Robinson
Land Development

Avalon Encore – Stage 6
Block 236
Infrastructure Servicing Brief

Prepared For:

Minto Communities Inc.

Prepared By:

Robinson Land Development

Our Project No. 17099
March 19, 2018

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1.0 INTRODUCTION

Robinson Land Development (a division of Robinson Consultants Inc.) has been retained by Minto Communities Inc. to provide the detailed engineering design for the water, storm and sanitary servicing for a proposed 64 unit terrace homes. This development is within Minto's Avalon Encore – Stage 6 residential subdivision currently under design review with the City of Ottawa. The site is tributary to the existing Neighbourhood 5 Ultimate Stormwater Management Facility. The location of the development is shown on Figure 1.

This development has been designed in accordance with current City of Ottawa design standards and the recommendations/guidelines stated in the following reports:

- IBI Group report titled "Mer Bleue Community Design Plan Infrastructure Servicing Study", dated April, 2006
- IBI Group report titled "Avalon West (Neighbourhood 5) Stormwater Management Facility Design, Revision 5", dated October 2013
- IBI Group Memorandum :Avalon West Stormwater Management Facility Design Report; Proposed Mattamy Bisson Lands", dated November 3, 2014
- Atrel Engineering report titled "Avalon Encore Stage 5, Stormwater Management watermain, Storm sewer and Sanitary sewer, Design Brief, Revision 2" dated Janauary, 2017
- DSEL & JFSA report titled "Sanitary Overflow Analysis for the Bission Lands / Mer Bleue Road" dated May 28, 2015
- Atrel Engineering report titled "Stormwater Management and Site Servicing Design Brief, Avalon Encore – Stage 6" dated November 20, 2017

2.0 WATERMAIN DISTRIBUTION

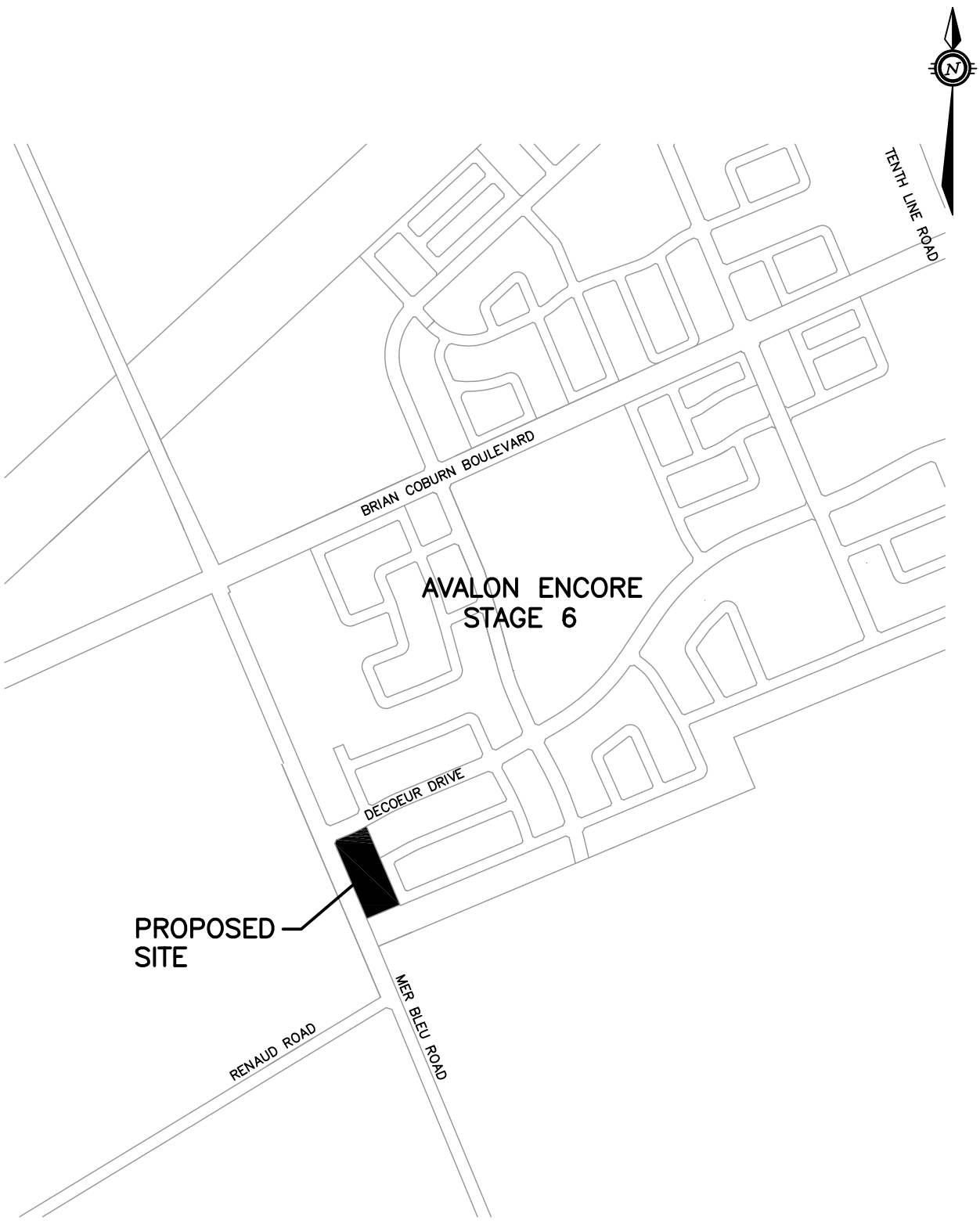
The lands will be serviced from the 2E pressure zone. Boundary conditions for the water distribution system were compared to existing models performed on the surrounding networks and confirmed with the City of Ottawa.

The existing water supply system in the vicinity of this development consists of a 406 mm diameter watermain along Mer Bleue Road (constructed in 2015). A 305mm diameter watermain will be constructed on Decoeur Drive and on Street No. 2. The proposed development will be serviced with a 203mm diameter watermain looping through the site connecting to the 305mm diameter watermain on Decoeur Drive and on Street No. 2.

2.1 Water Network Hydraulic Analysis

A steady state hydraulic model was created utilizing the watermain layout from the proposed servicing drawings for the subdivision prepared by Atrel Engineering Ltd. Junction elevations were input based on the proposed grading plan for the development. Domestic water demands were calculated based on the City of Ottawa Water Design Guidelines and can be found in Appendix 'D'. The boundary conditions received from the City of Ottawa were utilized for all simulations. Pipe and junction reports that summarize the values used can be found in Appendix 'D'. The model was run for the following conditions:

- Maximum Hour
- Maximum Day plus fire flow
- Basic Day – High pressure check



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scale 1:10000	CLIENT: MINTO COMMUNITIES INC.	project no. 17099
date 06/03/18	TITLE: KEY PLAN	FIG 1.0
drawn by JHB		

Figure 2: Hydraulic Model Set-up

2.2 Boundary Conditions 2336 Tenth Line Road.

Information Provided
Date provided: 07 March 2018

Provided Information:

	Demand	
Scenario	**L/min**	**L/s**
Average Daily Demand	42	0.7
Maximum Daily Demand	105	1.8
Peak Hour	231	3.9
Fire Flow Demand	15000	250.0

# of connections 1

Location

Results

Connection 1 - Mer Bleue Rd

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	61.4
Peak Hour	126.7	55.8
Max Day plus Fire (15,000 l/min)	123.8	51.7

[1] Ground Elevation = 87.42 m

Disclaimer

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

2.3 Hydraulic Modelling Results

2.3.1 Basic Day Demand (High Pressure Check)

The model was run using the high pressure boundary conditions provided by the City of Ottawa. The pressure was checked at each stacked townhome location, referenced to ground elevation. The results show pressure in the range of 59-60 psi. Since the expected high pressure is below 80 psi, pressure reducing valves will not be necessary.

2.3.2 Maximum Hour Demand

The model was run using the maximum hour boundary conditions provided by the City of Ottawa. The pressure was checked at each stacked townhome location, referenced to ground elevation. The results show pressures in the range of 53 to 55 psi. Since the expected maximum hour pressure is above 40 psi, it is considered acceptable.

2.3.3 Fire Flow Simulation

A fireflow simulation was completed utilizing the fireflow calculated using the Fire Underwriter's Service (FUS) Long Form. The value calculated was based on the area for one of the 12 unit stacked townhome units. The results of the FUS long form indicate that 15,000 Lpm (250 L/s) of fireflow is required from the Public water distribution system on Decoeur Drive. The results of the fireflow simulation indicate that there is 24,400 Lpm available on the hydrant on Decoeur Drive and 30,600 Lpm available from the proposed 203mm diameter service connection into the site. The fireflow available from the private hydrant on the site would be based on the Ontario Building Code. The fireflow simulation indicates that there is 8,200 Lpm available from the private hydrant. The results of the fireflow simulation can be seen in Appendix 'D'.

3.0 SANITARY SEWER DESIGN

Sanitary sewer flows for this proposed development have been calculated based on the City of Ottawa criteria indicated in the Ottawa Design Guidelines (Section 4). Refer to Appendix B for the sanitary sewer design sheet and drainage area plan 17099-SAN. The design criteria for this development are as follows:

- Average residential flow — 350 Lcap/day
- Peaking factor for residential flow (Harmon formula) — (1 + (14 / (4 + P1/2)))*k
- (max. = 4.0, min. = 2.0,k = 0.4 to 0.6, P = population in 1000's)
- Extraneous flow allowance — 0.28 L/sec/ha
- Population density for single family units — 3.4 persons/unit
- Population density for town-home units — 2.7 persons/unit
- Undeveloped land — 60 persons/gross ha.
- Minimum full flow velocity — 0.6 m/sec
- Maximum velocity — 3.0 m/sec
- Minimum pipe size — 200 mm
- If 10 or fewer units are tributary to a sewer, than a 200 mm diameter sewer at a minimum grade of 0.65% shall be used.

The proposed 200 mm diameter sanitary sewer will have adequate capacity to convey the peak sanitary flows from the development to the municipal sewer on Street No. 2. Refer to the sanitary sewer design sheet and Sanitary Drainage Area Plan in **Appendix B** for more details.

The report titled "Sanitary Overflow Analysis for the Bisson Lands / Mer Bleue Road" dated May 28, 2015 by DSEL and JFSA, summarizes the latest analysis regarding the sanitary overflow system for Tenth Line Road Pumping Station's tributary area in Neighbourhoods 4 and 5. The sanitary emergency HGL at the proposed connection to Street No. 2 is approximately 85.55m. The lowest designed USF in Block 236 is 1.3m above the HGL which exceeds the minimum 0.3m freeboard required.

3.1 Sanitary Sewer Temporary Flow Control Device

As per the City of Ottawa's Technical Bulletin No. SD-2011-1 a temporary orifice flow limiting/control device is required for the new sanitary sewer system. The sizing of the orifice requirements is as per Section 8.3.8.1 of the City's Sewer design guidelines as follows:

$Q = C(A)(2gh)^{0.5}$
$A = Q / (C(2gh)^{0.5})$
$\pi r2 = Q / (C(2gh)^{0.5})$
$D = 2r = 2 \times (Q / (\pi (C(2gh)^{0.5})))^{0.5}$

$Q_{(MH113)}$ = 3.02 L/s (per sanitary design sheet)

$D_{(MH113)} = 2 \times (0.00302 / (3.14*(0.61(2*9.81*2.0)^{0.5})))^{0.5}$ = 31.7 mm (therefore use minimum 67mm x 67mm diamond plug-type control in outlet per Guidelines) in outlet of 200mm dia. pipe.

Where;
C = 0.61 head loss coefficient for an orifice
H = 2.0 m (as per guidelines since ground elevations to pipe centreline is in excess of 2m)
A= Area of orifice; r= radius of orifice; g= acceleration due to gravity

4.0 STORM DRAINAGE SYSTEM

The minor system has been designed using the rational method, to convey frequent storm events up to the 1:5 year return period assuming inlet control devices are not installed. The minor system is connected to the 600mm dia. storm sewer on Street No. 2. The minor system drains to the existing Neighbourhood 5 Ultimate Stormwater Management Facility.

In accordance with the IBI Group Stormwater Management Servicing Report, storm drainage is to be controlled at the source to limit runoff rate from the site to 220 L/s/ha. Runoff entering the minor system is controlled using inlet control devices.

Major overland flow has been routed by grading, to drain through the parking lot towards the east and outlet to Street No. 2. The parking lot has been designed to allow ponding to a maximum depth of 0.30m.

4.1 Storm Sewer Hydraulic Grade Line

The on-site local storm sewer system which outlets to the storm sewer on Street No, 2 has been designed to convey flows based on the City of Ottawa 5 year Intensity Frequency Duration curve. The hydraulic grade line in the storm sewer on Street No. 2 at the proposed connection (MH209) is 85.10 (as per Atrel Engineering Ltd. Dwg. 170401-P50). The hydraulic grade line is below the obvert storm sewer and therefore it is not anticipated that the hydraulic grade line would be elevated in the on-site storm sewer system. The proposed development drains to the existing Neighbourhood 5 Ultimate Stormwater Management Facility and is not affected by the HGL elevation from the SWM Facility (100 year pond elevation = 84.51m). See Appendix C for the on-site hydraulic grade line calculations.

4.2 Storm Sewer Temporary Flow Control Devices

As required per the City of Ottawa's Technical Bulletin No. SD-2011-1, a temporary orifice flow limiting/control device is required for the new storm sewer system. The storm system for the development will have a plug-type control implemented in the outlet pipe of proposed MH208. The sizing of the orifice requirements is as per Section 8.3.8.1 of the City's Sewer design guidelines as follows:

$Q = C(A)(2gh)^{0.5}$ $Q_{(MH208)}$ = 61.18 L/s (per storm design sheet)
$A = Q / (C(2gh)^{0.5})$
$\pi r2 = Q / (C(2gh)^{0.5})$
$D= 2r = 2 \times (Q / (\pi (C(2gh)^{0.5})))^{0.5}$
$D_{(MH208)} = 2 \times (0.061 / (3.14*(0.61(2*9.81*2.69)^{0.5})))^{0.5}$ =133 mm (in the 300mm outlet pipe)

Where;
C = 0.61 head loss coefficient for an orifice
H = 2.69 m
A= Area of orifice; r= radius of orifice; g= acceleration due to gravity

The control will be removed once the newly connected storm sewer system have all inlet control devices installed and verified/certified as being correct in size and location.

5.0 STORMWATER MANAGEMENT CALCULATIONS

5.1 Allowable Release Rate

In accordance with the IBI Group Stormwater Management Servicing Report, storm drainage is to be controlled at the source to limit runoff rates to 220 L/s/ha. Runoff entering the minor system is controlled using inlet control devices. This development is approximately 0.81 hectares. Due to the grading design of the site there is 0.25 hectares that will free flow off the site to the subdivision and Mer Bleue Road. These free flow areas will be accommodated in Atrel Engineerings' stormwater management design of the subdivision. The remaining 0.56 hectares will be controlled to an allowable release rate of 123.2 L/s.

A = 0.56ha
Q(allowable) = 220 L/s x A(ha) = 220 x 0.56
Q(allowable) = 123.2 L/s

5.2 Post Development Average Run-off Coefficient

Area	Area (m2)	"C"
Building, Asphalt, Sidewalk	5857.17	0.9
Grass	2203.49	0.2

$$C = \frac{5857.17 \times 0.9 + 2203.49 \times 0.2}{8060.66}$$

C=0.71

As per Section 5.4.5.2.1 of the current 2012 Ottawa Sewer Design Guidelines, the runoff coefficient has been increased by 25% for the 100 year analysis in the calculations below.

Area	Area (m2)	"C"
Building, Asphalt, Sidewalk	5857.17	1.0 (0.9 x 1.25)
Grass	2203.49	0.25 (0.2 x 1.25)

$$C_{100} = \frac{5857.17 \times 1.0 + 2203.49 \times 0.25}{8060.66}$$

C_{100}=0.79

5.3 Overall Storage Requirements

The following table is a summary of area, run-off coefficient, release rate, required and provided storage.

Table 1.0
CBMH 1
100 yr. Storm Storage Requirements

Area = 0.03ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	1	351	23.3	16.0	7.3	0.4
	2	**315**	**20.9**	**16.0**	**4.9**	**0.6**
	3	286	19.0	16.0	3.0	0.5
	4	262	17.4	16.0	1.4	0.3

Table 1.1
CB 2
100 yr. Storm Storage Requirements

Area = 0.14ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	7	212	65.5	28.0	37.5	15.7
	8	199	61.6	28.0	33.6	16.1
	9	**188**	**58.2**	**28.0**	**30.2**	**16.3**
	10	179	55.2	28.0	27.2	16.3
	11	170	52.6	28.0	24.6	16.2

Table 1.2
CBMH 3
100 yr. Storm Storage Requirements

Area = 0.07ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	5	243	37.5	15.7	21.9	6.6
	10	**179**	**27.6**	**15.7**	**12.0**	**7.2**
	15	143	22.1	15.7	6.4	5.8
	20	120	18.6	15.7	2.9	3.5
	5	243	37.5	15.7	21.9	6.6

Table 1.3
CB 4
100 yr. Storm Storage Requirements

Area = 0.020ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	10	179	78.9	30.7	48.2	28.9
	15	**143**	**63.2**	**30.7**	**32.5**	**29.2**
	20	120	53.0	30.7	22.3	26.8
	25	104	45.9	30.7	15.2	22.8
	10	179	78.9	30.7	48.2	28.9

Table 1.4
CBMH 5
100 yr. Storm Storage Requirements

Area = 0.04ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	3	286	25.3	15.5	9.8	1.8
	4	**262**	**23.2**	**15.5**	**7.7**	**1.8**
	5	243	21.5	15.5	6.0	1.8
	6	226	20.0	15.5	4.5	1.6
	3	286	25.3	15.5	9.8	1.8

Table 1.5
CB 6
100 yr. Storm Storage Requirements

Area = 0.08ha
C = 0.79

Return Period	Time (min)	Intensity (mm/hr)	Flow Q in L/s	Allowable * Runoff in L/s	Net Runoff To Be Stored in L/s	Storage Req'd m^3
100 Year	5	243	42.9	17.9	25.0	7.5
	10	**179**	**31.6**	**17.9**	**13.7**	**8.2**
	15	143	25.3	17.9	7.4	6.6
	20	120	21.2	17.9	3.3	4.0
	5	243	42.9	17.9	25.0	7.5

5.4 Summary of Storage Provided

Table 2.0
Storage Provided (100 year design event)

Area	Release Rate (L/s)	Volume (m^3)		Pond Depth (m) To provide Required Storage
		Required	Available*1	
CBMH 1	16.0	0.60	0.60	0.07
CB 2	28.0	16.3	29.8	0.17
CBMH 3	15.7	7.2	17.3	0.13
CB 4	30.7	29.2	57.0	0.21
CBMH 5	15.5	1.8	15.0	0.11
CB 6	17.9	8.2	40.7	0.15

Note: *1 - The volume of the surface storage available is calculated using "Civil 3D" by Autodesk. This program creates three dimensional models of the proposed pond and of the top of ponded water surface. It then calculates a volume between these two surfaces, using three different algorithms, to ensure an accurate result.

There is a sufficient amount of storage available within the driving aisles and parking lot low points to contain the 100 year design event on site.

5.5 Inlet Control Device Calculations

Inlet controls are calculated based upon a standard orifice equation to achieve the target release rates as follows:

$Q = C(A)(2gh)^{0.5}$

C = 0.61
A = Area (m^2)
g = 9.81 m/s
h = Head (m)

Supporting calculations based on the above noted equation for each of the drainage areas and for the maximum head on each orifice during the 100 year event have been provided in Appendix C.

Table 3.0
Inlet Control Sizing Summary

Location	100 Year Release Rate (L/s)	Max. Head 100 yr (m)	Orifice Diam. (mm)	Orifice Type
CBMH 1	16.0	1.58	78.0	Tempest MHF
CB 2	28.0	1.27	109.1	Tempest MHF
CBMH 3	15.7	1.51	77.5	Tempest MHF
CB 4	30.7	1.28	113.9	Tempest MHF
CBMH 5	15.5	1.56	77.2	Tempest MHF
CB 6	17.9	1.25	86.8	Tempest MHF

6.0 EROSION AND SEDIMENT CONTROL

It will be necessary to implement the following sediment control measures, in accordance with current Ministry of Environment Best Management Practice guidelines, in order to minimize the transport of sediment to adjacent lands and into the existing storm sewer system. (see Appendix A, 17099-EC1 for details of the proposed control measures).
As a minimum, the following measures are proposed for this development:

- Silt fence along property boundaries where construction is taking place
- Filter socks are to be installed between the frame and cover of adjacent manholes and catchbasins
- Minimization, wherever possible, of exposed soils and cleared areas
- Soil stockpiles to be located away from any existing drainage ways and stabilized as soon as possible

These measures will be installed prior to construction and maintained in good order until construction has been completed and vegetation has been re-established in all disturbed areas.

7.0 CONCLUSION

The proposed 64 unit terrace homes development at the southeast corner of Mer Bleue Road and Decoeur Drive has been designed to contain the 1:100-year flow on site. Major overland flow has been routed to drain through the parking lot towards the east and outlet to Street No. 2. The parking lot has been designed to allow ponding to a maximum depth of 0.30m. The overland flow routes are shown on the drawings on 17099-GR1 in Appendix A.

This report satisfactorily addresses the method by which this site will meet the overall stormwater management requirements of the City of Ottawa. Inlet control devices are to be placed in all direct connection catchbasins. The recommended inlet control device is the Tempest MHF (see Appendix C). The ICD is to be installed in the outlet pipe of all catchbasins directly connected to the storm sewer system.

All storm sewers have been designed for a post-development 1:5-year storm event, which meets the current level of service for urban residential development. The storm sewer system will provide the usual 5-year level of service if the City of Ottawa considers it appropriate to remove the inlet control devices at some point in the future.

The hydraulic modelling has demonstrated that the proposed Avalon Encore – Stage 6 can be serviced by the proposed water distribution system consisting of 203mm, 152mm and 51mm diameter watermains. The hydraulic model created for the proposed private water distribution system indicated that the proposed water distribution system meets the City of Ottawa Water Design Guidelines for high pressure, maximum hour and maximum day plus fireflow.

In conclusion, sufficient capacity within the existing water, sanitary and storm municipal infrastructure exists to support the proposed 64 unit terrace homes development.

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MARCH 19/16

Appendix A

General Plan of Services
(Drawing #17099-S1)
Grading and Drainage Plan
(Drawing #17099-GR1)
Erosion and Sediment Control Plan
(Drawing #17099-EC1)

GENERAL NOTES:

MISCELLANEOUS:

1. THE CONTRACTOR TO VERIFY LOCATION AND ELEVATIONS OF ALL EXISTING SERVICES AND UTILITIES PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.
2. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED. ALL DRAWINGS SHOULD NOT BE SCALED BY THE CONTRACTOR. ANY MISSING OR QUESTIONABLE DIMENSIONS ARE TO BE CONFIRMED BY THE CONSULTANT IN WRITING.
3. CONSTRUCTION SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWING SUPPLEMENTS WHERE APPLICABLE. ONTARIO PROVINCIAL STANDARDS SHALL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE. ALL DRAWINGS TO BE CHECKED FOR CONFIRMATION WITH APPLICABLE BUILDING CODES.
4. ANY DISCREPANCIES, INTERPRETATIONS, CHANGES AND ADDITIONS TO THIS PLAN MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER, WHEN NOTED AND BEFORE PROCEEDING WITH CONSTRUCTION WORKS.
5. GEOTECHNICAL REPORT AVAILABLE FROM OWNER.
6. ALL DISTURBED AREAS TO BE REINSTATED TO EQUAL OR BETTER CONDITION. ALL NEW WORK SHALL TIE INTO EXISTING.

WATERMAIN, STORM AND SANITARY SEWERS:

7. ALL WATERMAIN, SANITARY AND STORM SEWER SERVICES, MATERIALS AND INSTALLATION SHALL CONFORM TO THE CURRENT CITY OF OTTAWA STANDARD DRAWINGS AND SPECIFICATIONS.
8. THERMAL INSULATION SHALL BE INSTALLED WHERE ADEQUATE SEPARATION CANNOT BE ACHIEVED. (AS PER CITY STANDARD W-22, W-23).
9. THE CONTRACTOR SHALL CONSTRUCT FLEXIBLE STORM AND SANITARY SEWERS IN ACCORDANCE WITH OPSD 802.010, 802.013 AND 802.014. DURING CONSTRUCTION THE CONTRACTOR SHALL PROTECT THE PIPES FROM HEAVY CONSTRUCTION EQUIPMENT AS PER OPSD 808.010. BEDDING AND BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% SPMDD.
10. THE CONTRACTOR SHALL CONDUCT EXFLITRATION (AS PER CURRENT OPSS) TESTING ON ALL NEWLY INSTALLED SANITARY SEWERS. THE TEST SHALL BE PREFORMED IMMEDIATELY AFTER SEWER INSTALLED AND SUPERVISED BY THE ENGINEER.
11. CLAY SEALS SHOULD BE PROVIDED IN THE SERVICE TRENCHES WHERE SILTY CLAY IS ENCOUNTERED. THE SEALS SHOULD BE AT LEAST 1.5 M LONG (IN THE TRENCH DIRECTION) AND SHOULD EXTEND FROM TRENCH WALL TO TRENCH WALL. GENERALLY, THE SEALS SHOULD EXTEND FROM THE FROST LINE AND FULLY PENETRATE THE BEDDING, SUBBEDDING AND COVER MATERIAL. THE BARRIERS SHOULD CONSIST OF RELATIVELY DRY AND COMPACTABLE BROWN SILTY CLAY PLACED IN MAXIMUM 225 MM THICK LOOSE LAYERS AND COMPACTED TO A MINIMUM OF 95% OF THE MATERIALS SPMDD. THE CLAY SEALS SHOULD BE PLACED AT THE SITE BOUNDARIES AND AT STRATEGIC LOCATIONS AT NO MORE THAN 60 M INTERVALS IN THE SERVICE TRENCHES.

CATCHBASINS:

12. ALL CATCHBASINS WHICH OUTLET DIRECTLY TO THE STORM SEWER SYSTEM ARE TO BE FITTED WITH A PREMANUFACTURED WALL MOUNT TYPE INLET CONTROL DEVICE (ICD) INSTALLED IN OUTLET PIPE. IDC'S SHALL BE IPEX TEMPEST MHF OR APPROVAL EQUIVALENT.
13. ALL REGULAR CATCHBASINS TO HAVE S-19 FRAME AND COVERS. ALL CURB FACE INLET CATCHBASINS TO HAVE S-22, S-23 STYLE FRAME & COVERS. ALL MANHOLES TO HAVE CLOSED LIDS AS PER S-24.
14. ALL STORM MANHOLES WITH STORM SEWERS 900mm DIA. AND LARGER TO BE BENCHED. ALL STORM MANHOLES WITH STORM SEWERS LESS THAN 900mm DIA. SHALL HAVE 300mm SUMP. AS PER SECTION 6.2.6 OF THE CITY OF OTTAWA'S SEWER DESIGN GUIDELINES LATEST EDITION.

SERVICES:

15. IN SITUATIONS WHERE WATER SERVICES ARE IN CONFLICT WITH STORM AND SANITARY SEWERS, THE CONTRACTOR SHALL INSTALL WATER SERVICES AS PER CITY STANDARD W-38.
16. ALL CONNECTIONS TO EXISTING WATERMAINS WILL BE DONE BY CITY OF OTTAWA FORCES. CONTRACTOR TO PROVIDE EXCAVATION BACKFILLING, COMPACTION AND REINSTATEMENT, IN ACCORDANCE WITH CURRENT CITY SPECIFICATIONS.
17. ALL FIRE HYDRANT LOCATIONS ARE TO BE IN ACCORDANCE WITH CITY STANDARD W-18.
18. THE CONTRACTOR IS REQUIRED TO SCHEDULE AND CO-ORDINATE ALL WORKS WITH UTILITY COMPANIES, MUNICIPAL AUTHORITIES AND OTHER CONTRACTORS ON SITE.
19. ALL UNITS WILL REQUIRE SANITARY BACKWATER VALVES IN ACCORDANCE WITH THE CITY OF OTTAWA'S TECHNICAL BULLETIN NO. ISD-2010-1, SECTION 4.4.5 OF THE CITY OF OTTAWA'S SEWER DESIGN GUIDELINES 2012 EDITION TITLED "SANITARY BACKWATER VALVES".

ROADWAYS & CURBS:

20. FULL R.O.W. IS TO BE STRIPPED. ALL BACKFILLING TO BE DONE AS PER OPSS 514.
21. PARKING AREA TO HAVE 375mm GRANULAR 'B' TYPE II, 150mm GRANULAR 'A' AND 50mm SP12.5 ASPHALTIC CONCRETE. HEAVY DUTY AREA (FIRE ROUTE) TO HAVE 450mm GRANULAR 'B' TYPE II, 150mm GRANULAR 'A', 80mm SP12.5 ASPHALTIC CONCRETE.
22. WHERE A TRANSITION IS REQUIRED BETWEEN MOUNTABLE CURB AND BARRIER CURB, THE TRANSITION POINT SHALL BE AT THE MIDPOINT OF THE CURB RADIUS.

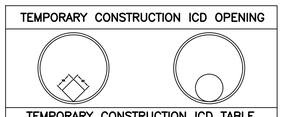
STORM MANHOLE TABLE			
MANHOLE No.	STRUCTURE	T/G ELEV	INVERT
201	1200mmø	88.03	N=86.24 SW=86.18
202	1200mmø	87.89	NE=85.94 SW=85.94 SE=85.89
203	1200mmø	87.85	NE=86.35
204	1200mmø	87.98	SW=86.07 NW=86.07 NE=86.01
205	1200mmø	88.21	SE=86.24
206	1200mmø	87.76	NW=85.54 SE=85.59 NE=85.48
207	1200mmø	87.95	SW=85.89 NW=85.83
208	1200mmø	87.75	SW=85.12 NE=85.06
209	1200mmø	87.62	SW=84.93

SANITARY MANHOLE TABLE			
MANHOLE No.	STRUCTURE	T/G ELEV	INVERT
101	1200mmø	88.08	SE=85.23
102	1200mmø	88.02	NW=85.02 SW=84.96
103	1200mmø	87.93	NE=84.80 SW=84.80 SE=84.74
104	1200mmø	88.17	S=85.36
105	1200mmø	88.21	NW=85.37
106	1200mmø	88.13	NE=85.08 SE=85.14 N=85.14
107	1200mmø	88.19	SE=85.12
108	1200mmø	88.02	SW=84.89 NW=84.89 NE=84.83
109	1200mmø	88.16	SE=85.26
110	1200mmø	88.10	NW=85.06 NE=85.00
111	1200mmø	87.96	SW=84.78 NW=84.72
112	1200mmø	87.76	NW=84.39 SE=84.39 NE=84.33
113	1200mmø	87.89	SW=84.06 NE=84.00
114	1200mmø	87.70	SW=83.90

SEWER CROSSING TABLE		
CROSSING No.	INVERTS (m)	SEPARATION (m)
1	SAN OBV.=84.13	1.70
	WAT INV.=85.83	
2	STM OBV.=85.51	0.40
	WAT INV.=85.91	
3	SAN OBV.=85.06	0.26
	WAT INV.=85.32	
4	STM INV.=86.20	0.32
	WAT OBV.=85.52	
5	SAN OBV.=84.93	1.02
	STM INV.=85.95	
6	STM INV.=85.97	0.48
	WAT OBV.=85.49	
7	SAN OBV.=85.02	0.28
	WAT INV.=85.30	
8	SAN OBV.=85.11	0.25
	WAT INV.=85.36	
9	STM INV.=86.09	0.57
	WAT OBV.=85.52	

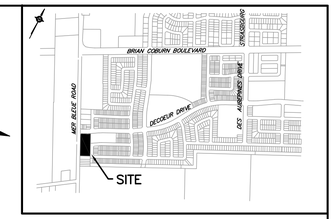
SEWER CROSSING TABLE		
CROSSING No.	INVERTS (m)	SEPARATION (m)
10	STM INV.=86.08	0.96
	SAN OBV.=85.12	
11	SAN OBV.=85.36	0.26
	WAT INV.=85.61	
12	STM INV.=85.57	0.37
	WAT OBV.=85.20	
13	SAN OBV.=84.61	0.59
	WAT INV.=85.20	
14	SAN OBV.=84.51	1.04
	STM INV.=85.55	
15	SAN OBV.=85.28	0.25
	WAT INV.=85.53	
16	SAN OBV.=84.12	0.51
	STM INV.=84.63	
17	STM OBV.=85.22	0.26
	WAT INV.=85.48	
18	SAN OBV.=83.97	1.51
	WAT INV.=85.48	

TEMPORARY CONSTRUCTION ICD OPENING



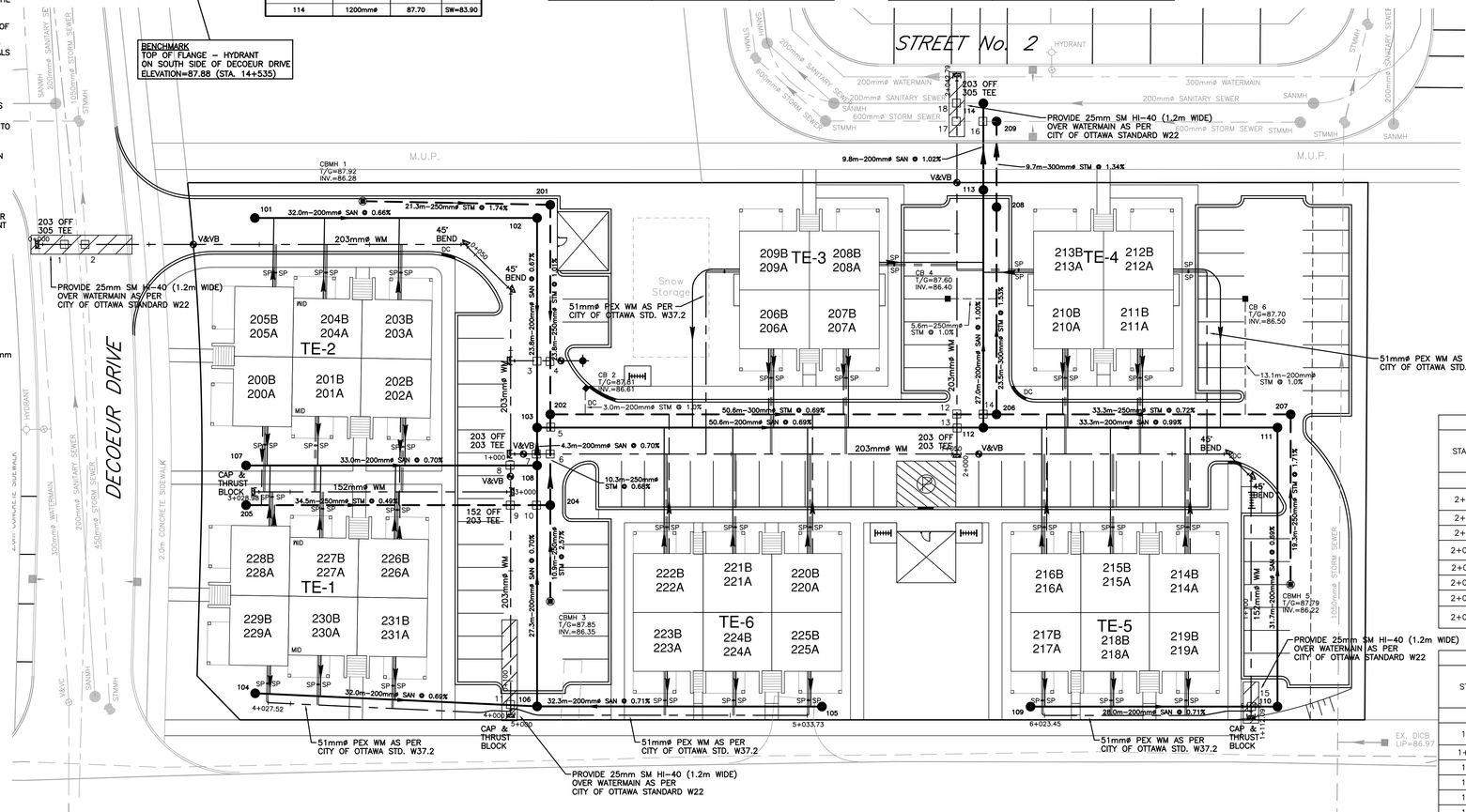
TEMPORARY CONSTRUCTION ICD TABLE

LOCATION	OUTLET DIRECTION	PIPE SIZE	ICD TYPE	OPENING DIMENSION
MH 113	EAST	200mm	DIAMOND	67mm x 67mm
MH 208	EAST	300mm	CIRCULAR	133mmø



LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED HYDRANT WITH VALVE AND VALVE BOX
- THRUST BLOCK & RESTRAINING JOINTS
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- EXISTING WATERMAIN
- EXISTING EDGE OF PAVEMENT
- PROPOSED SANITARY SEWER AND MANHOLE
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED WATERMAIN
- CATCHBASIN MANHOLE
- CATCHBASIN
- VALVE AND VALVE BOX
- INSULATION
- DC DEPRESSED CURB
- 16 SEWER CROSSING NUMBER



CATCHBASIN ICD TABLE				
LOCATION	ICD TYPE	FLOW (L/s)	ORIFICE DIA. (mm)	HEAD (m)
CBMH 1	TEMPEST MHF	16.0	78.0	1.58
CB 2	TEMPEST MHF	28.0	109.1	1.27
CBMH 3	TEMPEST MHF	15.7	77.5	1.51
CB 4	TEMPEST MHF	30.7	113.9	1.28
CBMH 5	TEMPEST MHF	15.5	77.2	1.56
CB 6	TEMPEST MHF	17.9	86.8	1.25

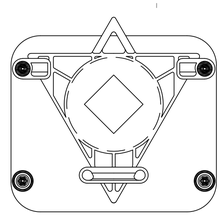
SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
TE 1-2 152mmø WATERMAIN			
3+000	88.01	85.52	152mm OFF 203mm TEE
3+010	88.32	85.56	TOP OF WATER
3+020	88.41	85.63	TOP OF WATER
3+029	88.21	85.70	CAP & THRUST BLOCK

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
203mmø WATERMAIN OFF DECOEUR DRIVE			
0+000	87.77	85.22	203mm OFF 305mm TEE (ROTATE TEE)
0+003.2	87.87	86.10	22.5° VERTICAL BEND
0+006.5	87.83	86.10	22.5° VERTICAL BEND
0+007.7	87.80	85.52	22.5° VERTICAL BEND
0+010	87.47	85.52	VALVE AND VALVE BOC
0+017.5	87.88	85.52	TOP OF WATER
0+020	87.92	85.52	TOP OF WATER
0+030	88.08	85.52	TOP OF WATER
0+040	88.09	85.52	TOP OF WATER
0+048.5	88.04	85.52	45° HORIZONTAL BEND
0+055.6	87.96	85.52	45° HORIZONTAL BEND
0+063.7	87.94	85.52	HYDRANT TEE
0+070	87.95	85.52	TOP OF WATER
0+074.2	88.00	85.52	203mm OFF 203mm TEE
0+076.8	88.04	85.52	VALVE AND VALVE BOX
0+078.6	88.02	85.52	150mm OFF 203mm TEE
0+080	88.00	85.52	TOP OF WATER
0+087.5	87.94	85.52	TOP OF WATER
0+092.1	87.93	85.52	TOP OF WATER
0+103.8	88.21	85.81	CAP AND THRUST BLOCK

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
TE 1 51mmø WATER SERVICE			
4+000	88.12	85.65	51mm OFF 203mmø MAIN
4+010	88.13	85.65	TOP OF WATER
4+020	88.24	85.65	TOP OF WATER
4+027.5	88.16	85.65	TOP OF WATER

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
TE 6 51mmø WATER SERVICE			
5+000	88.12	85.65	51mm OFF 203mmø MAIN
5+010	88.12	85.65	TOP OF WATER
5+020	88.12	85.65	TOP OF WATER
5+030	88.12	85.65	TOP OF WATER
5+033.7	88.12	85.65	TOP OF WATER

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
TE 5 51mmø WATER SERVICE			
6+000	88.10	85.65	51mm OFF 203mmø MAIN
6+010	88.11	85.65	TOP OF WATER
6+020	88.12	85.65	TOP OF WATER
6+023.5	88.12	85.65	TOP OF WATER



TYPICAL FLOW RESTRICTOR OPENING (WALL MOUNT)

(FLOW RESTICTOR SHALL BE IPEX TEMPEST MHF OR APPROVED EQUIVALENT)

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
203mmø INTERNAL WATERMAIN			
1+000	88.21	85.52	203mmø OFF 203mmø TEE
1+001.5	88.20	85.51	VALVE AND VALVE BOX
1+010	87.98	85.46	TOP OF WATER
1+020	87.99	85.39	TOP OF WATER
1+030	88.02	85.33	TOP OF WATER
1+040	87.91	85.27	TOP OF WATER
1+050.6	87.83	85.20	203mmø OFF 203mmø TEE
1+053.1	87.85	85.22	VALVE AND VALVE BOX
1+060	87.95	85.28	TOP OF WATER
1+070	88.03	85.37	TOP OF WATER
1+081.3	87.97	85.47	45° HORIZONTAL BEND
1+085	88.18	85.50	45° HORIZONTAL BEND
1+090	88.04	85.55	TOP OF WATER
1+100	88.00	85.60	TOP OF WATER
1+110	88.13	85.72	TOP OF WATER
1+111.6	88.10	85.73	51mmø OFF 203mmø MAIN
1+112.1	88.08	85.74	CAP AND THRUST BLOCK

SITE WATERMAIN GRADE TABLE			
STATION	FINISHED GRADE (m)	TOP OF WATER ELEVATION (m)	COMMENTS
203mmø WATERMAIN TO STREET #2			
2+000	87.83	85.20	203mm OFF 203mm TEE
2+010	87.72	85.20	TOP OF WATER
2+020	87.63	85.20	TOP OF WATER
2+030.8	87.83		VALVE AND VALVE BOX
2+034.1	87.77	85.20	22.5° VERTICAL BEND
2+036.3	87.61	85.20	22.5° VERTICAL BEND
2+040.5	87.70	85.68	22.5° VERTICAL BEND
2+042.8	87.63	85.68	CONNECT TO EX. 300mmø WATERMAIN

NOTES
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NO.	REVISION DESCRIPTION	DATE	BY
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SCALE
HORIZ. 1:300
0 3m 6m 12m

minto CANADA'S MOST HONOURED BUILDER

LICENSED PROFESSIONAL ENGINEER PROVINCE OF ONTARIO MARCH 19/18

Robinson Land Development
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

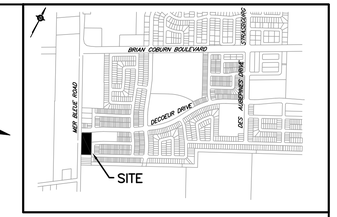
DESIGN	JHB
CHECKED	SMC
DRAWN	JHB
CHECKED	SMC
APPROVED	SMC

AVALON ENCORE STAGE 6
BLOCK 236

MINTO COMMUNITIES INC.
200-180 KENT STREET,
OTTAWA, ONTARIO, K1P OB6

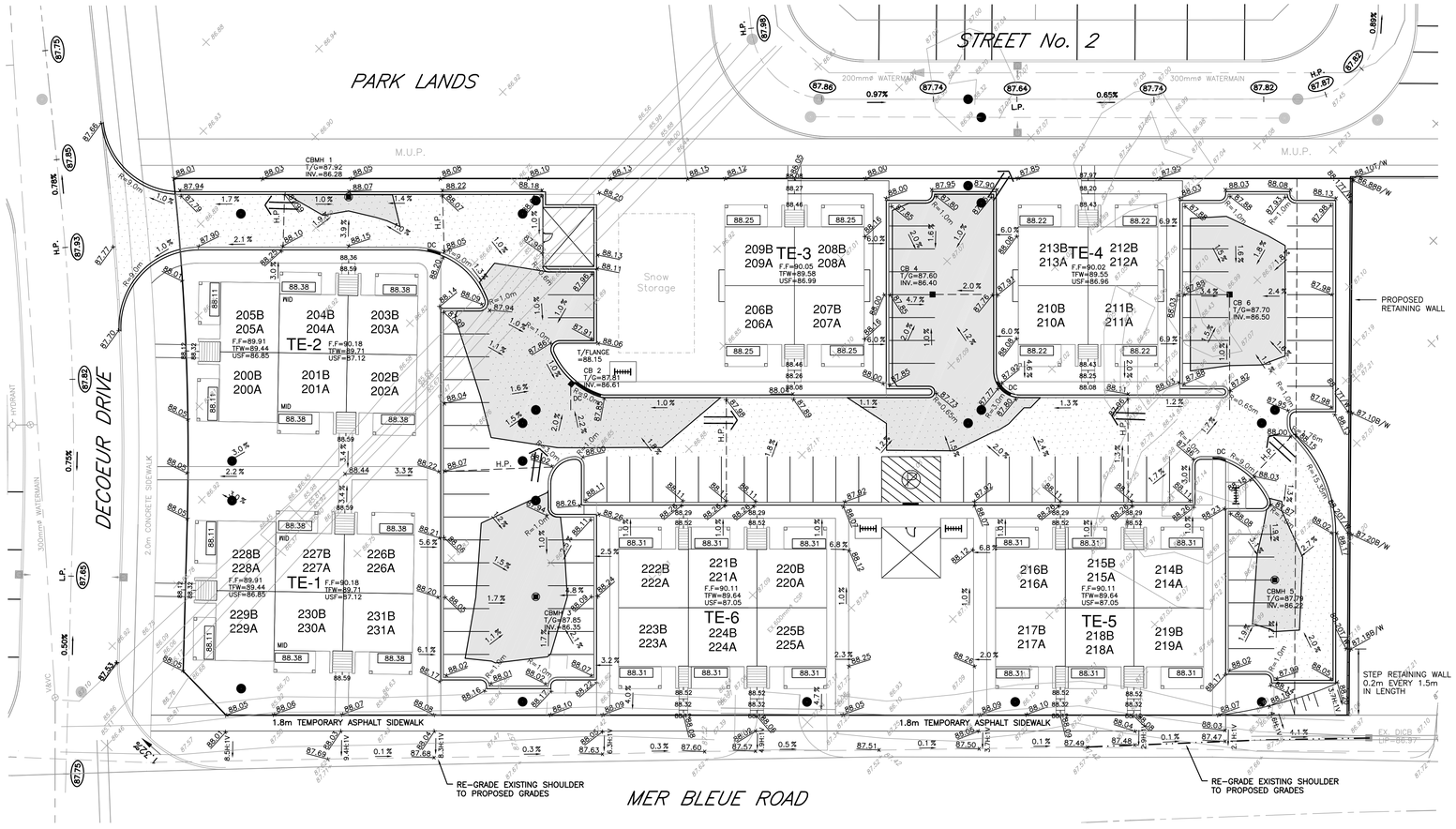
SITE SERVICE PLAN

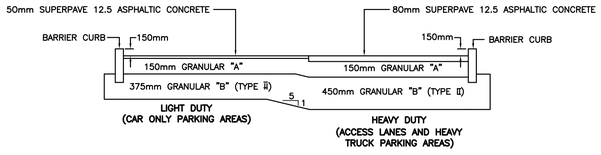
PROJECT NO.	17099
SURVEY	RLD
DATED	MARCH 2018
DWG. No:	17099-S1



LEGEND

- PROPOSED PROPERTY LINE
- PROPOSED HYDRANT WITH VALVE AND VALVE BOX
- EXISTING EDGE OF PAVEMENT
- SWALE
- 100 YEAR PONDING LIMIT
- CATCHBASIN MANHOLE
- CATCHBASIN
- 91.90 PROPOSED TERRACE GRADE OR CENTRELINE ROAD GRADE
- 91.70 PROPOSED DRIVEWAY GRADE AT GARAGE
- 91.20 PROPOSED GRADE
- 91.70 EXISTING ELEVATION
- 3.0% DRAINAGE SLOPE AND DIRECTION
- OVERLAND FLOW ROUTE





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SCALE

HORIZ. 1:300

0 3m 6m 12m

minto CANADA'S MOST HONOURED BUILDER

PROFESSIONAL ENGINEER PROVINCE OF ONTARIO MARCH 19, 2018

Robinson Land Development
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

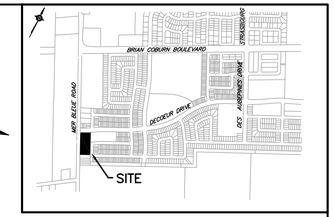
DESIGN	JHB
CHECKED	SMC
DRAWN	JHB
CHECKED	SMC
APPROVED	SMC

AVALON ENCORE STAGE 6
BLOCK 236

MINTO COMMUNITIES INC.
200-180 KENT STREET,
OTTAWA, ONTARIO, K1P OB6

GRADING and DRAINAGE PLAN

PROJECT NO.	17099
SURVEY	RLD
DATED	MARCH 2018
DWG. No:	17099-GR

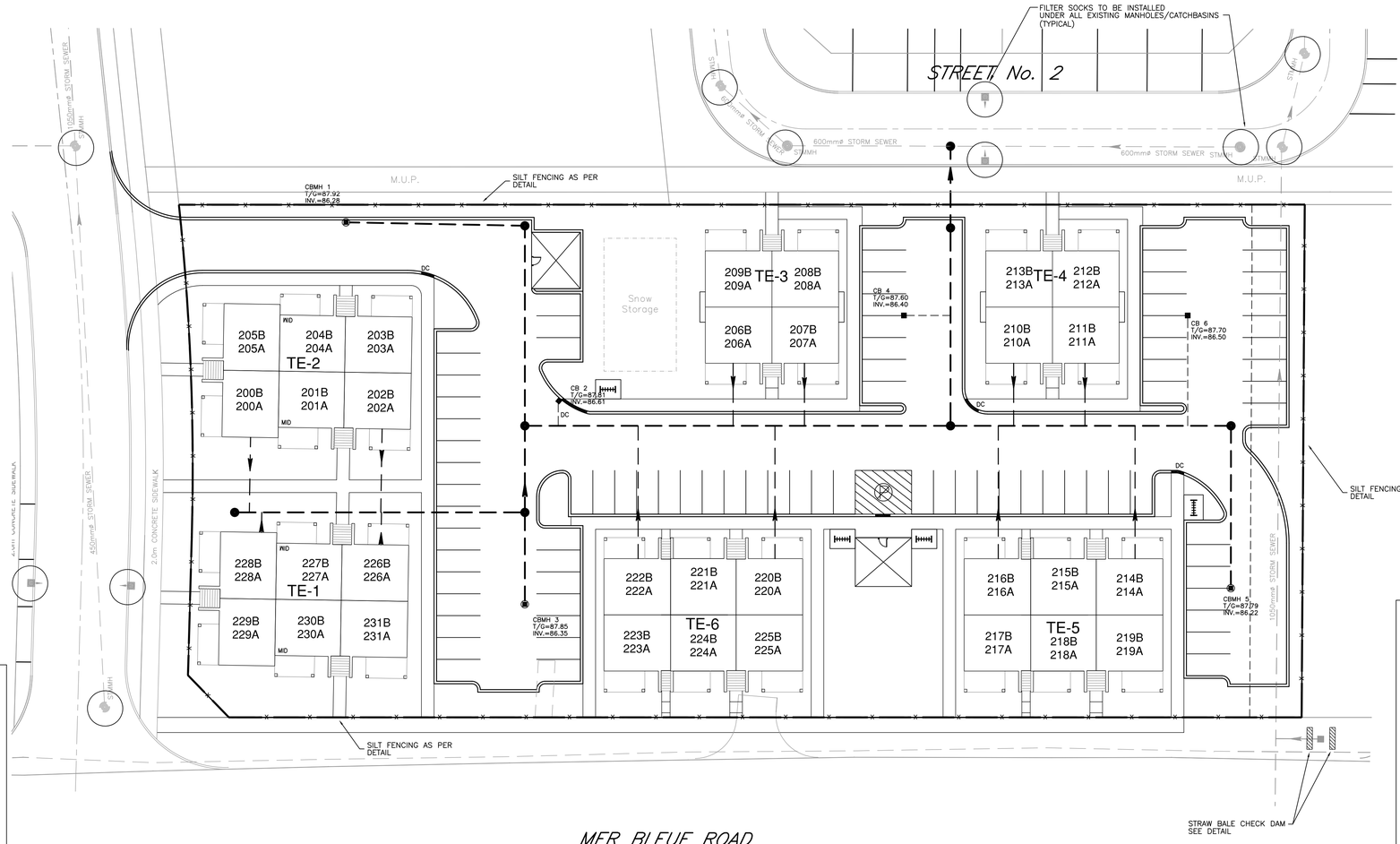


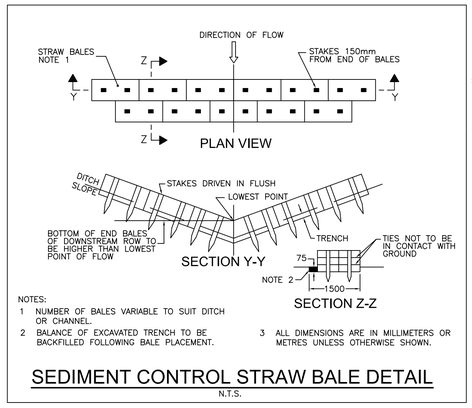
LEGEND

- EXISTING STORM SEWER
- EXISTING DITCH
- STORM SEWER
- STORM MANHOLE
- CB
- SILT FENCE
- STRAW BALE CHECK DAM

EROSION AND SEDIMENT CONTROL

1. FILTER SOCKS ARE TO BE PLACED UNDERNEATH ALL STORM CATCHBASIN AND CATCHBASIN MANHOLE LIDS UNTIL CONSTRUCTION IS COMPLETE.
2. SILT FENCING TO BE INSTALLED WHERE INDICATED.
3. 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.
4. MUD MATS TO BE INSTALLED AT ALL CONSTRUCTION ENTRANCES TO SITE.

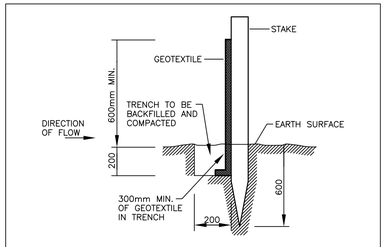




NOTES:
1 NUMBER OF BALES VARIABLE TO SUIT DITCH OR CHANNEL.
2 BALANCE OF EXCAVATED TRENCH TO BE BACKFILLED FOLLOWING BALE PLACEMENT.
3 ALL DIMENSIONS ARE IN MILLIMETERS OR METRES UNLESS OTHERWISE SHOWN.

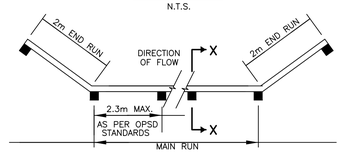
SEDIMENT CONTROL STRAW BALE DETAIL

N.T.S.



SECTION X-X

N.T.S.



PLAN OF SILT FENCE BARRIER

N.T.S.

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HORIZ. 1:300
0 3m 6m 12m

minto CANADA'S MOST HONOURED BUILDER

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350 PALLADIUM DRIVE
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DESIGN	JHB
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AVALON ENCORE STAGE 6
BLOCK 236

MINTO COMMUNITIES INC.
200-180 KENT STREET,
OTTAWA, ONTARIO, K1P OB6

EROSION AND SEDIMENT CONTROL PLAN

PROJECT NO.	17099
SURVEY	RLD
DATED	MARCH 2018
DWG. No:	17099-EC1

Appendix B

Sanitary Sewer Design Sheet
Sanitary Drainage Area Plan
17099-SAN

SANITARY SEWER CALCULATIONS
for
Minto Communitiies Inc.
Avalon Encore - Stage 6
Block 236, Infusion Terrace Homes

05/03/2018]4:45 PM

LOCATION			INDIVIDUAL		CUMMULATIVE		PEAKING	PEAK	PEAK	PEAK				PROPOSED SEWER DATA		EXCESS
STREET	FROM	TO	POP.	AREA	POP.	AREA	FACTOR	POP.	EXTRAN.	DESIGN	LENGTH	PIPE	GRADE	CAPACITY	VELOCITY	CAPACITY
	MH	MH		(ha)		(ha)	M	FLOW (l/s)	FLOW (l/s)	FLOW (l/s)	(m)	SIZE (mm)	(%)	(l/s)	(m/s)	(l/s)
Block 236	101	102	16.2	0.06	16.2	0.06	4.00	0.26	0.02	0.28	32.00	200	0.66	26.67	0.85	26.39
Block 236	102	103	0.0	0.05	16.2	0.11	4.00	0.26	0.03	0.29	23.80	200	0.67	26.87	0.86	26.58
Block 236	104	106	16.2	0.04	16.2	0.04	4.00	0.26	0.01	0.27	32.00	200	0.69	27.27	0.87	27.00
Block 236	105	106	16.2	0.04	16.2	0.04	4.00	0.26	0.01	0.27	32.30	200	0.71	27.66	0.88	27.39
Block 236	106	108	0.0	0.05	32.4	0.13	4.00	0.53	0.04	0.56	27.30	200	0.70	27.47	0.87	26.91
Block 236	107	108	32.4	0.08	32.4	0.08	4.00	0.53	0.02	0.55	33.00	200	0.70	27.47	0.87	26.92
Block 236	108	103	0.0	0.01	64.8	0.22	4.00	1.05	0.06	1.11	4.30	200	0.70	27.47	0.87	26.36
Block 236	103	112	32.4	0.16	113.4	0.49	4.00	1.84	0.14	1.97	50.60	200	0.69	27.27	0.87	25.30
Block 236	109	110	16.2	0.04	16.2	0.04	4.00	0.26	0.01	0.27	28.00	200	0.71	27.66	0.88	27.39
Block 236	110	111	0.0	0.05	16.2	0.09	4.00	0.26	0.03	0.29	31.70	200	0.69	27.27	0.87	26.98
Block 236	111	112	32.4	0.16	48.6	0.25	4.00	0.79	0.07	0.86	33.30	200	0.99	32.67	1.04	31.81
Block 236	112	113	10.8	0.06	172.8	0.80	4.00	2.80	0.22	3.02	27.00	200	1.00	32.83	1.05	29.81
Block 236	113	114	0.0	0.00	172.8	0.80	4.00	2.80	0.22	3.02	9.80	200	1.02	33.16	1.06	30.13
Street No. 2	114	Ex. San MH	19.0	0.27	191.8	1.07	4.00	3.11	0.30	3.41	16.90	200	0.65	26.47	0.84	23.06

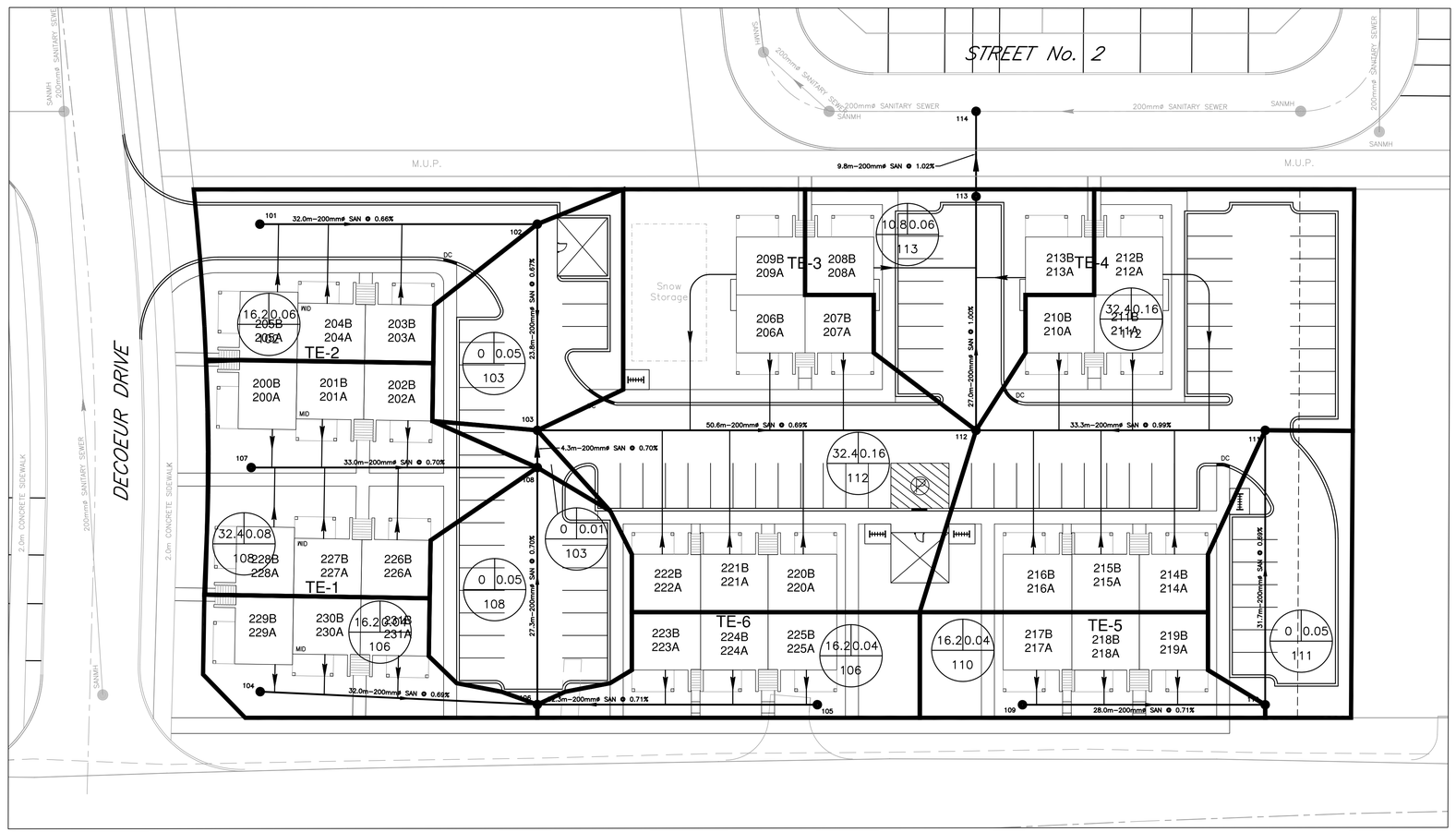
Population = 3.4 persons/unit for single family units
Population = 2.7 persons/unit for townhouse units
Population = 60 people / gross hectare for single family units
Population = 90 people / gross hectare for townhouse units

Peaking Factor = 1 + 14/(4 + (P)^0.5 P = Population in 1000's

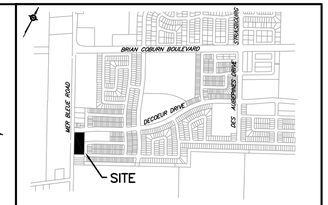
Peak Population Flow (l/s) = Cummulative Population (persons) x 350 l/person/day x Peaking Factor / 86400 sec/day

Peak Extraneous Flow (l/s) = Cummulative Area (ha) x 0.28 l/ha/s

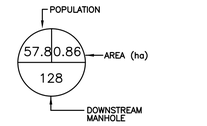
Peak Design Flow (l/s) = Peak Population Flow (l/s) + Peak Extraneous Flow (l/s)



MER BLEUE ROAD



LEGEND



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NO.	REVISION DESCRIPTION	DATE	BY
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SCALE
HORIZ. 1:300
0 3m 6m 12m

minto CANADA'S MOST HONOURED BUILDER

PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO — March 19/18

Robinson Land Development
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	SMC
DRAWN	JHB
CHECKED	SMC
APPROVED	SMC

AVALON ENCORE STAGE 6
BLOCK 236

MINTO COMMUNITIES INC.
200-180 KENT STREET,
OTTAWA, ONTARIO, K1P OB6

SANITARY DRAINAGE AREA PLAN

PROJECT NO.	17099
SURVEY	RLD
DATED	MARCH 2018
DWG. No:	17099-SAN

Appendix C

Storm Sewer Design Sheet
Storm Drainage Area Plan
17099-STM
Hydraulic Grade Line Calculation
Stormwater Management Plan
17099-SWM1
Tempest ICD's
Inlet Control Device Calculations
Avalon Encore Stage 6 – Street No. 2
Plan/Profile

STORM SEWER CALCULATIONS for
Minto Communitiies Inc.
Avalon Encore - Stage 6
Block 236, Infusion Terrace Homes

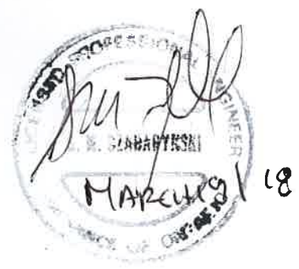
05/03/2018]4:45 PM

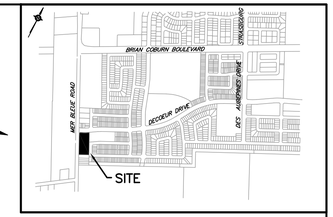
LOCATION			AREA (ha)						PROPOSED SEWER						%FULL
STREET	FROM MH	TO MH	R= 0.71	R= 0.7	INDIV. 2.78AR	ACCUM. 2.78AR	TIME OF CONC.	RAINFALL INTENSITY I	PEAK FLOW Q (l/s)	PIPE SIZE (mm)	GRADE (%)	LENGTH (m)	CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	
Block 236	CBMH 1	201	0.03		0.06	0.06	10.00	104.19	6.17	254.0	1.74	21.3	81.92	1.62	0.22	8%
Block 236	201	202	0		0.00	0.06	10.22	103.05	6.10	254.0	1.01	23.8	62.41	1.23	0.32	10%
Block 236	CBMH 3	204	0.07		0.14	0.14	10.00	104.19	14.40	254.0	2.57	10.9	99.56	1.96	0.09	14%
Block 236	205	204	0		0.00	0.00	10.00	104.19	0.00	254.0	0.50	34.5	43.91	0.87	0.66	0%
Block 236	204	202	0		0.00	0.14	10.66	100.81	13.93	254.0	0.68	10.3	51.21	1.01	0.17	27%
Block 236	CB 2	Main	0.14		0.28	0.28	10.00	104.19	28.79	203.0	1.00	3.5	34.16	1.06	0.06	84%
Block 236	202	206	0		0.00	0.47	10.54	101.42	48.04	304.8	0.69	50.6	83.88	1.15	0.73	57%
Block 236	CBMH 5	207	0.04		0.08	0.08	10.00	104.19	8.23	254.0	1.71	19.3	81.21	1.60	0.20	10%
Block 236	CB 6	Main	0.08		0.16	0.16	10.00	104.19	16.45	203.0	1.00	13.1	34.16	1.06	0.21	48%
Block 236	207	206			0.00	0.24	10.20	103.14	24.43	254.0	0.72	33.3	52.69	1.04	0.53	46%
Block 236	CB 4	Main	0.2		0.39	0.39	10.00	104.19	41.13	254.0	1.00	5.6	62.10	1.23	0.08	66%
Block 236	206	208			0.00	0.63	11.28	97.91	61.84	304.8	1.53	23.5	124.91	1.71	0.23	50%
Block 236	208	209	0		0.00	0.63	11.50	96.87	61.18	304.8	1.34	9.7	116.90	1.60	0.10	52%
Block 236	209	Ex Stm MH		0.19	0.37	1.00	11.60	96.42	96.55	609.6	0.15	19.4	248.34	0.85	0.38	39%

Run-off Coefficient = 0.6 for all areas, with the following exceptions;
= 0.20 for Parkland

Peak Flow = Accummulated 2.78AR x Rainfall Intensity

Rainfall Intensity = $998.071 / (T + 6.053)^{0.814}$ T= time in minutes
(City of Ottawa, 5 year storm)





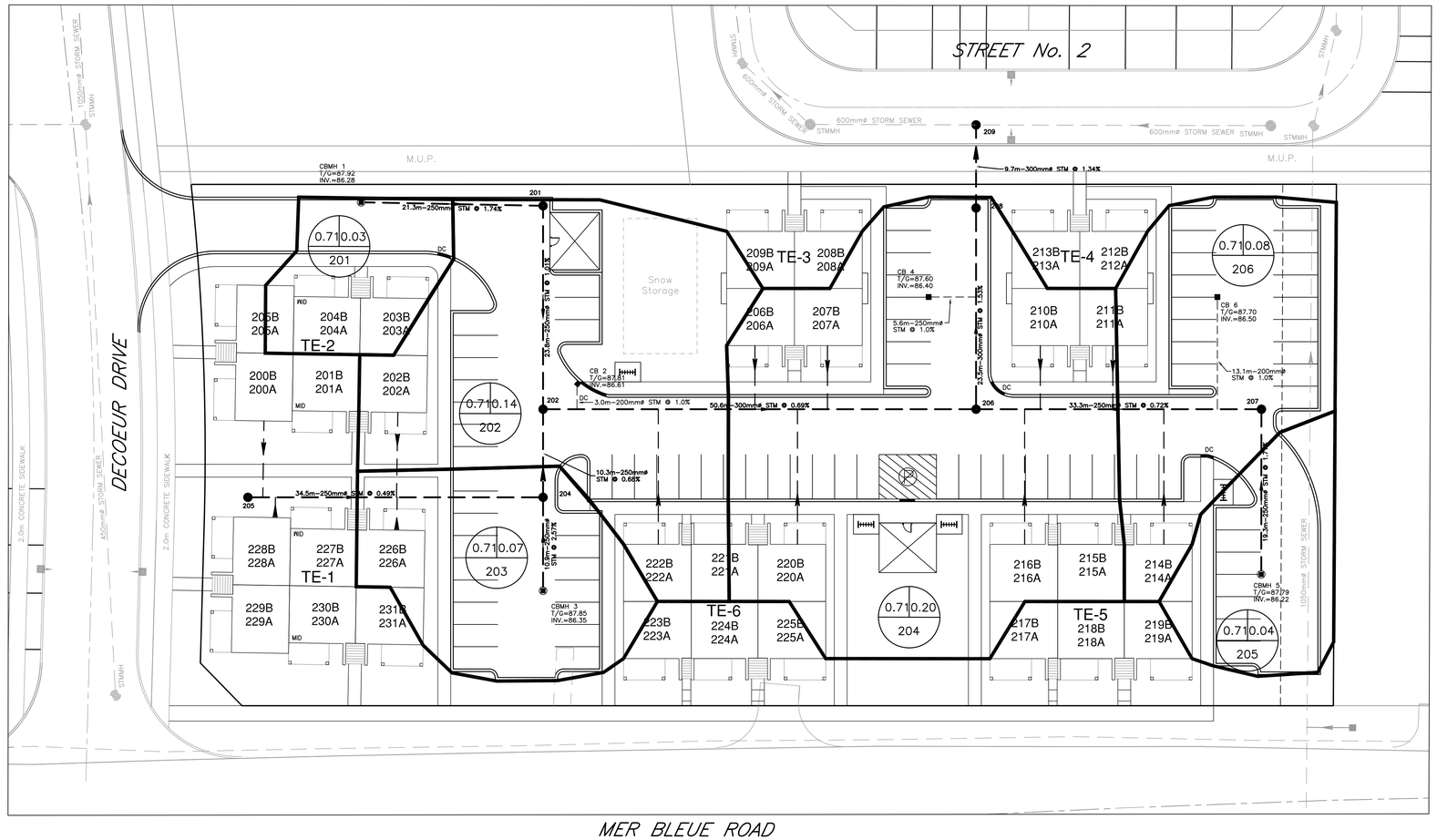
LEGEND

RUNOFF COEFFICIENT
0.50 0.28 ← AREA (ha)
201
DOWNSTREAM MANHOLE

MH 209 — PROPOSED STORM SEWER AND MANHOLE

STREET CATCHBASIN

STORM AREA BOUNDARY



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

NO.	REVISION DESCRIPTION	DATE	BY
1	ISSUED FOR SITE PLAN APPLICATION	19/03/18	SMC

SCALE
HORIZ. 1:300
0 3m 6m 12m

minto CANADA'S MOST HONOURED BUILDER

PROFESSIONAL ENGINEER J. H. BRENNAN MARCH 19/18 PROVINCE OF ONTARIO

Robinson Land Development
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	SMC
DRAWN	JHB
CHECKED	SMC
APPROVED	SMC

AVALON ENCORE STAGE 6
BLOCK 236

MINTO COMMUNITIES INC.
200-180 KENT STREET,
OTTAWA, ONTARIO, K1P OB6

STORM DRAINAGE AREA PLAN

PROJECT NO.	17099
SURVEY	RLD
DATED	MARCH 2018
DWG. No:	17099-STM

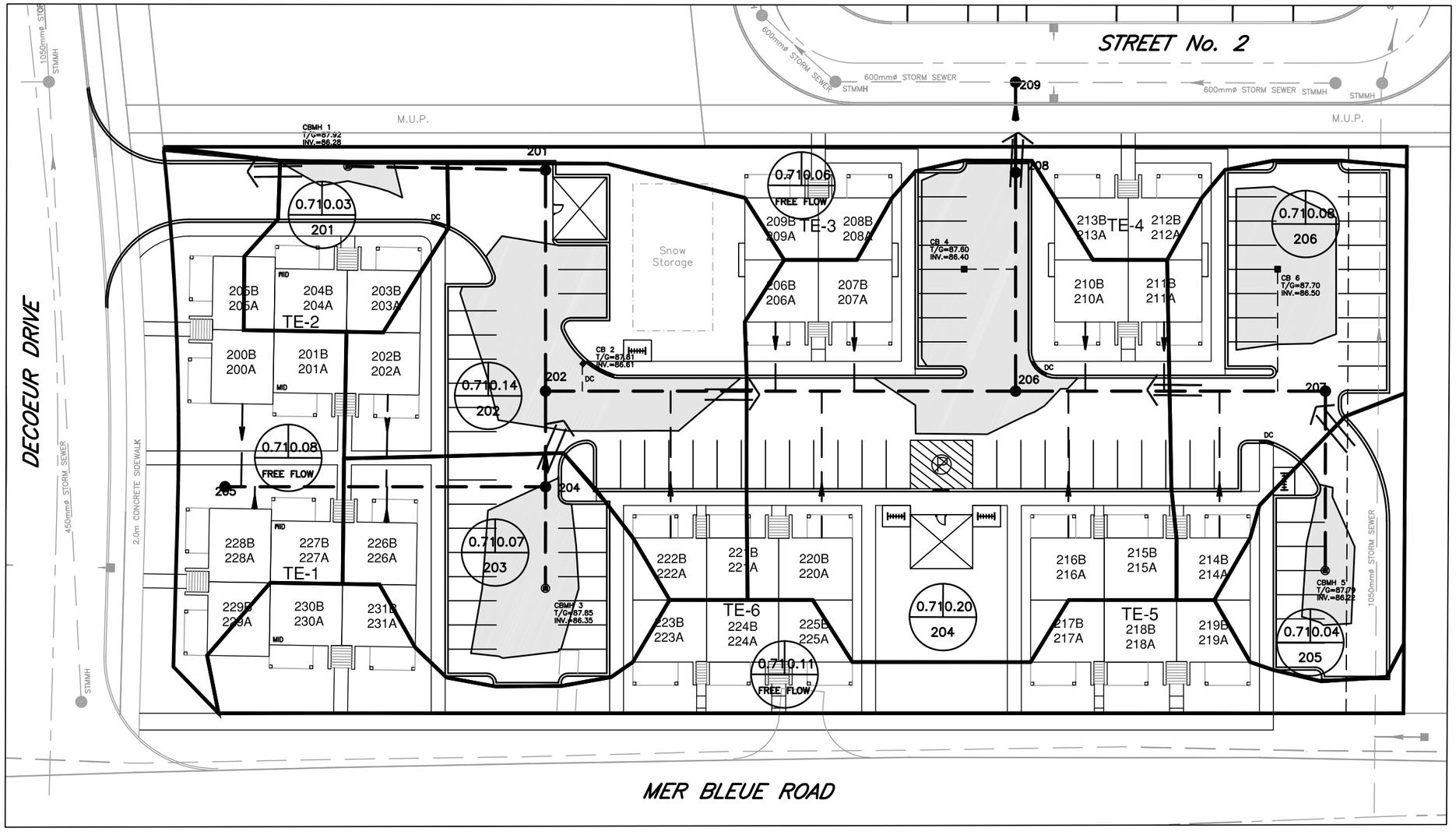
HYDRAULIC GRADE LINE COMPUTATION FORM

Manhole From	Manhole To	U/S Invert	D/S Invert	U/S Obvert	D/S Obvert	Slope	TW	Diameter D_o	Area	Hydraulic Radius	5 Year Peak Flow Q_o	Length L_o	Velocity V_o	Velocity Head $V_o^2/2g$	Friction Slope Sf_o	Friction Loss H_f	Angle of deflection at U/S MH	Hydraulic Loss at MH[1]	EGL_o	EGL_i	HGL_o	HGL_i	USF Elev.	Surcharge Depth	Free board
		m	m	m	m	m/m	m	m	m^2	m	m^3/s	m	m/s	m	m/m	m	degrees	m	m	m	m	m	m	m	m
209	208	85.060	84.930	85.360	85.230	0.0134	85.10	0.300	0.07	0.08	0.0610	9.7	0.86	0.04	0.0040	0.039	90	0.0008	85.14	85.18	85.10	85.14	86.96	-0.22	1.82
208	206	85.480	85.120	85.780	85.420	0.0153	85.14	0.300	0.07	0.08	0.0620	23.5	0.88	0.04	0.0041	0.097	0	0.0518	85.18	85.33	85.14	85.29	86.96	-0.49	1.67
206	207	85.830	85.590	86.080	85.840	0.0072	85.29	0.250	0.05	0.06	0.0240	33.3	0.49	0.01	0.0016	0.054	90	0.0002	85.30	85.35	85.29	85.34	86.96	-0.74	1.62
207	CBMH 5	86.240	85.890	86.490	86.140	0.0171	85.34	0.250	0.05	0.06	0.0080	19.3	0.16	0.00	0.0002	0.003	90	0.0000	85.34	85.35	85.34	85.35	87.05	-1.14	1.70
206	202	85.540	85.890	85.790	86.140	0.0069	85.29	0.250	0.05	0.06	0.048	50.6	0.98	0.05	0.0065	0.330	90	0.0010	85.34	85.67	85.29	85.62	86.99	-0.17	1.37
202	201	85.940	86.180	86.190	86.430	0.0101	85.62	0.250	0.05	0.06	0.006	23.8	0.12	0.00	0.0001	0.002	90	0.0010	85.62	85.62	85.62	85.62	87.12	-0.57	1.50
201	CBMH 1	86.240	86.280	86.540	86.580	0.0174	85.62	0.300	0.07	0.08	0.006	34.3	0.08	0.00	0.0000	0.001	90	0.0000	85.62	85.62	85.62	85.62	86.85	-0.92	1.23
202	204	86.010	85.940	86.260	86.190	0.0068	85.29	0.250	0.05	0.06	0.014	10.3	0.29	0.00	0.0006	0.006	90	0.0001	85.29	85.30	85.29	85.29	87.05	-0.97	1.76
204	CBMH 3	86.360	86.070	86.610	86.320	0.0257	85.29	0.250	0.05	0.06	0.014	10.9	0.29	0.00	0.0006	0.006	0	0.0055	85.30	85.31	85.29	85.31	87.12	-1.30	1.81
204	205	86.240	86.070	86.490	86.320	0.0049	85.29	0.250	0.05	0.06	0.000	34.5	0.00	0.00	0.0000	0.000	90	0.0000	85.29	85.29	85.29	85.3	86.85	-1.20	1.56

Notes:

[1] From "Sewer Bend Loss Coefficient Design Chart", Appendix 6-B, City of Ottawa Sewer Design Guidelines, 2

Designed: John Burns	Project: Avalon Stage 6, Block 236 Terrace Homes		
Checked:	Location: Ottawa, Ontario		
Dwg. Reference: 17099-S1	File Ref.: 17099	Date: March 9, 2018	Sheet No. 1 of 1



LEGEND

- CALCULATED RUNOFF COEFFICIENT
- 0.63 / 1.53 — AREA (ha)
- A2 — STORM DRAINAGE AREA NUMBER
- STORM DRAINAGE BOUNDARY
- MH 209 — STORM SEWER AND MANHOLE
- CATCHBASIN
- 100 YEAR PONDING LIMIT
- OVERLAND DRAINAGE DIRECTION

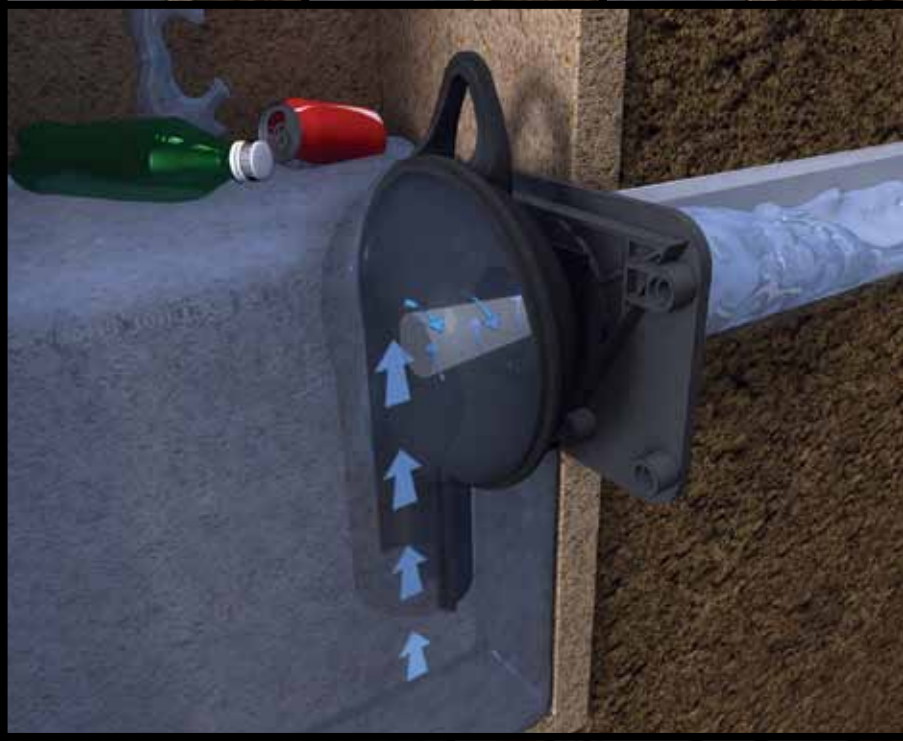
CATCHBASIN ICD TABLE

LOCATION	ICD TYPE	FLOW (L/s)	PONDING DEPTH (m)	100 YEAR VOLUME (m3)	ORIFICE DIA. (mm)	HEAD (m)
CBMH 1	TEMPEST MHF	16.0	0.07	0.6	78.0	1.58
CB 2	TEMPEST MHF	28.0	0.17	16.3	109.1	1.27
CBMH 3	TEMPEST MHF	15.4	0.13	7.2	77.5	1.51
CB 4	TEMPEST MHF	30.7	0.21	29.2	113.9	1.28
CBMH 5	TEMPEST MHF	15.5	0.11	1.8	77.2	1.56
CB 6	TEMPEST MHF	17.6	0.15	8.2	86.8	1.25

Robinson
Land Development

scale 1:500	CLIENT: MINTO AVALON ENCORE STAGE 6	project no. 17099
date 19/03/18	TITLE: BLOCK 236 SWM PLAN	SWM1
drawn by JHB		

The Next Generation in Storm Sewer Inlet Controls



TEMPEST®
INLET CONTROL DEVICES

STORM WATER FLOW CONTROL

THE COST-EFFECTIVE SOLUTION TO YOUR STORM WATER SURCHARGE PROBLEMS

- Conserves sewer system capacity
- System accommodates low to high flows
- Integrated odour and floatable control
- Fast and easy to install and maintain

IPEX

We build tough products for tough environments®

TEMPEST®
INLET CONTROL DEVICES

THE NEXT GENERATION IN STORM SEWER INLET CONTROLS

Reduces Sewer Overflows and Basement Backups

Tempest is a family of cost-effective inlet control devices that work together across a series of catch basins to limit the amount of storm water runoff that can enter a combined sewer system during a storm event. Basement backups and sewer overflows are avoided because storm water surcharges are controlled at the sewer inlet and are allowed to remain in catch basins or temporarily above ground.

Integrated Odour and Floatable Control

In addition to flow control, Tempest systems can also alleviate sewer system odour emissions as well as prevent floating debris from entering the sewer system.

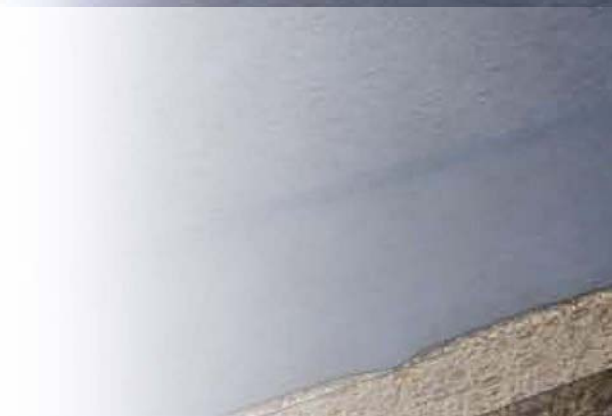
Wide Range of Models & Pre-set Flow Rates

Available in a wide range of patent pending models and pre-set flow rates, Tempest systems can accommodate most storm water flow control requirements from 2 lps to 17 lps and beyond. Application specific solutions can also be engineered to meet your unique needs in both wet and dry catch basin environments.

Easy to Install and Maintain

Constructed from durable PVC, Tempest units are corrosion free and built to last. The Tempest's light weight design accommodates both square and round catch basins and features a universal back plate and interchangeable components with no moving parts that makes the units quick and easy to install over a catch basin outlet pipe.

These devices also include a quick release mechanism to allow easy access for service without the need to drain the installation.



FEATURES & BENEFITS

1. Restricts flow to a narrow range regardless of head
2. Unit design prevents the passage of floatables and odours
3. Neoprene gasket for air-tight seal*
4. Virtually maintenance free and corrosion free durable PVC construction
5. Features a quick release mechanism that's accessed with reach bar. Unit can then be simply lifted out for easy maintenance*
6. Universal back plates available for both square and round catch basins*

For Square Catch Basins

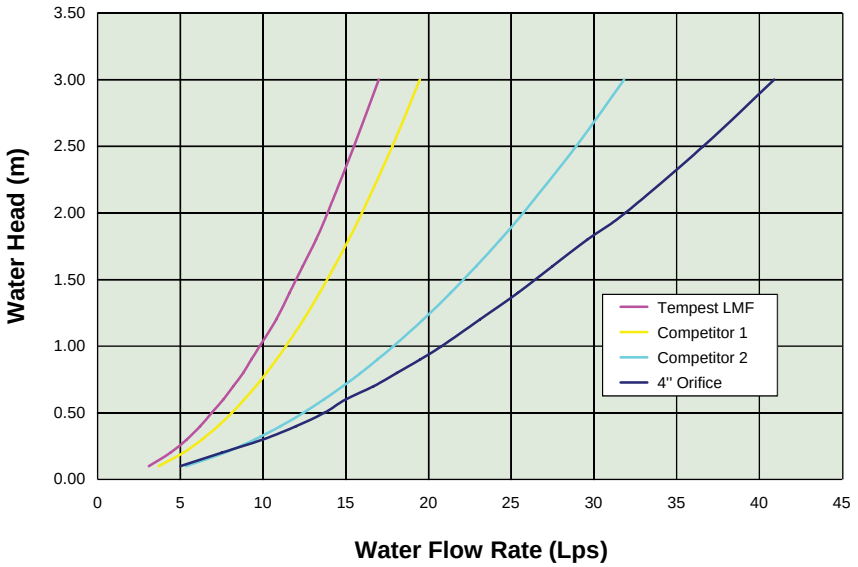
For Round Catch Basins

Tempest LMF

The system depicted is the Tempest LMF available in 14 pre-set rates and designed specifically for low to moderate flow rates with an engineered inlet design that eliminates the passage of odour and floatables

*Excluding Tempest HF Sump

Tempest Inlet Control Devices restrict flow to a narrower range than traditional methods regardless of head



THE TEMPEST FAMILY OF SYSTEMS

TEMPEST LMF

Restricts:
- ✓ Flow
- ✓ Odours
- ✓ Floatables

LOW to MODERATE FLOW RATES

2 L/s (32 GPM) – 17 L/s (270 GPM) **14 pre-set flow rates**

The Tempest LMF system features a vortex inlet design that allows a low flow rate to be set and eliminates the passage of odours and floatables and allows for debris and sediment to collect in the structure.

TEMPEST HF & HF SUMP

Restricts:
- ✓ Flow
- ✓ Odours
- ✓ Floatables

HIGH FLOW RATES

15L/s (240 GPM) or greater **5 pre-set flow rates**

The standard Tempest HF system allows a near constant discharge rate to be set and eliminates the passage of odours and floatables and allows for debris and sediment to collect in the structure.

The Tempest HF SUMP system is designed for catch basins & manholes in which there is no sump or the outlet pipe is too low to install standard Tempest device.

TEMPEST MHF

Restricts:
- ✓ Flow

Plate

Plug

MEDIUM TO HIGH FLOW RATES

9L/s (143 GPM) or greater **Specified pre-set flow rates**

The Tempest MHF is a standard orifice plate or plug device designed to allow a specified flow volume through the outlet pipe at a specified head.

THE NEXT GENERATION IN STORM SEWER INLET CONTROLS

IPEX INTEGRATED TOTAL SOLUTIONS

TEMPEST®
INLET CONTROL DEVICES

www.ipexinc.com

PROBLEM: SURCHARGED SEWER SYSTEMS

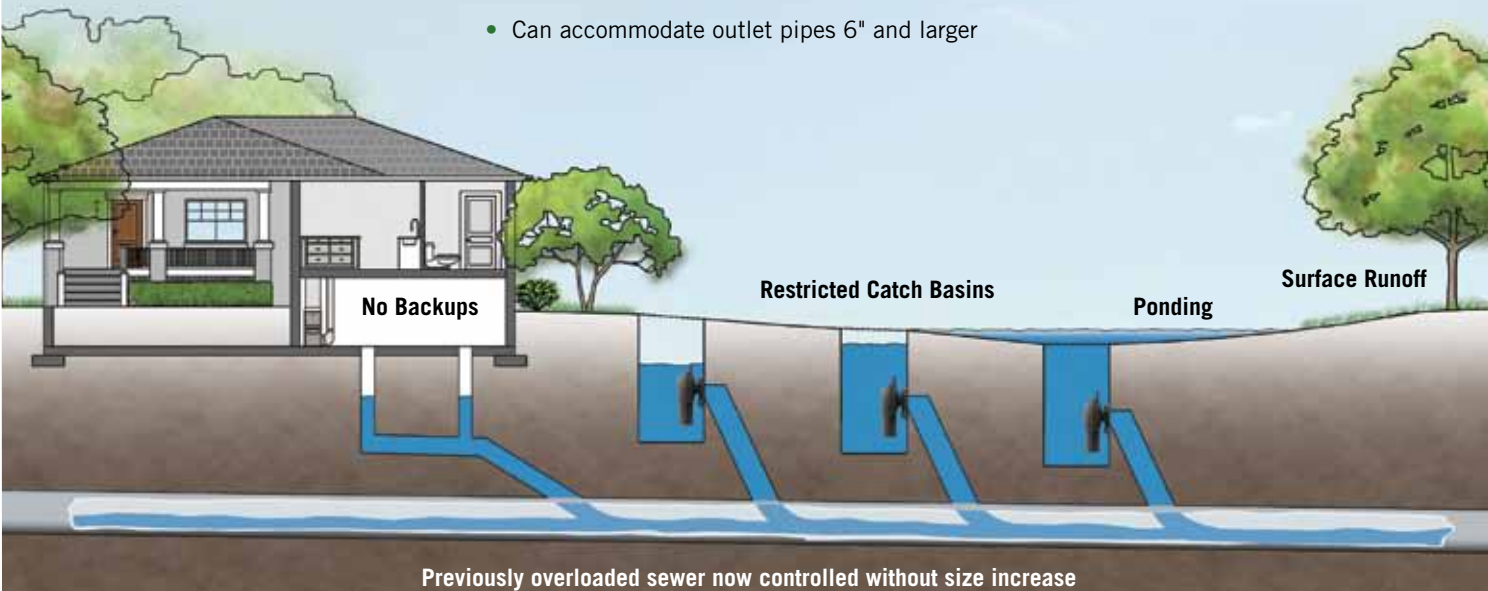
During heavy rain events, storm sewers can become overloaded causing sewer backups into residential basements and onto urban environments and streets. These events cause significant environmental and property damage and are all too common in older sections of municipalities where combined, undersized sewer systems often end up discharging a mixture of storm water runoff and sanitary wastewater into homes, streets and lakes when sewer capacities exceed historical norms.

Traditional approaches to overcoming these challenges have been expensive, disruptive and time consuming for municipalities and the private sector.

SOLUTION: TEMPEST INLET CONTROL SYSTEMS

TEMPEST® INLET CONTROL DEVICES

- Provides control by restricting flow into the sewer system
- Provides temporary ponding in catch basins, parking lots & roadways
- Helps preserve sewer capacity, slows down the inlet flow
- Reduces residential flooding and flash flooding
- Water surcharge is controlled & directed as per engineer design
- Can accommodate outlet pipes 6" and larger



Previously overloaded sewer now controlled without size increase

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Fax (306) 934-2020

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Fax (204) 633-3075

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Fax (506) 633-8720

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Tel (709) 747-7473 (PIPE)
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Toll free in Canada
(866) 473-9462 (IPEX INC)

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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.

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IPEX

BRMNTPIP141105

Area	Outlet Pipe Inv. Elev. (m)	Outlet Pipe Diam. (m)	Max. Ponding depth (m)	T/G Elev. (m)	Max. Ponding Elev. (m)	C/L orifice elev. (m)	Head (m) to C/L orifice	Max. Outflow (L/s)	Orifice Area (m^2)	Square (1-side mm)	Circular (diam.-mm)	Orifice Type
CBMH 1	86.28	0.250	0.07	87.92	87.99	86.41	1.58	16	0.005	69.2	78.0	Tempest MHF
CB 2	86.61	0.200	0.17	87.81	87.98	86.71	1.27	28	0.009	96.7	109.1	Tempest MHF
CBMH 3	86.35	0.250	0.13	87.85	87.98	86.48	1.51	15.4	0.005	68.7	77.5	Tempest MHF
CB 4	86.4	0.250	0.21	87.60	87.81	86.53	1.28	30.7	0.010	100.9	113.9	Tempest MHF
CBMH 5	86.22	0.250	0.11	87.79	87.9	86.35	1.56	15.5	0.005	68.4	77.2	Tempest MHF
CB 6	86.5	0.200	0.15	87.7	87.85	86.60	1.25	17.6	0.006	77.0	86.8	Tempest MHF
Total								123.2				

Head Calculations to C/L of orifice (m)

(T/G + max. ponding)- (outlet pipe invert + (outlet pipe diam./2))

CBMH 1

Head = (87.92+0.07) - (86.28+(0.250/2))
= 87.99-86.41
= 1.58

CB 2

Head = (87.81+0.16) - (86.61+(0.200/2))
= 87.98-86.71
= 1.27

CBMH 3

Head = (87.85+0.13) - (86.35+(0.250/2))
= 87.98-86.48
= 1.51

CB 4

Head = (87.60+0.21) - (86.40+(0.250/2))
= 87.81-86.53
= 1.28

CBMH 5

Head = (87.79+0.11) - (86.22+(0.250/2))
= 87.90-86.35
= 1.56

CB 6

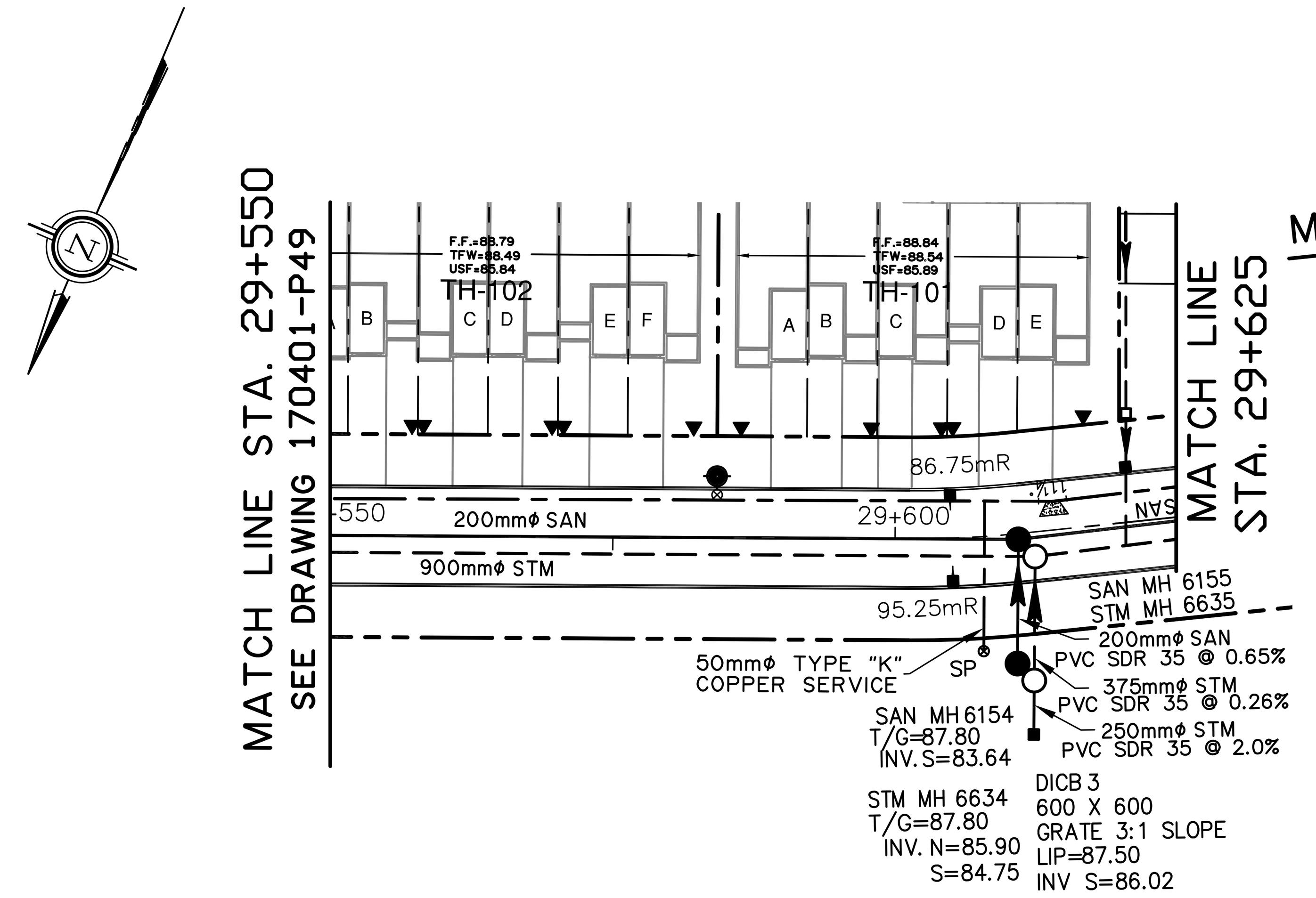
Head = (87.70+0.15) - (86.50+(0.200/2))
= 87.85-86.60
= 1.25

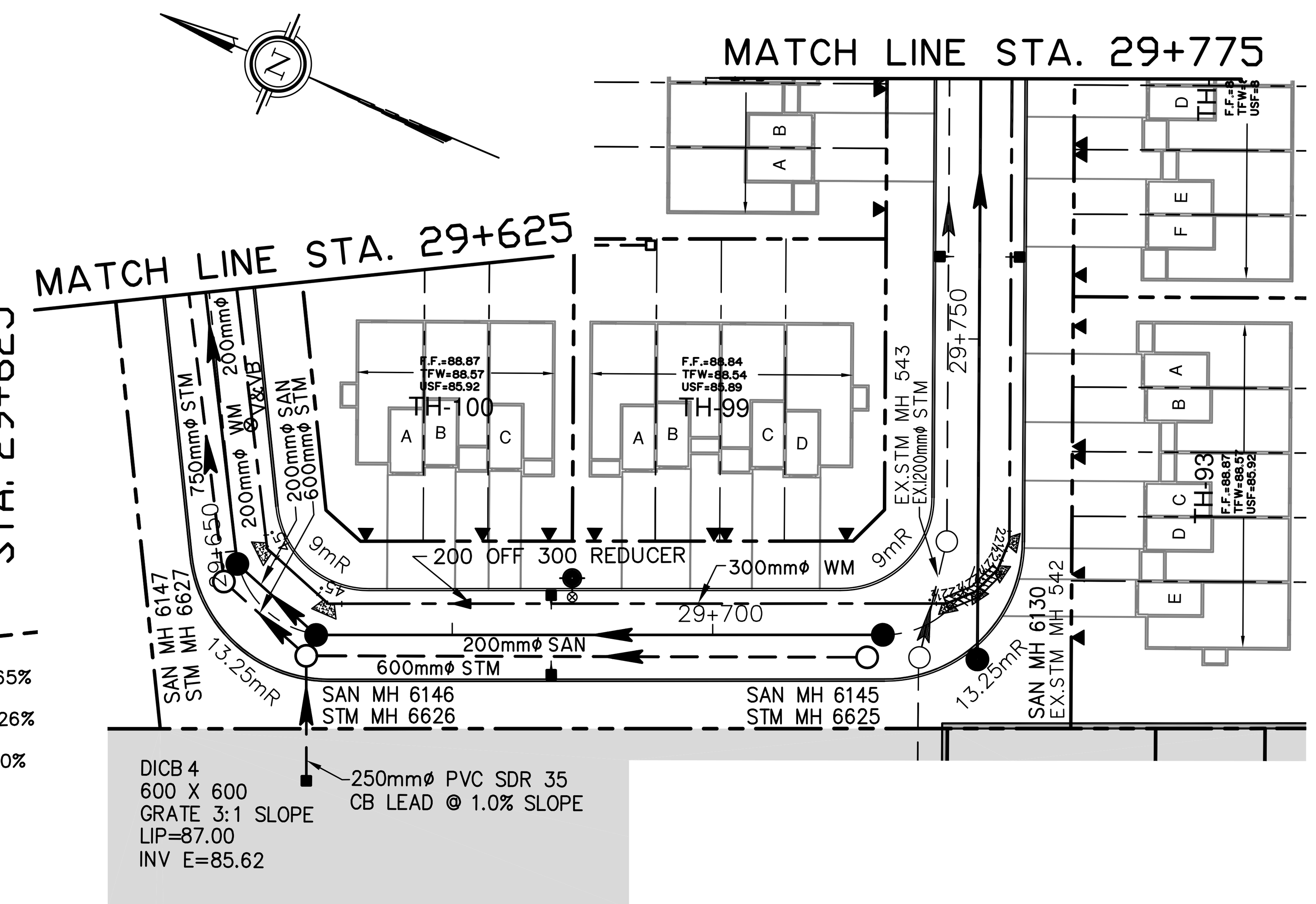
NOTES:

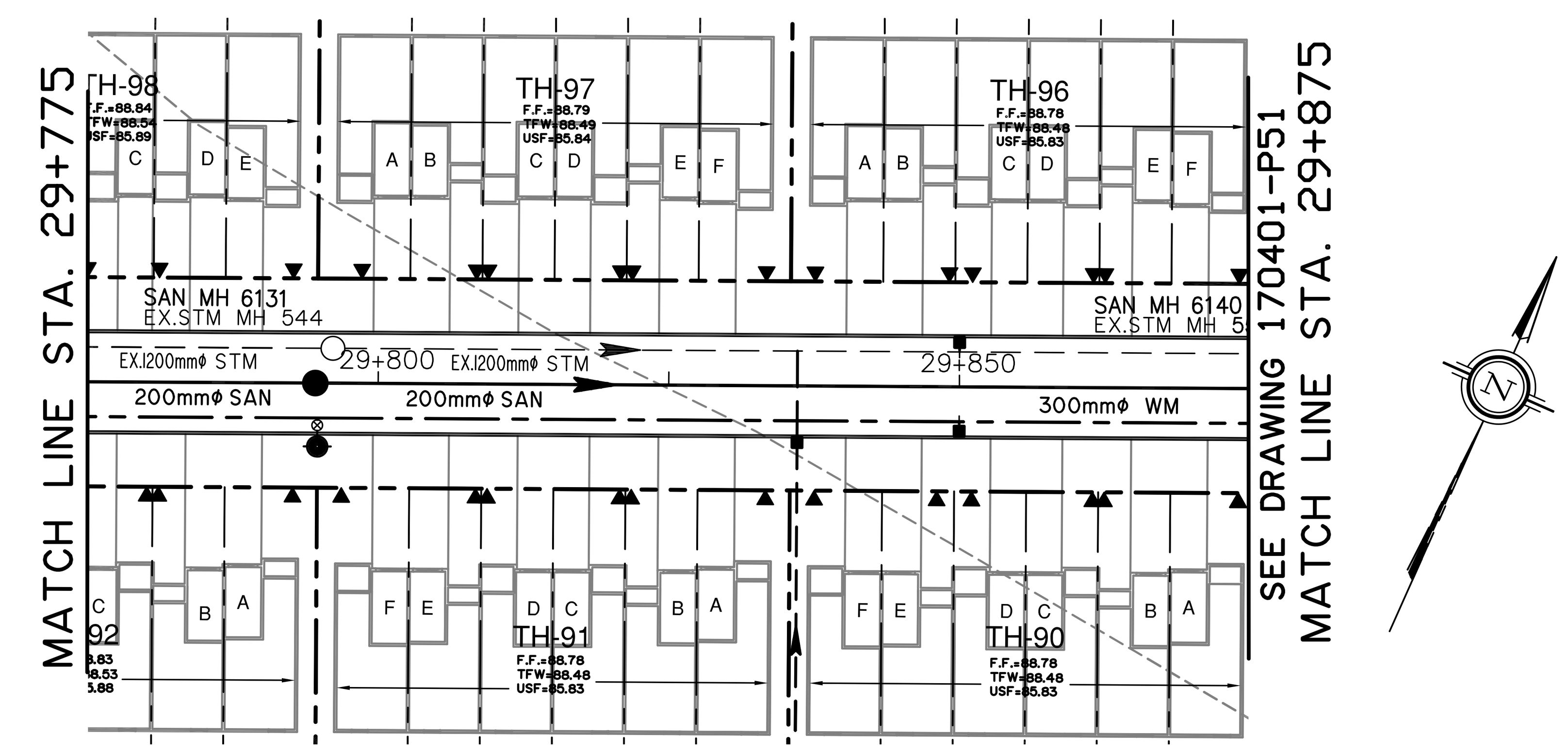
(COW) CUT OFF WALL (1.5m WIDE) SHALL BE INSTALLED AS PER CITY OF OTTAWA'S STANDARD DETAIL DRAWING S8 (SPACED NO MORE THAN 60m APART)

WATERMAIN CROSSING BELOW AND OVER SEWERS SHALL BE AS PER CITY OF OTTAWA'S STANDARD DETAIL DRAWINGS W25 AND W25.2 RESPECTIVELY.

OUTSIDE PROPOSED DEVELOPMENT







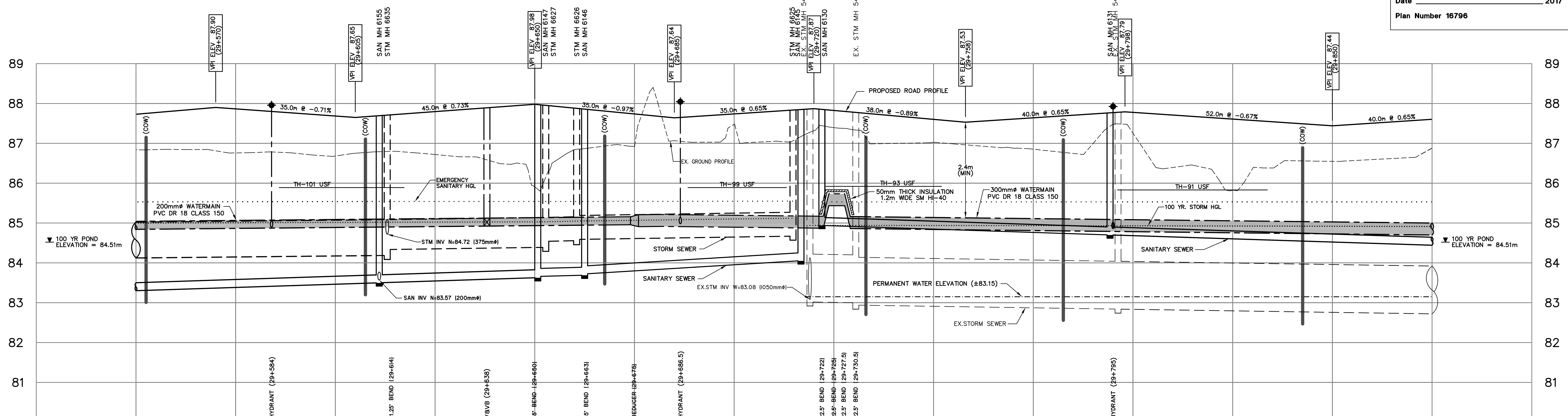
REVIEWED BY DEVELOPMENT REVIEW BRANCH

Signed ______________________

Date ______________________ 2017

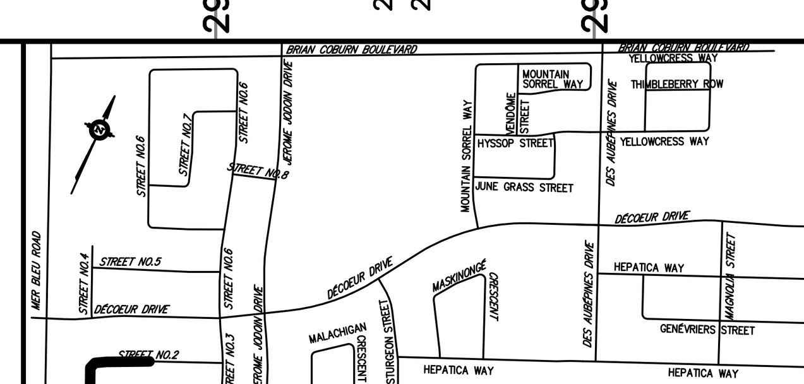
Plan Number 16796

STREET No.2



℄ ROAD ELEVATION	87.73, 87.90, 87.86, 87.69, 87.65, 87.80, 87.98, 87.74, 87.64, 87.74, 87.87, 87.82, 87.60, 87.53, 87.64, 87.79, 87.78, 87.61, 87.44, 87.60
TOP OF WATERMAIN ELEVATION	85.03, 85.06, 85.07, 85.08, 85.10, 85.11, 85.13, 85.15, 85.15, 85.16, 85.21, 85.22, 85.21, 85.20, 85.17, 85.17, 85.16, 85.16, 85.14, 85.11, 85.09, 85.08, 85.06, 85.03, 85.00
STORM SEWER INVERT	115.0m-900mmø STM @0.10% CONC 65D; 84.19 84.34; 40.0m-750mmø STM @0.15% CONC 65D; 84.40 84.55; 84.57 84.60; 10.5m-600mmø STM @0.15% CONC 65D; 54.0m-600mmø STM @0.15% CONC 65D; 84.68; 83.02; 83.00 82.94; EX.11.5m-1200mmø STM @0.15% CONC 65D; EX.65.5m-1200mmø STM @0.15% CONC 65D; 82.84 82.84; EX.85.5m-1200mmø STM @0.15% CONC 65D
SANITARY SEWER INVERT	111.0m-200mmø SAN @0.32% PVC SDR 35; 83.51 83.51; 40.0m-200mmø SAN @0.32% PVC SDR 35; 83.64 83.67; 83.70 83.73; 10.0m-200mmø SAN @0.32% PVC SDR 35; 51.0m-200mmø SAN @0.65% PVC SDR 35; 84.06; 84.95; 75.5m-200mmø SAN @0.32% PVC SDR 35; 84.71 84.71; 84.5m-200mmø SAN @0.32% PVC SDR 35
EXISTING ℄ R.O.W. ELEVATION	86.84, 86.84, 86.85, 86.84, 86.81, 86.76, 86.77, 86.78, 86.75, 86.70, 86.68, 86.75, 86.79, 86.80, 86.76, 86.72, 86.67, 86.66, 86.53, 86.49, 85.91, 86.55, 86.85, 86.90, 86.96, 86.92, 88.30, 87.07, 87.03, 87.03, 87.48, 87.03, 87.05, 87.08, 87.32, 87.39, 87.34, 86.99, 87.00, 87.01, 87.02, 86.99, 86.95, 86.91, 86.88, 86.85, 86.80, 86.75, 87.00, 87.48, 87.25, 86.50, 86.39, 86.45, 86.31, 85.82, 86.37, 86.38, 86.56, 86.55, 86.55, 86.57, 86.59, 86.62, 86.65, 86.88
CHAINAGE	29+550, 29+575, 29+600, 29+611, 29+612.5, 29+625, 29+650, 29+651, 29+652.5, 29+661.5, 29+662, 29+675, 29+700, 29+714.5, 29+716, 29+719, 29+722, 29+725, 29+730.5, 29+750, 29+775, 29+794.5, 29+796, 29+800, 29+825, 29+850, 29+875

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



No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY

SCALE
1:500 HORIZONTAL (5m 0 15m)
1:50 VERTICAL (0.5m 0 1.5m)

DESIGN PLM
CHECKED AGS
DRAWN PNC
CHECKED AGS
APPROVED AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Nov. 20, 2017
PROVINCE OF ONTARIO

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
EAST URBAN COMMUNITY
AVALON ENCORE STAGE 6

MINTO COMMUNITIES INC.

CLIENT No. 148
PROJECT No. 170401

PLAN AND PROFILE
STREET No.2
STATION 29+550 TO STATION 29+875

DRAWING No. 170401-P50

D07-16-09-0018-STAGE 6

16796

Appendix D

Watermain Hydraulic Analysis

WATERMAIN DESIGN SHEET

Avalon Encore - Stage 6 Block 236

Project No. 17099

TABLE 1.0

Junction Node Number	RESIDENTIAL POPULATION				NON-RES		AVG. DAILY				MAX. DAILY				MAX. HOURLY			
	ACTUAL COUNT				COMM. (HA)	INST. (HA)	DEMAND (l/s)				DEMAND (l/s)				DEMAND (l/s)			
	Low Density	Medium Density	High Density	Total Population			RES.	COMM.	INST.	TOTAL	RES.	COMM.	INST.	TOTAL	RES.	COMM.	INST.	TOTAL
		64		172.80			0.70			0.70	1.75			1.75	3.85			3.85
Total		64		172.80			0.70			0.70	1.75			1.75	3.85			3.85
										0.01				0.03				0.06

Residential Densities

Low Density (SFH's) = 3.4 cap/unit

Medium Density (Townhouses) = 2.7 cap/unit

High Density (Apartments) = 1.8 cap/unit

Avg. Daily Demand:

Residential = 350 L/cap/day

Max. Daily Demand:

2.5 x Avg. Day

Max. Hourly Demand:

2.2 x Max. Day

FUS Fire Flow Calculations

Robinson Consultants

Project #: 17099
Project Name: Infusion Terrace Homes Block 236
Date: 21, February, 2018

Calculations Based on 1999 Publication "Water Supply for Public Fire Protection" by Fire Underwriters' Survey (FUS)

Building Type/Description/Name: Terrace Homes

Table A: Fire Underwriters Survey Determination of Required Fire Flow - Long Method

Step	Task	Term	Options	Multiplier Associated with Option	Choose:	Value Used	Unit	Total Fire Flow (L/min)
1	Choose Frame Used for Construction of Unit	**Framing Material**						
		Coefficient related to type of construction (C)	Wood Frame	1.5	Wood Frame	1.5	m	
			Ordinary Construction	1				
			Non-combustible construction	0.8				
			Fire resistive construction (< 2 hrs)	0.7				
			Fire resistive construction (> 2 hrs)	0.6				
2	Choose Type of Housing (if TH, Enter Number of Units per TH Block)	**Floor Space Area**						
		Type of Housing	Single Family	1	Townhouse - indicate # of units	12	Units	
			Townhouse - indicate # of units	12				
			Other (comm, ind, etc.)	1				
2.2	# of Storeys	Number of Floors/Storeys in the Unit (do not include basement):			3	3	Storeys	
3	Enter Ground Floor Area of One Unit	Enter Ground Floor Area (A) of One Unit Only:			316	948	Area in Square Metres (m^2)	
		Measurement Units	Square Feet (ft^2)	0.09290304	Square Metres (m2)			
			Square Metres (m^2)	1				
			Hectares (ha)	10,000				
4	Obtain Required Fire Flow Without Reductions	Required Fire Flow (without reductions or increases per FUS) (F=220*C*VA), round to nearest 1000 L/min						10000
5	Apply Factors Affecting Burning	**Reductions/Increases Due to Factors Affecting Burning**						
5.1	Choose Combustibility of Building Contents	Occupancy content hazard reduction or surcharge	Non-combustible	-0.25	Combustible	0	N/A	10000
			Limited Combustible	-0.15				
			Combustible	0				
			Free burning	0.15				
			Rapid Burning	0.25				
5.2	Choose Reduction Due to Presence of Sprinklers	Sprinkler reduction	Complete Automatic Sprinkler Protection	-0.3	None	0	N/A	0
			None	0				
5.3	Choose Separation Distance Between Units	Exposure Distance Between Units	North Side	30.1 to 45m	0.05	0.5	N/A	5000
			East Side	3.1 to 10m	0.2			
			South Side	30.1 to 45m	0.05			
			West Side	3.1 to 10m	0.2			
6	Obtain Required Fire Flow, Duration & Volume	***Total Required Fire Flow, rounded to nearest 1000 L/min:***						15000
		Total Required Fire Flow (above) in L/s:						250
		Required Duration of Fire Flow (hrs)						9.5
		Required Volume of Fire Flow (m^3)						8550

Note: The most current FUS document should be referenced before design to ensure that the above figures are consistent with the intent of the Guidelines

Legend	
	Drop down menu - choose option, or enter value
	No information, No input required

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)	Status	Flow Reversal Count
1		19	32	30	19.000	203.000	110.000	3.742	0.116	0.003	0.134	Open	0
2		21	30	28	29.000	203.000	110.000	3.621	0.112	0.004	0.126	Open	0
3		33	14	12	29.000	152.000	100.000	0.484	0.027	0.000	0.015	Open	0
4		35	12	10	21.000	152.000	100.000	0.242	0.013	0.000	0.004	Open	0
5		41	22	24	28.000	51.000	90.000	0.242	0.118	0.028	1.016	Open	0
6		43	24	26	18.000	51.000	90.000	0.121	0.059	0.005	0.282	Open	0
7		47	72	74	26.000	51.000	90.000	0.242	0.118	0.026	1.016	Open	0
8		49	74	76	28.000	51.000	90.000	0.121	0.059	0.008	0.282	Open	0
9		59	42	44	14.000	203.000	110.000	1.564	0.048	0.000	0.027	Open	0
10		61	44	46	14.000	203.000	110.000	1.443	0.045	0.000	0.023	Open	0
11		69	50	52	8.000	152.000	100.000	0.968	0.053	0.000	0.053	Open	0
12		71	52	54	18.000	152.000	100.000	0.847	0.047	0.001	0.041	Open	0
13		73	54	56	10.000	152.000	100.000	0.726	0.040	0.000	0.032	Open	0
14		85	62	64	28.000	51.000	90.000	0.242	0.118	0.028	1.017	Open	0
15		87	64	66	26.000	51.000	90.000	0.121	0.059	0.007	0.282	Open	0

		ID	Demand (Lpm)	Elevation (m)	Head (m)	Pressure (psi)
1		10	2.640	88.590	130.598	59.719
2		12	2.640	88.590	130.598	59.719
3		14	2.640	88.590	130.598	59.719
4		22	1.320	88.590	130.594	59.713
5		24	1.320	88.590	130.593	59.711
6		26	1.320	88.590	130.593	59.711
7		28	1.320	88.360	130.599	60.047
8		30	1.320	88.360	130.599	60.047
9		32	1.320	88.360	130.599	60.047
10		FH	0.000	88.150	130.599	60.345
11		38	1.320	88.520	130.598	59.818
12		40	1.320	88.520	130.598	59.818
13		42	1.320	88.520	130.598	59.818
14		44	1.320	88.520	130.598	59.818
15		46	1.320	88.520	130.598	59.818
16		50	1.320	88.520	130.598	59.818
17		52	1.320	88.520	130.598	59.818
18		54	1.320	88.520	130.598	59.818
19		56	1.320	88.520	130.598	59.818
20		58	1.320	88.520	130.598	59.818
21		60	1.320	87.600	130.597	61.124
22		62	1.320	88.520	130.598	59.818
23		64	1.320	88.520	130.597	59.816
24		66	1.320	88.520	130.597	59.815
25		68	2.640	88.520	130.598	59.818
26		72	1.320	88.520	130.593	59.811
27		74	1.320	88.520	130.592	59.809
28		76	1.320	88.520	130.592	59.809
29		82	1.320	88.520	130.598	59.818

		ID	Demand (Lpm)	Elevation (m)	Head (m)	Pressure (psi)
1		10	14.520	88.590	126.662	54.123
2		12	14.520	88.590	126.662	54.123
3		14	14.520	88.590	126.663	54.124
4		22	7.260	88.590	126.567	53.987
5		24	7.260	88.590	126.538	53.947
6		26	7.260	88.590	126.533	53.940
7		28	7.260	88.360	126.677	54.472
8		30	7.260	88.360	126.681	54.477
9		32	7.260	88.360	126.684	54.480
10		FH	0.000	88.150	126.669	54.758
11		38	7.260	88.520	126.662	54.222
12		40	7.260	88.520	126.661	54.221
13		42	7.260	88.520	126.661	54.220
14		44	7.260	88.520	126.660	54.220
15		46	7.260	88.520	126.660	54.219
16		50	7.260	88.520	126.657	54.215
17		52	7.260	88.520	126.657	54.215
18		54	7.260	88.520	126.656	54.214
19		56	7.260	88.520	126.656	54.213
20		58	7.260	88.520	126.655	54.212
21		60	7.260	87.600	126.636	55.494
22		62	7.260	88.520	126.654	54.211
23		64	7.260	88.520	126.625	54.170
24		66	7.260	88.520	126.618	54.160
25		68	14.520	88.520	126.659	54.218
26		72	7.260	88.520	126.539	54.047
27		74	7.260	88.520	126.512	54.009
28		76	7.260	88.520	126.504	53.998
29		82	7.260	88.520	126.656	54.213

		ID	Static Demand (Lpm)	Static Pressure (psi)	Static Head (m)	Fire-Flow Demand (Lpm)	Residual Pressure (psi)	Available Flow at Hydrant (Lpm)
1		34	0.000	51.063	123.800	14,999.895	42.784	30,673.738
2		FH	0.000	50.678	123.799	14,999.895	-42.773	8,210.308
3		FH_PUBLIC	0.000	51.063	123.800	14,999.895	38.508	24,475.434

Appendix E

Development Servicing Study Checklist

4.1 General Content

☒ Executive Summary (for larger reports only).

Comments: *N/A due to report length*

☒ Date and revision number of the report.

Comments: *See Cover Page*

☒ Location map and plan showing municipal address, boundary, and layout of proposed development.

Comments: *See Figure 1.0 in report*

☒ Plan showing the site and location of all existing services.

Comments: *see Servicing Plan 17099-S1 for services*

☒ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.

Comments: *The applicable governing reports are documented in Section 1.0. Adherence to zoning has been covered in consultation with City staff.*

☒ Summary of Pre-consultation Meetings with City and other approval agencies.

Comments: *Various pre-consultations have taken place between land owner and City staff for the subdivision configuration*

☒ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.

Comments: *See Section 1.0*

☒ Statement of objectives and servicing criteria.

Comments: *Stated throughout the report*

☒ Identification of existing and proposed infrastructure available in the immediate area.

Comments: *see Servicing Plan 17099-S1 for services*

☒ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).

Comments: *IBI Group*
Mer Bleue Community Design Plan Infrastructure Servicing Study, dated April 2006.

☒ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.

Comments: *see Grading Plan 17099-GR1 in Appendix A*

☒ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.

Comments: *N/A*

☒ Proposed phasing of the development, if applicable.

Comments: *Any proposed phasing is not known at this time.*

☒ Reference to geotechnical studies and recommendations concerning servicing.

Comments: *Paterson Group Investigation, report titled "Avalon Encore - Stage 6" dated January 20, 2017*

☒ All preliminary and formal site plan submissions should have the following information:

- ☒ Metric scale
- ☒ North arrow (including construction North)
- ☒ Key plan
- ☒ Name and contact information of applicant and property owner
- ☒ Property limits including bearings and dimensions
- ☒ Existing and proposed structures and parking areas
- ☒ Easements, road widening and rights-of-way
- ☒ Adjacent street names

Comments: *N/A*

4.2 Development Servicing Report: Water

☒ Confirm consistency with Master Servicing Study, if available

Comments: *IBI Group*
Mer Bleue Community Design Plan Infrastructure Servicing Study, dated April 2006.

☒ Availability of public infrastructure to service proposed development

Comments: *See Section 2.0 and Appendix D*

☒ Identification of system constraints

Comments: *N/A*

☒ Identify boundary conditions

Comments: *See Section 2.0 and Appendix D*

☒ Confirmation of adequate domestic supply and pressure

Comments: *See Section 2.0 and Appendix D*

☒ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.

Comments: *See Section 2.0 and Appendix D*

☒ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.

Comments: *See Section 2.0 and Appendix D*

☒ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design

Comments: *No constraints.*

☒ Address reliability requirements such as appropriate location of shut-off valves

Comments: *N/A*

☒ Check on the necessity of a pressure zone boundary modification.

Comments: *N/A*

☒ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range

Comments: *See section 2.0 and Appendix D*

☒ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.

Comments: *See section 2.0 and Appendix D and servicing drawing.*

☒ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.

Comments: *N/A*

☒ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.

Comments: *See Section 2.0 and Appendix D*

☒ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.

Comments: *See Appendix D*

4.3 Development Servicing Report: Wastewater

☒ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).

Comments: *See Section 3.0 and Appendix B*

☒ Confirm consistency with Master Servicing Study and/or justifications for deviations.

Comments: *See Section 3.0 and Appendix B*

☒ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.

Comments: *N/A*

☒ Description of existing sanitary sewer available for discharge of wastewater from proposed development.

Comments: *see Section 3.0, design sheets and drawing 17099-S1 and 17099-SAN*

☒ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)

Comments: *Verified in sewer design sheet in Appendix B*

☒ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.

Comments: *N/A*

☒ Special considerations such as contamination, corrosive environment etc.

Comments: *N/A*

4.4 Development Servicing Report: Stormwater

☒ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)

Comments: *Minor system goes to Street No. 2, major overland to Street No. 2 - See Section 5.0*

☒ Analysis of available capacity in existing public infrastructure.

Comments: *See storm sewer design sheet in Appendix C*

☒ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.

Comments: *See drawing 17099-S1 and 17099-STM*

☒ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.

Comments: *See Section 4.0 and 5.0 for various details. Quality control is provided by the Avalon West Neighbourhood 5 Stormwater Management Facilty.*

☒ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.

Comments: *Quality control is provided by the Avalon West Neighbourhood 5 Stormwater Management Facilty.*

☒ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.

Comments: *See Section 4.0 and 5.0 for various details.*

☒ Set-back from private sewage disposal systems.

Comments: *N/A*

☒ Watercourse and hazard lands setbacks.

Comments: *N/A*

☒ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.

Comments: *Record of a pre-consultation has been included in Appendix C*

☒ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.

Comments: *See discussion in Section 4.0*

☒ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).

Comments: *See Section 4.0 and Appendix C*

☒ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.

Comments: *N/A*

☒ Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.

Comments: *See Section 4.0 and Appendix C. Pre/post not required. Design is based upon a prescribed 220 L/s/ha*

☒ Any proposed diversion of drainage catchment areas from one outlet to another.

Comments: *N/A*

☒ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.

Comments: *See drawings 17099-S1 and SWM in Appendix A and C*

☒ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.

Comments: *Quantity control is proposed. See Section 4.0 for details*

☒ Identification of potential impacts to receiving watercourses

Comments: *N/A*

☒ Identification of municipal drains and related approval requirements.

Comments: *N/A*

☒ Descriptions of how the conveyance and storage capacity will be achieved for the development.

Comments: *See Section 4.0 and Appendix C for details of surface storage.*

☒ 100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.

Comments: *Maximum ponding levels of 0.3m on the parking lot and driving ailes.*

☒ Inclusion of hydraulic analysis including hydraulic grade line elevations.

Comments: *See Section 4.0 and Appendix C*

☒ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.

Comments: *See Section 6.0 and Erosion and Sediment Control drawing 17099-EC1*

☒ Identification of floodplains - proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.

Comments: *N/A*

☒ Identification of fill constraints related to floodplain and geotechnical investigation.

Comments: *N/A*

4.5 Approval and Permit Requirements: Checklist

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

☒ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.

Comments: *N/A*

☒ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.

Comments: *N/A*

☒ Changes to Municipal Drains.

Comments: *N/A*

☒ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)

Comments: *N/A*

4.6 Conclusion Checklist

☒ Clearly stated conclusions and recommendations

Comments: *See Section 7.0*

☒ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.

Comments: *N/A*

☒ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario

Comments: *Report are signed.*