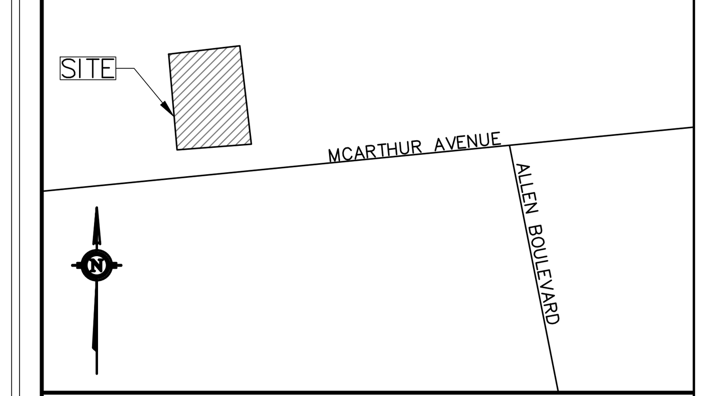
NOTES:

- SUBGRADE TO BE INSPECTED BY GEOTECHNICAL ENGINEER PRIOR TO THE ADDITION OF ANY GRANULAR MATERIAL OR EARTH BORROW

DRAWING No: 180140-GEC

DRAWING NAME: SITE GRADING & EROSION CONTROL PLAN

KEY PLAN:
N.T.S.



0 1 2 3 4 5 10

SCALE 1:100 METRES

GENERAL NOTES:

1. All dimensions are in metres; all elevations are in metres and are geodetic. TBM = Top of grate of STM-MH1. Elevation= 63.66.
2. This is not a legal survey. Boundary information was derived from Plan of Survey of PART OF LOT G REGISTERED PLAN NO. 381 surveyed by Arpentage Dutrisac Surveying Inc. on November 23rd, 2017.
3. Contractor is responsible for location and protection of utilities.
4. All dimensions to be verified on site by contractor prior to construction.
5. Any changes made to this plan must be verified and approved by Kollaard Associates Inc.
6. Client is responsible for acquiring all necessary permits. This drawing is not for construction until a building permit has been granted.
7. The proposed grades have been set and verified for site grading control only. The grade raise at the building location should be verified with regard to subsurface conditions by qualified geotechnical personnel after completion of the excavation.
8. The underside of footing elevation has been set based on the information available and may not have accounted for actual ground water conditions at the exact house location and should be verified by qualified geotechnical personnel upon completion of the excavation.
9. A geotechnical engineer should be retained to provide recommendations with respect to the sub-grade conditions prior to footing installation.
10. The owner agrees to prepare and implement an erosion and sediment control plan to the satisfaction of the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current Best Management Practices for Erosion and Sediment Control such as, and not limited to installing filter cloths across manhole/catchbasin lids to prevent sediments from entering structures and install and maintain a light duty silt fence barrier as required.
11. All materials and construction to be in accordance with City of Ottawa standards and Ontario Provincial Standards and Specifications; sewer and watermain material types; disinfection, provide minimum 2.4 metres of cover for water services, cathodic protection, City of Ottawa insulation specifications for watermain, pipe bedding, reinstatement of disturbed areas and leakage testing.
12. Reference to Kollaard File No. 180140 for Storm Water Management Design and Geotechnical Report.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL	02/28/2019	AVB

CLIENT:
BERGERON CONSTRUCTION

PROJECT:
PROPOSED MULTI-USE BUILDING

LOCATION:
257 MCARTHUR AVENUE
OTTAWA ONTARIO
K1L 6P3

CONSULTANTS:

Kollaard Associates
Engineers

P.O. BOX 189, 210 PRESCOTT ST. (613) 860-0923
KEMPTVILLE, ONTARIO info@kollaard.ca
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http://www.kollaard.ca

LICENSED PROFESSIONAL ENGINEER
FEB 28, 2019
S.E. deWit
100079612
PROVINCE OF ONTARIO

DESIGNED BY: SD	CHECKED BY: SD
DRAWN BY: AVB	APPROVED BY: SD
DATE: JAN 28, 2019	
DRAWING NUMBER: 180140-GEC	
PROJECT NUMBER: 180140	

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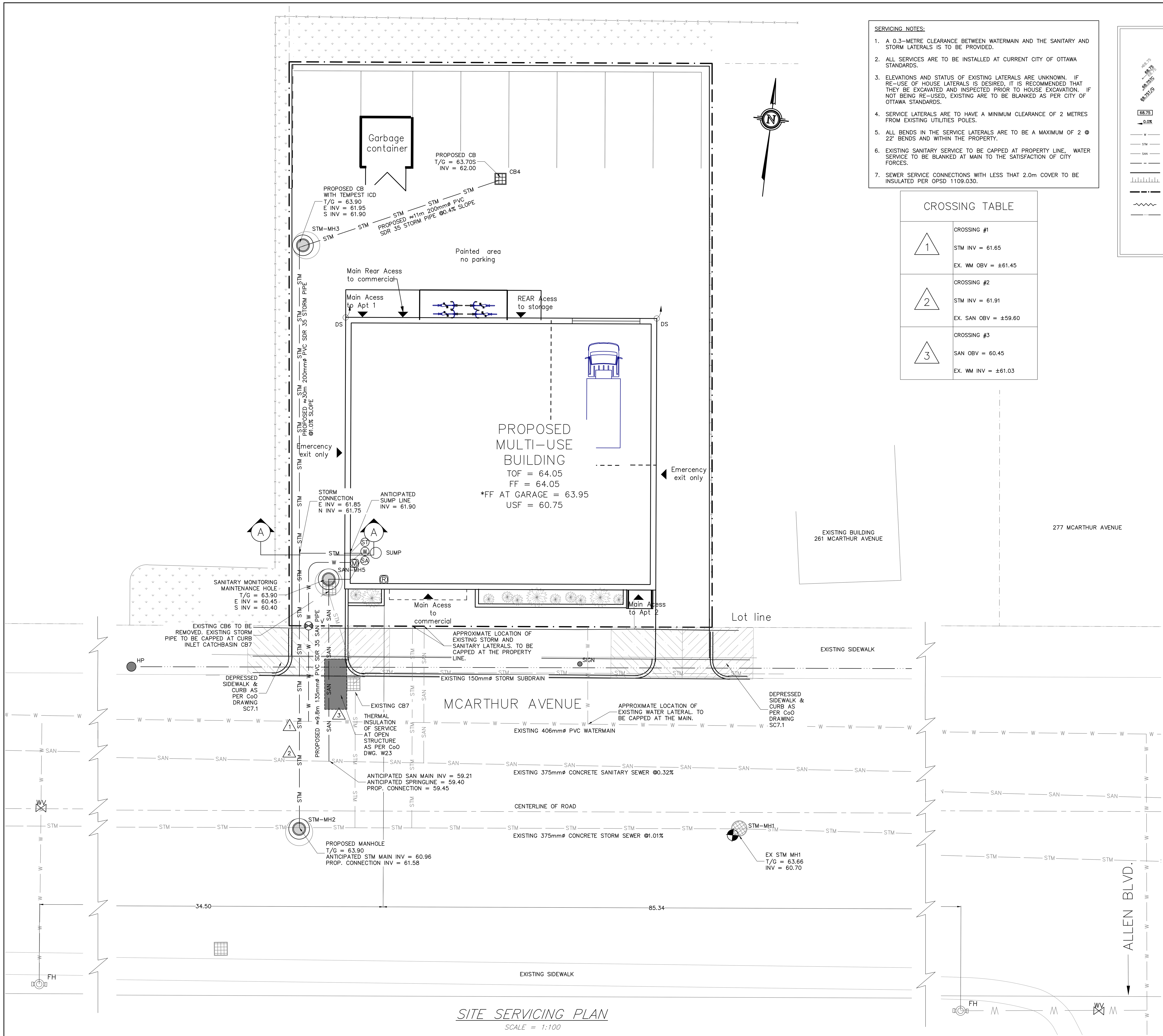


SITE SERVICING PLAN

SCALE = 1:100

SERVICING NOTES:

1. A 0.3-METRE CLEARANCE BETWEEN WATERMAIN AND THE SANITARY AND STORM LATERALS IS TO BE PROVIDED.
2. ALL SERVICES ARE TO BE INSTALLED AT CURRENT CITY OF OTTAWA STANDARDS.
3. ELEVATIONS AND STATUS OF EXISTING LATERALS ARE UNKNOWN. IF RE-USE OF HOUSE LATERALS IS DESIRED, IT IS RECOMMENDED THAT THEY BE EXCAVATED AND INSPECTED PRIOR TO HOUSE EXCAVATION. IF NOT BEING RE-USED, EXISTING ARE TO BE BLANKED AS PER CITY OF OTTAWA STANDARDS.
4. SERVICE LATERALS ARE TO HAVE A MINIMUM CLEARANCE OF 2 METRES FROM EXISTING UTILITIES POLES.
5. ALL BENDS IN THE SERVICE LATERALS ARE TO BE A MAXIMUM OF 2 @ 22° BENDS AND WITHIN THE PROPERTY.
6. EXISTING SANITARY SERVICE TO BE CAPPED AT PROPERTY LINE, WATER SERVICE TO BE BLANKED AT MAIN TO THE SATISFACTION OF CITY FORCES.
7. SEWER SERVICE CONNECTIONS WITH LESS THAT 2.0m COVER TO BE INSULATED PER OPSD 1109.030.

CROSSING TABLE	
1	CROSSING #1 STM INV = 61.65 EX. WM OBV = ±61.45
2	CROSSING #2 STM INV = 61.91 EX. SAN OBV = ±59.60
3	CROSSING #3 SAN OBV = 60.45 EX. WM INV = ±61.03

LEGEND

EXISTING ELEVATION	EXISTING HYDRO POLE
PROPOSED/EXISTING ELEVATIONS	EXISTING HYDRO GUY WIRE ANCHOR
PROPOSED TOP OF CURB ELEVATION	EXISTING FIRE HYDRANT
PROPOSED TOP OF GRATE ELEVATION	EXISTING WATER VALVE
PROPOSED ELEVATION	WATER METER
DRAINAGE SLOPE	REMOTE WATER METER
WATERMAIN	PROPOSED WATER VALVE
STORM SEWER	PROPOSED DOWNSPOUT LOCATION
SANITARY SEWER	EXISTING STORM MANHOLE
CENTRELINE OF ROAD	EXISTING SANITARY MANHOLE
EDGE OF ROAD	EXISTING CATCH BASIN
TOP OF SLOPE	PROPOSED CATCH BASIN
PROPERTY LINE	PROPOSED STORM MANHOLE
SILT FENCE	PROPOSED SANITARY MANHOLE
OVERHEAD UTILITY WIRES	TEMPORARY BENCHMARK

WATERMAIN NOTES:

1. CITY TO SUPPLY, INSTALL & DISINFECT THE WATER SERVICE; CONTRACTOR TO EXCAVATE, BACKFILL AND REINSTATE THE ROADWAY AS PER STD DWG R10.
2. SPECIFICATIONS:

ITEM REFERENCE	SPEC. No.	City Std Dwg No.
WATERMAIN BEDDING AND BACKFILL OPSD	802.010/802.031	W17 (trench detail)
CATHODIC PROTECTION OPSD	1109.010	W40
PRESSURE TESTING AWWA	C-605-5	
CHLORINATION AWWA	C-651-05	
WATERMAIN MATERIAL	PVC DR18	(CLASS 150)

3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED. WHERE LESS THAN 2.4m COVER, THERMAL INSULATION IS TO BE PROVIDED AS PER CITY STD DWG W22 (In shallow trenches), W23 (At open structures).
4. A MINIMUM OF 0.5m VERTICAL CLEARANCE IS REQUIRED BETWEEN THE WATERMAINS AND ALL UTILITIES AND SEWERS. IN LOCATIONS WHERE THIS IS NOT ACHIEVABLE, MUST FOLLOW PROCEDURE F-6-1 SEC. 5.2 OF THE ONTARIO DRINKING WATER RESOURCES ACT.
5. METALLIC WARNING TAPE SHALL BE USED OVER ALL WATERMAINS.
6. INSTALL AND TEST TRACER WIRE FOR ALL PROPOSED WATERMAIN IN ACCORDANCE WITH THE CITY OF OTTAWA DESIGN STANDARDS AS SPECIFIED IN SECTION 8.28.
7. EXISTING WATERMAIN INFORMATION SHOWN ON MCARTHUR AVENUE IS BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION OF WATERMAIN AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
8. WATER SHUTOFF VALVE AND VALVE BOX TO BE WITHIN THE ROAD ALLOWANCE AND LOCATED A MINIMUM OF 1.0 METRES FROM THE BUILDING FOUNDATION. TYPICAL PRIVATE SERVICE AS PER STD. DWG. W50 (with the exception that the V&VB are to be located 1.0 m minimum from the foundation wall); VALVE BOX ASSEMBLY AS PER STD. DWG. W24.
9. CONNECTIONS AT ELBOWS AND TEEs IN WATER MAINS SHOULD BE MADE WITH THE USE OF JOINT RESTRAINERS DESIGNED FOR WATERMAIN APPLICATION. JOINT AND PIPE RESTRAINERS SHOULD MEET THE REQUIREMENTS OF AWWA C900, C905 AND C907 AND ASTM F1674-11. JOINT RETRAINERS SHOULD BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS.
10. ALL CONNECTORS, RODS AND VALVE BOLTS SHALL BE STAINLESS STEEL.
11. VALVES ARE TO BE OPERATED BY CITY OF OTTAWA STAFF ONLY.
12. NO CONNECTION TO EXISTING WATER NETWORK SHALL BE COMPLETED UNTIL A WATER PERMIT IS OBTAINED FROM THE CITY OF OTTAWA AND CITY OF OTTAWA FORCES ARE ON HAND TO MAKE THE CONNECTION.

SEWER NOTES:

1. ONTARIO ONE CALL AT 1-800-400-2255.
2. ALL NOTES ARE AS PER CURRENT CITY/PROVINCIALL STANDARDS, GUIDELINES, BY-LAWS AND DETAIL DRAWINGS.
3. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS.
4. SPECIFICATIONS:

ITEM	CITY OF OTTAWA STD DWG NO.
CATCH BASIN	S1-S4.1, S19-S25 & S28-S31
STORM/SANITARY MANHOLE	S12-S13.4, S24-S25, & S33
REAR YARD CBs	S29 & S30
BACKWATER VALVES	S14-S14.2 & S18.
WASTE WATER SAMPLING/INSPECTION CHAMBER	S18.1
SEWER SERVICE CONNECTION	S11 & S11.1
STORM MANHOLE FRAME & COVER	S24.1 & S25
CATCH BASIN FRAME & COVER	S19, S22 & S23
SEWER TRENCH	S6 & S7

SERVICE LATERALS:

SANITARY - PVC DR 35 @ 1.0% (MIN)
STORM - PVC DR 35 @ 1.0% (MIN)
WATER - PEX SDR 9 MUNICIPAL WATER SERVICE TUBING (SUCH AS Blue904™ OR APPROVED EQUIVALENT)

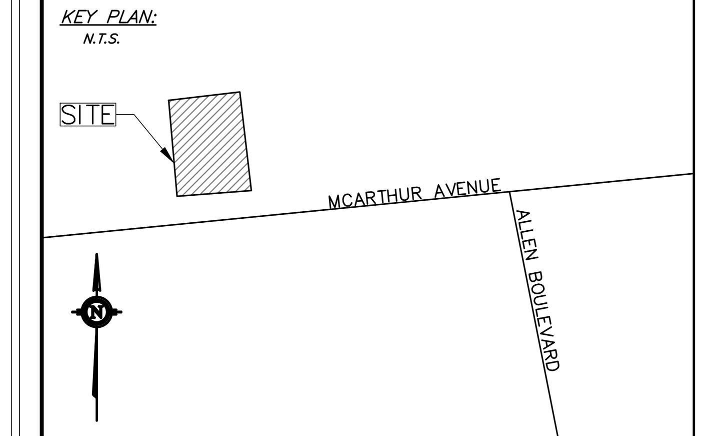
TRENCH BACKFILL AS PER GEOTECHNICAL ENGINEER RECOMMENDATIONS REFERENCE GEOTECHNICAL REPORT PREPARED BY KOLLAARD ASSOCIATES DATED JANUARY 29, 2019.

5. INSULATE ALL STORM PIPES THAT HAVE LESS THAN 1.2m COVER AND ALL SANITARY PIPES THAT HAVE LESS THAN 2.1m COVER WITH THERMAL INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
6. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
7. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTION PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). SANITARY RUBBER GASKET TYPE JOINTS SHALL CONFORM TO CSA (B-182.2,3,4).
8. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
9. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS (AS PER SUMP DETAIL ON OPSD 701.010), UNLESS OTHERWISE INDICATED.
10. BUILDING CONTRACTOR TO PROVIDE TEMPORARY ADDITIONAL GRANULAR BACKFILL ABOVE SHALLOW CULVERTS AND STORM SEWERS TO SUPPORT HEAVY CONSTRUCTION EQUIPMENT.
11. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmø OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES TO MUNICIPAL SATISFACTION.
12. WHERE THE SANITARY SEWER CROSSES ABOVE THE WATERMAIN, THE CONTRACTOR IS TO PROVIDE A MINIMUM OF 0.50m VERTICAL SEPARATION, ADEQUATE STRUCTURAL SUPPORT OF THE SEWER TO PREVENT SETTLING AND EXCESSIVE JOINT DEFLECTION AND ENSURE THAT THE LENGTH OF THE WATER PIPE BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS ARE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.

DRAWING No: 180140-SER

DRAWING NAME: SITE SERVICING PLAN

KEY PLAN:
N.T.S.



0 1 2 3 4 5 10

SCALE 1:100 METRES

GENERAL NOTES:

1. All dimensions are in metres; all elevations are in metres and are geodetic. TBM = Top of grate of STM-MH1. Elevation= 63.66.
2. This is not a legal survey. Boundary information was derived from Plan of Survey of PART OF LOT G REGISTERED PLAN NO. 381 surveyed by Arpentage Dutrisac Surveying Inc. on November 23rd, 2017.
3. Contractor is responsible for location and protection of utilities.
4. All dimensions to be verified on site by contractor prior to construction.
5. Any changes made to this plan must be verified and approved by Kollaard Associates Inc.
6. Client is responsible for acquiring all necessary permits. This drawing is not for construction until a building permit has been granted.
7. The proposed grades have been set and verified for site grading control only. The grade raise at the building location should be verified with regard to subsurface conditions by qualified geotechnical personnel after completion of the excavation.
8. The underside of footing elevation has been set based on the information available and may not have accounted for actual ground water conditions at the exact house location and should be verified by qualified geotechnical personnel upon completion of the excavation.
9. A geotechnical engineer should be retained to provide recommendations with respect to the sub-grade conditions prior to footing installation.
10. The owner agrees to prepare and implement an erosion and sediment control plan to the satisfaction of the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current Best Management Practices for Erosion and Sediment Control such as, and not limited to installing filter cloths across manhole/catchbasin lids to prevent sediments from entering structures and install and maintain a light duty silt fence barrier as required.
11. All materials and construction to be in accordance with City of Ottawa standards and Ontario Provincial Standards and Specifications; sewer and watermain material types; disinfection, provide minimum 2.4 metres of cover for water services, cathodic protection, City of Ottawa insulation specifications for watermain, pipe bedding, reinstatement of disturbed areas and leakage testing.
12. Reference to Kollaard File No. 180140 for Storm Water Management Design and Geotechnical Report.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL	02/28/2019	AVB

CLIENT: BERGERON CONSTRUCTION

PROJECT: PROPOSED MULTI-USE BUILDING

LOCATION:
257 MCARTHUR AVENUE
OTTAWA ONTARIO
K1L 6P3

CONSULTANTS:

Kollaard Associates
Engineers

P.O. BOX 189, 210 PRESCOTT ST.
KEMPTVILLE, ONTARIO
K0G 1J0 FAX (613) 258-0475
http://www.kollaard.ca
(613) 860-0923
info@kollaard.ca

LICENSED PROFESSIONAL ENGINEER
FEB. 28, 2019
S.E. deWit
100079612
PROVINCE OF ONTARIO

DESIGNED BY: SD	CHECKED BY: SD
DRAWN BY: AVB	APPROVED BY: SD
DATE: JAN 28, 2019	
DRAWING NUMBER: 180140-SER	
PROJECT NUMBER: 180140	

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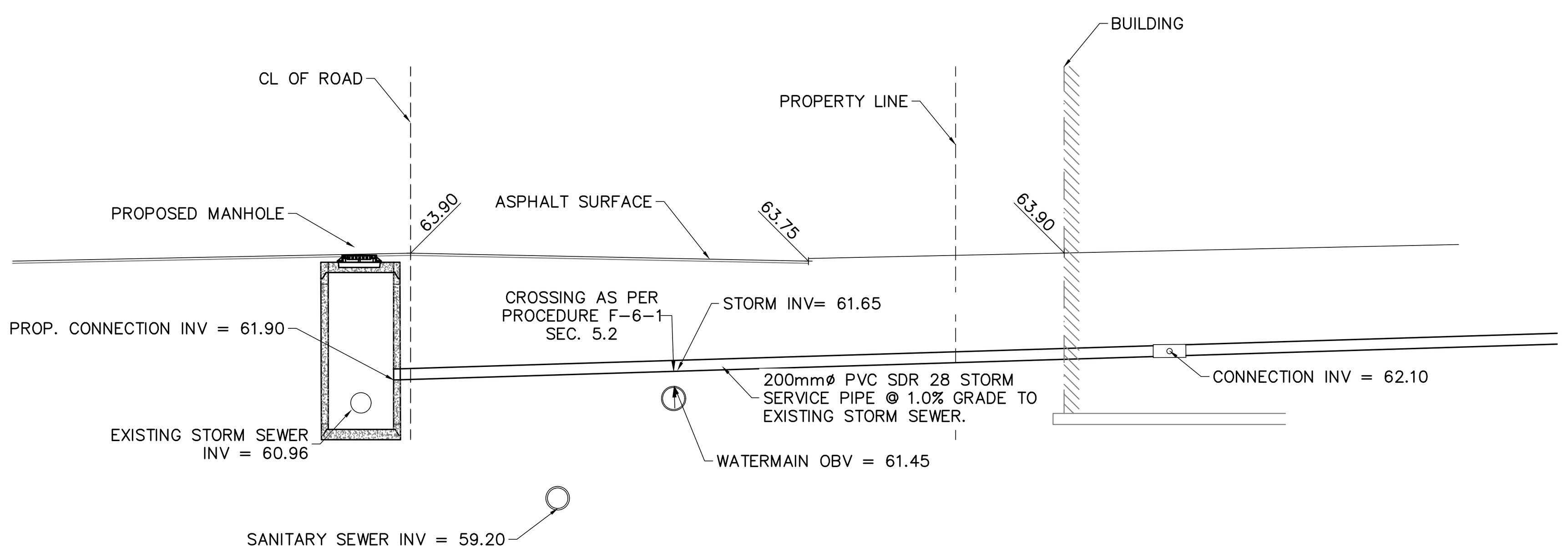
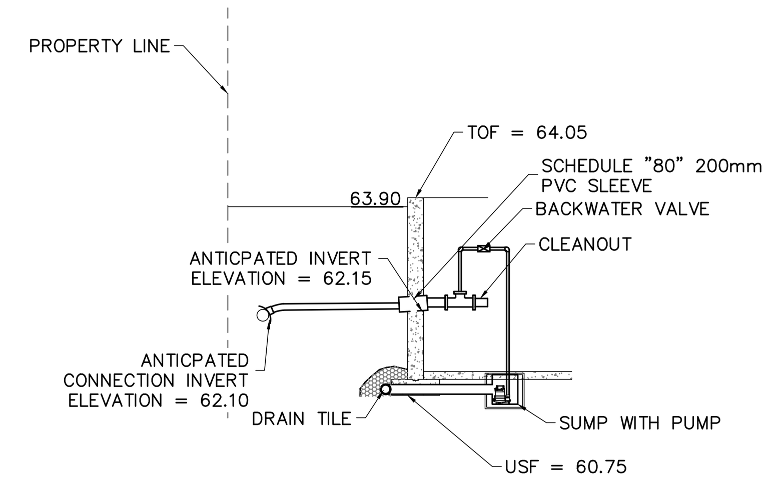
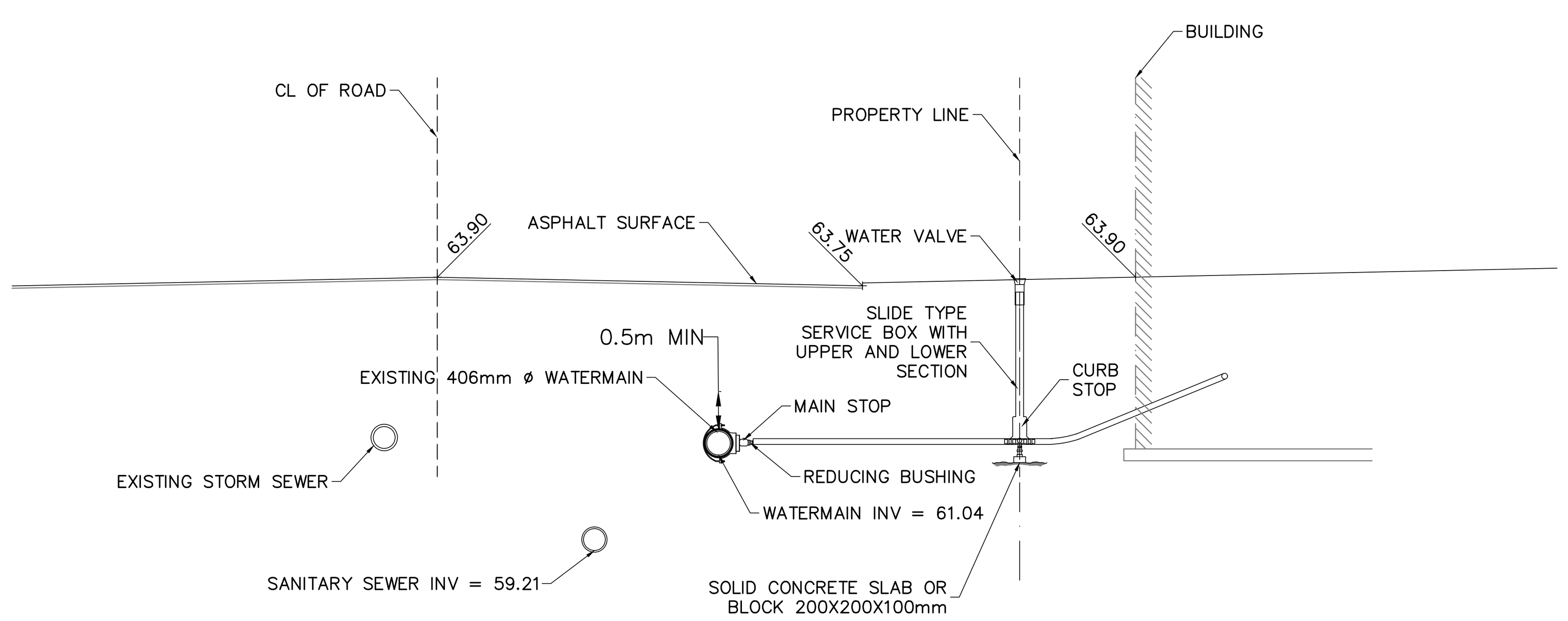


STORM SERVICE CONNECTION
SCALE = 1:100



SECTION A–A



WATER SERVICE CONNECTION
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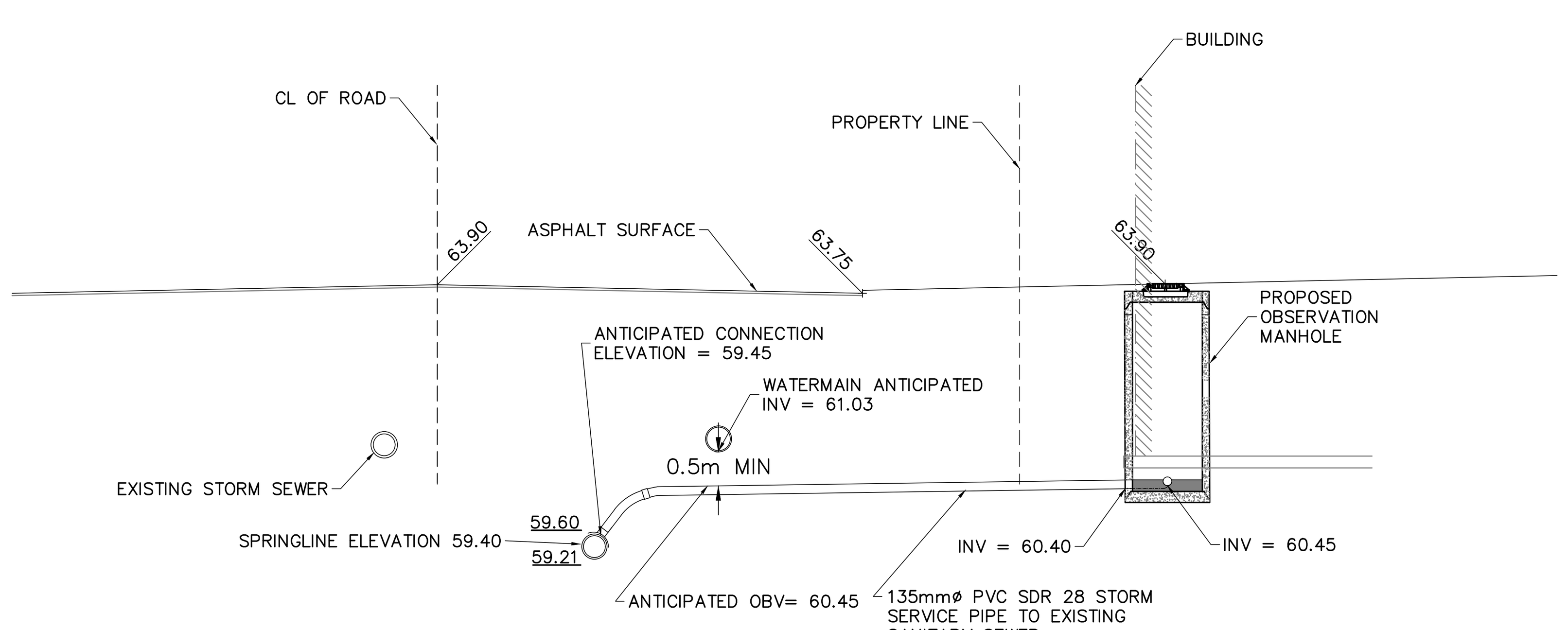
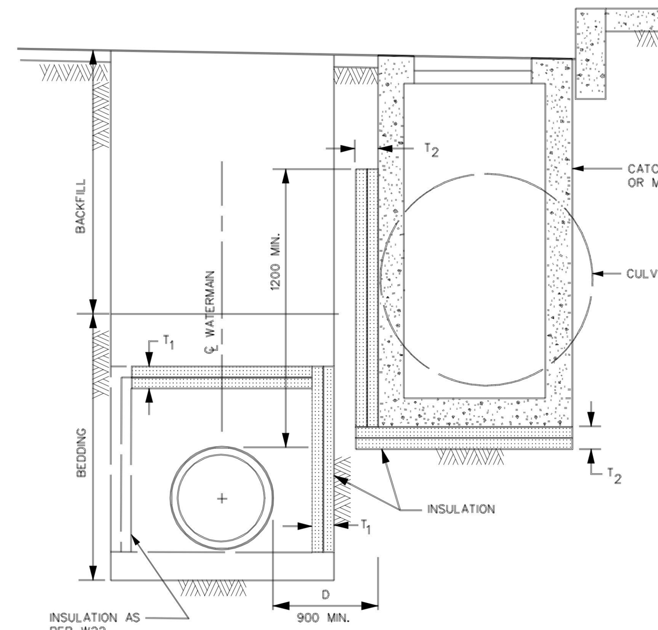


SANITARY SERVICE CONNECTION
SCALE = 1:100

INSULATION REFERENCE TABLE	
D DISTANCE FROM C.B. OR M.H. WALL	T REQUIRED INSULATION THICKNESS $T = T_1 + T_2$
2400 - 1800 mm.	50 mm
1800 - 1500 mm.	75 mm
1500 - 1200 mm.	100 mm
1200 - 900 mm.	125 mm



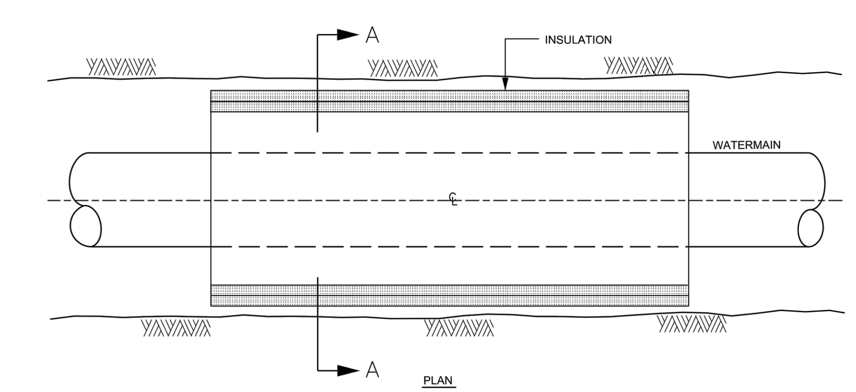
NOTES

FOR WATERMAINS & SERVICES IN PROXIMITY TO CATCHBASINS MAINTENANCE HOLES, CULVERTS ETC.

1. INSULATION SHALL EXTEND 1000 mm EACH WAY FROM THE ENDS OF THE STRUCTURE, PARALLELED TO THE WATERMAIN.
2. STAGGER JOINTS OF MULTIPLE SHEETS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
4. INSULATION CAN BE AT EITHER LOCATION OR BOTH.

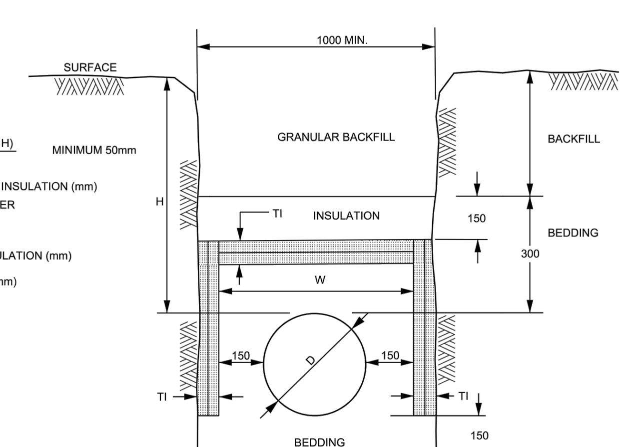
Ottawa — THERMAL INSULATION OF WATER-MAINS AT OPEN STRUCTURES

DATE: MAY 2001
REV. DATE: FEB 2004
DWG. No.: W23



$TI = \frac{(2400 - H)}{12}$ MINIMUM 50mm

TI = THICKNESS OF INSULATION (mm)
H = DEPTH OF COVER
W = D + 300
W = WIDTH OF INSULATION (mm)
D = O.D. OF PIPE (mm)



SECTION A - A

NOTES

FOR 150 - 400mm (NOMINAL DIAMETER) WATERMAINS, WHERE THE DEPTH OF COVER IS LESS THAN 2400mm

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 25mm.
2. IN PROXIMITY OF MAINTENANCE HOLES, CULVERTS, CATCHBASINS, ETC., INSULATION SHALL BE PLACED PER DETAIL W23
3. DEPTH OF COVER LESS THAN 1200mm REQUIRES SPECIAL DESIGN
4. STAGGER JOINTS OF MULTIPLE SHEETS.
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.

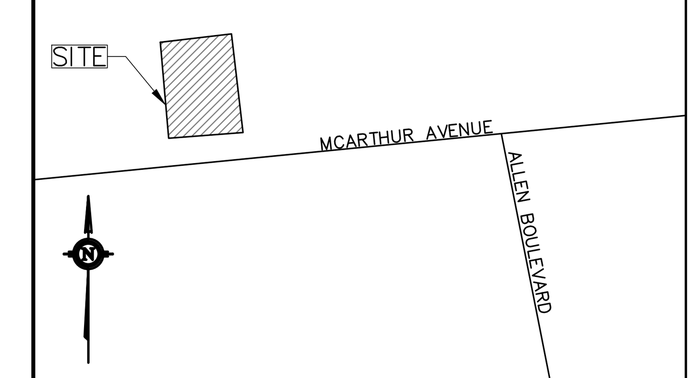
Ottawa — THERMAL INSULATION FOR WATERMAINS IN SHALLOW TRENCHES

DATE: MAY 2001
REV. DATE: MARCH 2013
DWG. No.: W22

DRAWING No: 180140–DETAILS

DRAWING NAME: SITE SERVICING DETAILS

KEY PLAN:
N.T.S.



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12. Reference to Kollaard File No. 180140 for Storm Water Management Design and Geotechnical Report.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL	02/28/2019	AVB

CLIENT: BERGERON CONSTRUCTION

PROJECT: PROPOSED MULTI–USE BUILDING

LOCATION: 257 MCARTHUR AVENUE
OTTAWA ONTARIO
K1L 6P3

CONSULTANTS:

Kollaard Associates
Engineers

P.O. BOX 189, 210 PRESCOTT ST. (613) 860–0923
KEMPTVILLE, ONTARIO info@kollaard.ca
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LICENSED PROFESSIONAL ENGINEER
FEB. 28, 2019
S.E. deWit
100079612
PROVINCE OF ONTARIO

DESIGNED BY: SD	CHECKED BY: SD
DRAWN BY: AVB	APPROVED BY: SD
DATE: JAN 28, 2019	
DRAWING NUMBER: 180140–DETAILS	
PROJECT NUMBER: 180140	

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