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Prepared for:

MINTO COMMUNITIES INC.
200-180 Kent Street
Ottawa, ON
K1P 0B6

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED
864 Lady Ellen Place
Ottawa, ON
K1Z 5M2
Tel: 613-728-3571
Fax: 613-728-6012

Site Servicing Report

Morgan's Creek - Stage 1 (762 March Road)

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 Introduction

Minto Communities Incorporated (Minto), along with their subsidiary companies, is one of the major landowners in the Kanata North Urban Area, located in the western portion of the City of Ottawa. In 2012, J.L. Richards & Associates Limited (JLR) had been retained by Minto to proceed with the detailed design of municipal infrastructure for a private development located at 760 March Road referred to as Morgan's Creek.

The Morgan's Creek development consisted of a 2.87 ha parcel bisected by Shirley's Brook, within the jurisdiction of the Mississippi Valley Conservation Authority (MVCA). Given that Shirley's Brook represents a natural barrier bisecting the parcel, the overall servicing for the property was divided into two sites (for design purposes) and investigated independently based on their respective frontage. The western parcel fronting onto March Road was referred to as the March Road Site (Site 1) while the eastern parcel fronting onto Sandhill Road was referred to as the Sandhill Road Site (Site 2). A Site Servicing Brief was submitted to the City of Ottawa (City) in 2012, which described infrastructure requirements for both private sites. Subsequently, the City and other regulatory agencies granted Site Plan Approvals. The infrastructure works were tendered in 2012 and a composite utility plan (CUP) was submitted to the City in 2013. Although the Tender was awarded, construction was never initiated on either of the sites.

Minto now wishes to revise the housing product and layout for both sites (March Road and Sandhill Road) to satisfy current housing demands in the Kanata North Urban Area. It is proposed to develop Morgan's Creek in two (2) stages; Stage 1 consists of the development fronting March Road (762 March Road) while Stage 2 consists of the development fronting Sandhill Road (335 Sandhill Road). The approval for Stage 1 will be under Site Plan Control and subsequent Plan of Condominium, while Stage 2 will require approval under Draft Plan of Subdivision and Plan of Condominium. As such, this Site Servicing Report was prepared for Stage 1 (762 March Road) and a Servicing Brief will be submitted under separate cover for Stage 2 (335 Sandhill Road).

This Site Servicing Report outlines the design objectives and criteria, servicing constraints and strategies for the development of Morgan's Creek Stage 1 in accordance with the November 2009 Servicing Study Guidelines for Development Applications in the City of Ottawa (City) as well as the Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins. This includes servicing solutions for water, wastewater and stormwater management, as well as erosion and sedimentation control throughout construction. The City of Ottawa Development Servicing Study Checklist has been included in this document (Appendix 'A').

1.1 Site Description

Morgan's Creek is sited on a ±2.87 ha parcel of land bisected by Shirley's Brook. As a result of this constraint, a significant portion of the parcel (±0.57 ha) will not be developable as this block is floodplain land. The legal description of the subject property is Part of Lot 10, Concession 4, Township of March, City of Ottawa (refer to Appendix 'A' for Plan of Survey). As noted previously, this Site Servicing Report was prepared solely for Morgan's Creek Stage 1 (762 March Road).

Stage 1 consists of a 0.77 ha parcel adjacent to March Road that is currently undeveloped with the exception of a small gravel pad and access road. Topography generally slopes mildly towards Shirley's Brook. Minto wishes to develop Stage 1 into 60 terrace townhouse units serviced from March Road, as shown on the Site Plan included in Appendix 'E'. The 0.77 ha parcel is bounded by vacant lands to the north, by Shirley's Brook to the east, by an existing residential development to the south (Blue Heron cooperative development), and by March Road to the west.

1.2 Existing Infrastructure

The Morgan's Creek Stage 1 development is proposed to be serviced from the existing watermains, sanitary sewers, and storm sewers that are located on March Road. This infrastructure has been identified as being readily accessible, if residual capacity can be proven to be available.

Water

There are two (2) 200 mm diameter watermain stubs (connected to the 400 mm diameter trunk feedermain on March Road) that have been constructed for the purpose of servicing this property.

Sanitary

There are no immediate sanitary sewers bounding the site. However, there is an existing 200 mm diameter sanitary sewer stub that is capped at both ends across March Road. This 200 mm diameter stub was intended to provide conveyance for wastewater across March Road to the existing Mersey Drive 200 mm diameter PVC sanitary sewer, within the Morgan's Grant Subdivision. From that stub, it is proposed that wastewater flows from Stage 1 be conveyed to the Morgan's Grant system.

Storm

There is a 675 mm diameter trunk storm sewer along March Road that was designed for the subject site. In addition, there is a 450 mm diameter storm sewer stub capped at the property line of the site as the dedicated outlet for Stage 1.

1.3 Background Documents

Infrastructure associated with the Morgan's Creek development is designed in accordance with the following documents:

- Kanata North Environmental/Stormwater Management Plan, CH2M Gore & Storrie, 2001.
- March Road Reconstruction – Morgan's Grant Way to Old Carp Road (Halton Terrace Extension) Drainage Design Brief and Detailed Design Drawings 018, 019 and DA1, Stantec, October 3, 2010.
- Shirley's Brook Floodplain Analysis and Stormwater Management Report Novatech Engineering Consultants Ltd, November 2006.

- Shirley's Brooks Stormwater Management Facility 1 – West, Design Brief, David McManus Engineering Ltd., April 15, 2009

- Detailed Design Information (Morgan's Grant) - As-constructed Drawings 16087-11 and Sanitary Sewer Design Sheet, J.L. Richards & Associated Limited, July 2018.

1.4 Consultation and Permits

Two (2) pre-consultation meetings were held in 2012 for Morgan's Creek. Due to the six (6) year time lapse since the original pre-consultation meetings, another pre-consultation meeting was held on August 22, 2018 (refer to Appendix 'A' for meeting notes). Subsequently, a written confirmation from the MVCA was received in regard to the weeping tile drainage system (Appendix 'A').

2.0 Geotechnical

A geotechnical investigation was carried out by Paterson Group Inc. (Paterson) to assess general soil, groundwater and infiltration capabilities, and to provide recommendations for development, including construction considerations. The findings and recommendations of this investigation were compiled in the Report entitled "Geotechnical Investigation Proposed Residential Development, Sandhill Road at Ottawa, Ontario," Report Number PG2234-2, dated July 13, 2011. In 2012, a complete copy of this Report was provided to the City.

An updated geotechnical investigation (dated November 9, 2018) was recently carried out by Paterson. A copy of this Report has been provided to the City.

3.0 Water Servicing

3.1 Design Criteria

A Hydraulic Network Analysis (HNA) was conducted for Morgan's Creek Stage 1 to confirm that the existing and proposed watermains can provide adequate supply while complying with both the City of Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletins ISDTB-2014-02 and ISTB-2018-02. These documents have been referred to in this section as the Design Guidelines, TB-2014-02 and TB-2018-02, respectively. The Design Guidelines require that a water supply system be designed to satisfy the following demand criteria:

- maximum day demand plus fire flow; and
- maximum hourly demand (peak hour demand).

Section 4.2.2 of the Design Guidelines requires that all new development additions to the public water distribution system be designed such that the minimum and maximum water pressures, as well as flow rates, conform to the following:

- Under maximum hourly demand conditions (peak hour), the pressures shall not be less than 276 kPa (40 psi);

- 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);
- In accordance with the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi);
- The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi); and
- Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand.

To satisfy the design criteria and water demand, supply to Morgan's Creek Stage 1 will be achieved from the existing connections listed in Section 1.2. To minimize degradation of water quality, the following is proposed:

- Providing the best configuration of the system, particularly at dead ends. Note that the proposed watermain servicing the on-site hydrants does not include any dead ends; and
- Optimizing and limiting the sizes of proposed infrastructure to minimize water degradation. Note that the proposed watermains servicing the multi-unit residential buildings have been limited to 200 mm in diameter, as per the recommendations of TB-2014-02.

3.2 Domestic Water Demands

The water demands presented in this section were calculated for 60 terrace townhouse (duplex) units, as proposed on the Site Plan (refer to Appendix 'E'). A population density of 2.3 persons/unit was used, as prescribed in Table 4.1 of the Design Guidelines.

The residential consumption rate for average day demand was set in accordance with Table 4-2 of the Design Guidelines. Given that the population for Stage 1 is less than 500 people, peaking factors interpolated from the MOE Design Guidelines (Table 3-3) were used to generate the maximum day and peak hour demands. Table 3-1 summarizes the water consumption rates and peaking factors used in the HNA.

Table 3-1: Water Consumption Rates and Peaking Factors

Demand Scenario	Residential
Average Day Demand	350 L/c/d
Maximum Day Demand (Interpolated from Table 3-3)	5.4 x Avg Day
Peak Hour Demand (Interpolated from Table 3-3)	8.1 x Avg Day

Table 3-2 summarizes the overall water demands computed using the aforementioned consumption rates and peaking factors (refer to Appendix 'B' for detailed calculations).

Table 3-2: Calculated Water Demands

Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
0.56	3.02	4.53

3.3 Proposed Water Servicing and Roughness Coefficients

The proposed water servicing for the site includes a 200 mm diameter watermain within the private roadway to supply the three (3) on-site hydrants. A 150 mm diameter watermain is proposed to extend in front of the units fronting March Road and those fronting Shirley's Brook, since all services must enter at the front of the units. The overall watermain layout for Stage 1 is shown on the Site Servicing Plan (Drawing S1). Watermain roughness coefficients were determined using the friction factors presented in Section 4.2.12 of the Design Guidelines and summarized in Table 3-3 below. The internal pipe diameters were modelled based on Section 4.3.5 of the Design Guidelines, as summarized in Table 3-4 below.

Table 3-3: Watermain Roughness Coefficients

Watermain Diameter	C-Factor
150 mm	100
200 to 250 mm	110
300 to 600 mm	120

Table 3-4: PVC Watermain Internal Diameters

Nominal Diameter	Inside Diameter
150 mm	155 mm
200 mm	204 mm
250 mm	250 mm
300 mm	297 mm
400 mm	393 mm

3.4 Fire Flow Requirements

3.4.1 General

Various Guidelines are used throughout North America to establish fire flow requirements for different types of buildings. The Guidelines entitled "Water Supply for Public Fire Protection (1999)" developed by the Fire Underwriters Survey (FUS) govern fire flow protection in the City of Ottawa.

Fire flow requirements for this HNA were calculated for the terrace townhome units in accordance with the FUS Guidelines, as well as TB-2014-02 and TB-2018-02.

Specifically, the protocol for the application of the FUS method was used as outlined in Appendix H: Protocol to Clarify the Application of the Fire Flow calculation method Published by Fire Underwriters Survey (FUS) of TB-2018-02.

3.4.2 Required Fire Flow

The Design Guidelines as well as TB-2014-02 and TB-2018-02 require that fire flow requirements be calculated based on the type of unit, exposure to adjacent units, building material, etc. In addition, the required fire flow (RFF) must consider all structures separated by less than 3.0 m as a single fire area (per FUS).

Within the subject site, the units do not qualify for the capped fire flow of 10,000 L/min (167 L/s) as they are multi-unit residential buildings. The maximum RFF was estimated at 12,000 L/min (200 L/s) as summarized in Table 3-5 (refer to Appendix 'B' for FUS calculations).

Table 3-5: FUS Fire Flow Requirements

Block Number	Fire Flow L/min (L/s)	Capped Flow L/min (L/s)	Targeted Flow L/min (L/s)
TE-2	12,000 (200)	N/A[1]	12,000 (200)

[1] The proposed units do not qualify for the capped fire flow per ISTB-2014-02.

3.5 Hydraulic Boundary Conditions

The HNA was carried out using hydraulic boundary conditions given by the City for various water demand conditions (refer to Appendix 'B' for a copy of the City correspondence). Potable water will be supplied to Stage 1 via a 200 mm diameter watermain loop. Table 3-6 summarizes the hydraulic boundary conditions used in the HNA.

Table 3-6: Hydraulic Boundary Conditions at Existing Stubs

Demand Scenarios	Head (m)
Peak Hour	124.2
Maximum Day + Fire Flow 13,000 L/min (217 L/s)[1]	121.4
Maximum Pressure Check	131.6

[1] Due to minor Site Plan changes, the given boundary condition represents a more conservative fire flow.

3.6 Simulation Results

The proposed water distribution system (refer to Appendix 'B' for Schematic), as depicted on the Site Servicing Plan (Drawing S1) was modelled in WaterCAD® and evaluated under various water demand scenarios in accordance with the Design Guidelines. The model simulation results are summarized below (refer to Appendix 'B' for detailed results).

3.6.1 Peak Hour

The peak hour demand shown in Table 3-2 was distributed between two main junctions within the site. Using the boundary condition shown in Table 3-6, the minimum pressures were found to be between 449 kPa (65.1 psi) at Junction J-1 and 450 kPa (65.3 psi) at Junctions J-2 and J-3, as shown in Appendix 'B'. The simulated hydraulic grade lines (HGL) were found to be constant across the development at an elevation of 124.20 m.

Providing the minimum pressure of 276 kPa (40 psi) at the top finished floor was also verified. A conservative height of 9.0 m represents a pressure head reduction of 88 kPa (12.8 psi), which gives a minimum pressure of 361 kPa (52.3 psi) at the top finished floor.

Based on these simulation results, the minimum pressure criterion of 276 kPa (40 psi) will be exceeded throughout the site.

3.6.2 Maximum Day Plus Fire Flow

To ensure adequate fire protection, the maximum day demand shown in Table 3-2 was simulated simultaneously with the fire flow. The simulation was carried out using the boundary condition presented in Table 3-6. Although the maximum RFF for the site was calculated at 12,000 L/min (200 L/s), the conservative boundary condition of 13,000 L/min (217 L/s) was used for the analysis.

The fire flow simulation was carried out by allowing WaterCAD® to calculate the maximum fire flow that can be drawn from each hydrant without allowing any part of the system to experience pressures less than 140 kPa (20 psi), and recognizing that hydrants have limited capacity. The simulation results showed that 95 L/s (the maximum fire flow that can be supplied by a hydrant per ISTB-2018-02) can be drawn from each proposed hydrant within Stage 1 while maintaining a minimum system pressure of 140 kPa.

The simulation results (Appendix 'B') show that the proposed water distribution system is capable of delivering fire flows ranging between 33,300 L/min (555 L/s) and 48,840 L/s (814 L/s) within Stage 1 under the 13,000 L/min (217 L/s) boundary condition. Hence, the RFF can be fulfilled everywhere within Stage 1.

Three (3) hydrants are proposed within Stage 1 to achieve the aggregate fire flow requirement of 13,000 L/min (217 L/s) for the critical residential block TE-1. For this block, the RFF can be provided by the following hydrants as per the limitations described in ISTB-2018-02:

<u>Block TE-1 (13,000 L/min or 217 L/s):</u>

- 5,700 L/min (95 L/s) at H-1 and H-2;
- 3,780 L/min (63 L/s) at H-3.

As shown above, the RFF for Stage 1 can be met with hydrant spacing depicted on the Site Servicing Plan.

3.6.3 Maximum HGL

The Design Guidelines require that a high pressure check (maximum hydraulic grade elevation) be performed on the proposed system to ensure that the maximum pressure constraint of 552 kPa (80 psi) is not exceeded. Based on the average day demand shown in Table 3-2 and the boundary condition shown in Table 3-6, maximum pressures of 521 kPa (75.6 psi) and 522 kPa (75.7 psi) are anticipated within the site (refer to Appendix 'B'). These maximum pressures are below the maximum pressure constraint of 552 kPa (80 psi).

4.0 Sanitary Servicing

4.1 Design Criteria

Local sanitary sewers for Morgan's Creek Stage 1 were designed in accordance with the City of Ottawa Sewer Design Guidelines (2012) and Technical Bulletins. Key design parameters have been summarized in Table 4-1 below.

Table 4-1: Wastewater Servicing Design Criteria

Design Criteria	Design Value	Reference
Residential average flow	280 L/cap/day	ISTB-2018-01
Residential peaking factor	Harmon Formula x 0.8	ISTB-2018-01
Commercial average flow	28,000 L/gross ha/day	ISTB-2018-01
ICI peaking factor(1)	1.0/1.5	ISTB-2018-01
Total Infiltration	0.33 L/s/ha	ISTB-2018-01
Minimum velocity	0.6 m/s	OSDG Section 6.1.2.2
Maximum velocity	3.0 m/s	OSDG Section 6.1.2.2
Manning Roughness Coefficient (for smooth wall pipes)	0.013	OSDG Section 6.1.8.2
Minimum allowable slopes	Varies	OSDG Table 6.2, Section 6.1.2.2
Population Density	Towns: 2.7 pers/unit	OSDG Table 4.2, Section 4.3

(1) 1.5 if ICI contribution >20%, 1.0 otherwise

4.2 Proposed Sanitary Sewer Servicing and Calculations

It is proposed to collect and convey wastewater generated by the Stage 1 site to the Mersey Drive sanitary sewer system via an existing 200 mm diameter sewer stub that was constructed as part of the March Road reconstruction project (refer to Appendix 'C' for copies of email correspondence dated October 12, 2010). As noted in this correspondence, this sanitary sewer stub was capped at both ends of March Road to prevent a potential road cut for future development. Copies of design drawings issued by Stantec are included in Appendix 'C' (Drawings 018, 019 and DA1 and the Storm Sewer Design Worksheet – Minor Flow Analysis). Based on the capacity calculations presented in the noted correspondence, this 200 mm diameter sanitary stub was sized to provide the conveyance of wastewater generated by two (2) parcels; i) the Morgan's Creek Stage 1 lands (762 March Road) with an estimated area of 0.69 ha and ii) the northern adjacent commercial parcel, with an estimated area of 0.83 ha. Since a Certificate of Approval was never sought for this sanitary sewer stub, the connection to the Mersey Drive 200 mm diameter sanitary sewer was not completed. This sanitary stub was constructed approximately 2 m past the west pavement edge of March Road, short of the existing Bell/fibre optic duct, and ended approximately 12 m east of the Mersey Drive 200 mm diameter sanitary sewer (refer to Drawing S1 at the back of the Report for stub location and Appendix 'C' for Stantec Design Drawings).

Based on as-constructed information noted in a separate email issued by Stantec (dated October 14, 2010) and also on an "as-constructed" drawing issued by Stantec, the sanitary stub was constructed at an elevation below the existing invert elevation of the sanitary sewer at maintenance hole MH124. Copies of the "as-constructed" drawing for the Morgan's Grant Subdivision - Drawing 16087-11 and Sanitary Drainage Plan and copies of Sanitary Sewer Design Sheets are presented in Appendix 'C'. A connection is therefore proposed to the existing Mersey Drive 200 mm diameter sanitary sewer, approximately 33 m downstream of MH124. At that location, the elevation difference between the stub and the existing sewer system will allow for a gravity fed system.

Peak sanitary flows of 2.11 L/s and 4.20 L/s were calculated for the subject site and the adjacent commercial site, respectively, for an overall peak flow of 6.31 L/s (refer to Appendix 'C' for Sanitary Sewer Design Sheet – and information provided by David Schaeffer engineering Ltd. for 788 March Rd.).

This overall peak flow of 6.31 L/s is proposed to be conveyed across March Road, via the existing sanitary sewer stub and discharge into the Mersey Drive 200 mm diameter sanitary sewer system. The Sanitary Sewer Design Sheet for this development provides all sanitary sewer works proposed for the Morgan's Creek development along with those associated with the existing system for the Morgan's Grant Subdivision. Based on this compiled information and wastewater calculations, the Morgan's Grant sanitary sewer system (i.e., Mersey Drive 200 mm diameter sanitary sewer) has the capacity to accommodate the anticipated flow increase of 6.31 L/s. Although the 6.31 L/s is slightly higher than the allocation of 3.61 L/s previously approved through JLR's 2012 submission for the subject site, the peak design flow at the downstream end (MH15A-8C) in the Briar Brooke Subdivision has been reduced from the 2012 approved design due to the City's recent technical bulletin ISTB-2018-01. It should also be noted that the peak flow for the subject site has been reduced from 2.66 L/s to 2.11 L/s based on this design submission.

4.3 Summary and Conclusions

Based on the above servicing details and the Sanitary Sewer Design Sheet (refer to Appendix 'C'), it is recommended that the sanitary servicing proposed on Drawing S1 (at the back of the Report) be implemented for Morgan's Creek Stage 1.

5.0 Storm Servicing and Stormwater Management

5.1 General

This section of the report presents the analyses completed to confirm that the existing and proposed storm sewers and stormwater management systems can accommodate the proposed development.

5.2 Storm Criteria

Servicing of Morgan's Creek Stage 1 will require that it be developed and designed in accordance with the following:

1. The March Road reconstruction project where a trunk storm sewer system was identified as the dedicated sewer for the Stage 1 lands (refer to Section 1.3 for details); and

2. The end-of-pipe facility referred to as SWM Facility 1 - West (refer to Section 1.3 for details), the dedicated outlet for the Stage 1 lands.

In addition to the above constraints, servicing within Morgan's Creek Stage 1 must be designed in accordance with the Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins.

The design information compiled for the March Road reconstruction project (refer to Appendix 'A' for Drawings and Appendix 'D' for Storm Sewer Design Sheet), shows that the existing 675 mm diameter trunk sewer was sized as the outlet for an overall 1.52 ha parcel with a runoff coefficient of 0.8. This parcel includes the March Road site (0.77 ha) and the adjacent commercial parcel sited at 788 March Road.

Storm runoff from these parcels is to be collected and conveyed by a local collection system and discharge to the existing March Road 675 mm diameter storm sewer via a 450 mm diameter storm sewer stub located along the northern perimeter of the March Road site (refer to Appendix 'E' for Drawings). Once captured, runoff is to be conveyed northerly along the March Road storm sewer (from ex. MH 13 to ex. MH6) where it eventually discharges into an end-of-pipe facility referred to as SWM Facility 1 – West (refer to Section 1.3) where water quantity and quality control is provided. Based on the above infrastructure, the following summarizes the servicing constraints for Morgan's Creek Stage 1:

- A capacity of 159.89 L/s was assigned to the existing March Road 675 mm diameter trunk sewer based on a 0.69 ha parcel, a runoff coefficient (C) of 0.8 and a time of concentration of 10 minutes (refer to Appendix 'D' for Storm Sewer Design Worksheet). The March Road 675 mm diameter trunk storm sewer has been sized with an allocated capacity 159.89 L/s for the subject site.

- The dedicated facility for Morgan's Creek Stage 1, SWM Facility 1 – West, was designed by David McManus Engineering based on a unit rate of 70 L/s/ha for the lands east of March Road. These lands have been referred to as the Klondike Area (A-500), which has been simulated as a 1.52 ha parcel at a total imperviousness of 0.86 (C–Factor = 0.80). The allowable release rate for Morgan's Creek Stage 1 (0.77 ha) shall be based on the unit capture rate of 70 L/s/ha. Consequently, SWM Facility 1 – West was sized to provide Morgan's Creek Stage 1 with an allocated capacity of 53.90 L/s (0.77 ha x 70 L/s), which is more restrictive than the capacity allocated in the March Road trunk storm sewer (159.89 L/s).

Based on the above two (2) design constraints, the storm and stormwater management system for Stage 1 were designed based on the allowable capacity of 53.90 L/s.

In terms of major overland flow, the stormwater management design was carried out such that the 1:100 year post-development flows generated by Stage 1 would be detained on-site while releasing to the maximum allowable release rate of 53.90 L/s. On-site detention is mandatory given that the site bounds an arterial. Based on the design of the March Road trunk storm sewer system, there is a restriction in regard to the hydraulic grade line (HGL) along this trunk sewer system. As noted by Stantec, areas connecting to the existing March Road 675 mm diameter trunk storm sewer system will be impacted by high HGLs (refer to Note 1 on Drawings 018 and 019, Appendix 'A'). Since the HGLs may be encountered that could reach roadway grades, no direct service connections are to be made to the March Road trunk storm sewer (refer to Note 1 on Drawings 018 and 019). Consequently, a secondary sewer system is proposed to convey the weeping tile flows to Shirley's Brook. This servicing solution was approved in 2012by regulatory agencies. The MVCA has re-confirmed that they do not object to a system collecting and discharging weeping tile drainage to Shirley's Brook (see Appendix 'A' for email correspondence).

- To achieve the above minor and major system constraints, storm servicing will incorporate an Inlet Control Device (ICD) along with above-ground storage via the parking lot surface and underground storage from oversized storm sewers.

- In terms of fish habitat protection, the subject site is tributary to the Shirley's Brook watershed and, as such, provision of water quality control measures is mandatory. Since runoff conveyed by the existing March Road 675 mm diameter sewer eventually outlets to a wet detention facility (i.e., SWM Facility 1 – West) sized for water quality control, no additional water quality control measures are warranted.

- As previously noted, Shirley's Brook bisects the total 2.89 ha Morgan's Creek parcel. A review of the Flood Risk Map for Shirley's Brook (1989) shows a floodplain elevation of 74.0 m. This floodplain elevation was considered in the layout of the development.

5.3 Proposed Storm Servicing and Stormwater Management Evaluation

5.3.1 General

Storm servicing for Morgan's Creek Stage 1 was designed such that the minor system can capture and convey runoff during frequent storm events while the major system was designed to detain flows up to the 1:100 year recurrence. The dual drainage system has been designed in accordance with the City of Ottawa Sewer

Design Guidelines (2012), all Technical Bulletins and the servicing constraints summarized in Section 5.2. The general stormwater servicing design parameters used to complete the detailed design for the subject site are listed in Table 5-1.

Table 5-1: Stormwater Servicing Design Criteria

General Design Criteria
Maximum allowable release rate = 53.9 L/s
1:100 year major overland flow to be contained on-site
On-site water quality control by means of SWM Facility 1 - West
Minimum swale grades at 1.5% (with lower grades sub-drain must be provided).
Minimum roadway profile grades at 0.5%.
Minimum roadway slope of 0.1% from crest to crest for overland flow route.
Minimum freeboard of 0.30 m between the finished floor elevation and the maximum street ponding elevation.
Maximum ponding depth of 0.35 m.
Minimum of 0.30 m clearance between the underside of footing and the 1:100 year HGL elevation (N/A as units are not connected to storm system).
Minimum circular orifice diameter of 75 mm or Commercially Distributed Restrictors.
Ensure ponding water does not directly enter the sanitary sewer system through sanitary maintenance holes.
Storm sewers sized for the 1:5 year storm event using the Rational Method and City of Ottawa Intensity-Duration-Frequency (IDF) curves.
Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

5.3.2 Minor System

The proposed storm sewer system for Stage 1 was designed using the Rational Method to size the minor system. Storage requirements, release rates, and the computed hydraulic grade line (HGL) elevations were then verified using the PCSWMM software platform that has the ability to perform hydraulic and hydrologic calculations.. An inlet time of ten (10) minutes was utilized in the Rational Method at the upstream end of the sewer system along with runoff coefficients (C) ranging between 0.45 and 0.85 as shown on Drawing 'SWM'.

The 1:5 year rainfall intensities used in the Rational Method were set based on the rainfall equations reported in Section 5.4.2 of the Design Guidelines. The Rational Method Storm Sewer Design Sheet provides the proposed storm sewer configuration for Stage 1 (refer to Appendix 'D' for copies of the Storm Sewer

Design Sheet) and Drawing 'SWM' provides the details in regard to drainage for the site.

5.3.3 Stormwater Management Calculations

The performance of the proposed storm and stormwater management systems was evaluated via computer modelling to demonstrate that the design criteria listed in Section 5.2 and Section 5.3 were fulfilled (i.e., allowable release rate and on-site capture of 1:100 year storm) such that the integrity of the downstream minor/major systems is preserved. Given that Stage 1 will incorporate surface and underground storage, the storage volume requirements were assessed using the PCSWMM software platform.

The stormwater management calculations shown in Appendix 'D' along with Drawings SWM and S1 show the servicing strategy. The allowable release rate of 53.9 L/s included an uncontrolled area of 0.07 ha which represents land that is fronting onto March Road. Based on the desktop calculation (Appendix 'D'), this uncontrolled area was found to generate a 1:100 year peak flow of 22.59 L/s. Consequently, the proposed on-site storm and stormwater management systems must be designed to detain the 1:100 year design storm while releasing flows below 31.31 L/s, the allocated minor system release rate for the remainder of Stage 1. The allowable flow of 31.31 L/s can outlet at the existing storm sewer stub located downstream of proposed storm MH506. The minor system flow rate is proposed to be controlled using an ICD placed in MH506. The simulation results indicate that a 120mm diameter ICD placed at MH506 results in a maximum release rate of 30 L/s during a 1:100 year storm event and is, therefore, being proposed.

Parking lot depressions and oversized sewers are being proposed to fulfill the on-site storage requirements for the site. The PCSWMM modelling platform was used to verify that the storage requirements, HGL levels and release rates were met. Drainage areas, modelling parameters and results are shown in Appendix 'D'. Table 5-2 shown below summarizes the available on-site storage. The modelling results shown in the table below indicate that available storage provided from the road sags and pipe network are sufficient.

Table 5-2: Available On-Site Storage

Surface Storage		
Ponding Area	Available Storage (m^3) Road Sags	Storage Used (m^3) Modelling Results
CB 1	59	50
CB 2	69	51
CB 3	32	4
Underground Storage		
Pipe Reach (450mm Dia.)	Available Storage (m^3)	Modelling Storage Used (m^3)
CB3-MH508 (24m)	3.8	3.8
MH507-MH507 (85m)	13.5	13.5
MH507-MH506 (30m)	4.8	4.8

The above summarized simulation results show that the on-site storage provided by the design is sufficient to detain the 1:100 year.

5.3.4 Dual Drainage Modelling

The analysis of both major and minor drainage systems was carried out to demonstrate their compliance with respect to the design criteria described in Sections 5.2 and 5.3. The performance of the major overland system and minor storm sewer system was analyzed with PCSWMM. This software is a dynamic model which allows both hydrologic and hydraulic components to be simulated in the same platform and also allows the simulation of the interaction between the major and minor systems. The PCSWMM software platform was used to:

i) Generate the surface runoff hydrograph for each sub-area under various recurrences;
ii) Subdivide each inflow hydrograph into its minor and major system components based on the proposed inlet capture rates and roadway sag storage;
iii) Assess cascading, if any.

The 1:100 year event (3 hour Chicago Storm) was used to evaluate the performance of the on-site stormwater management system by ensuring that the allowable release rate is not exceeded and that the on-site storage is sufficient to detain the 1:100 year design storm. In order to simulate the receiving system (March Road Storm Sewer), one full pipe length downstream of the proposed site was incorporated in the model and the 1:100 year HGL in the trunk storm sewer was set as the boundary condition. The 1:100 year HGL (77.3 m) at ex. MH11 was extracted from the March road reconstruction drawing 019 dated September 2019 (refer to Appendix 'A'). Table 5-2 summarizes the simulation results and confirms containment of the 1:100 year design storm is achieved.

5.3.5 Stormwater Quality

Storm runoff generated from Stage 1 will be collected and conveyed to SWM Facility 1 – West where water quality control volume is provided to meet regulatory requirements. Consequently, no other water quality measures are proposed.

5.4 Hydraulic Grade Line Analysis

Weeping tile drainage associated with Stage 1 will be collected by a separate storm sewer system, which will outlet directly to Shirley's Brook given that a connection to the March Road trunk storm sewer cannot be made due to high hydraulic grades. This servicing strategy was accepted in 2012 and is maintained for the current design.

6.0 Erosion and Sedimentation Control

During the construction of Morgan's Creek Stage 1, appropriate erosion and sedimentation control measures, as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, will be implemented to trap sediment on site. As a minimum, the following erosion and sedimentation control measures are proposed, as shown on Drawing RESC:

- Supply and installation of a silt fence barrier, as per OPSD 219.110;
- Supply and installation of filter fabric between the frame and cover of catch basins and maintenance holes adjacent to the project area during construction, to prevent sediment from entering the sewer system. The filter fabric is to be inspected regularly and corrected as required;
- Stockpiling of material during construction is to be located along flat areas away from drainage paths. For material placed on sloped areas, stockpiles are to be enclosed with a silt fence to protect watercourses;
- All catch basins are to be equipped with sumps, inspected frequently, and cleaned as required; and
- Sandbags are to be placed blocking part of the sewer pipe in the connecting storm maintenance holes to eliminate construction debris from entering the existing storm sewer system. The sandbags are to be removed after the proposed storm sewers have been fully cleaned.

The proposed erosion control measures shall conform to the following documents:

- "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.
- "MTO Drainage Manual", Chapter F: "Erosion of Materials and Sediment Control", Ministry of Transportation & Communications, 1985.
- "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.
- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

7.0 Conclusions and Recommendations

This Site Servicing Report and associated Drawings describe the proposed servicing and grading design for Morgan's Creek Stage 1, which is in general compliance with the Ottawa Sewer Design Guidelines and the Design Guidelines for Water and associated Technical Bulletins.

The existing water infrastructure has sufficient capacity to service the subject site and the proposed system was found to comply with the pressure and fire flow requirements given in the Design Guidelines. There is adequate capacity in the existing storm and sanitary outlet sewers for the subject site. Grade raises have been kept below the maximum allowable limit and geotechnical recommendations have been respected. Storm and stormwater management servicing has been designed to provide sufficient on-site storage to detain the 1:100 year design storm with flows to the prescribed unit rate of 70 L/s/ha. Construction details shall be in accordance with Local and Provincial design standards.

Local and Provincial Regulating Authorities (City of Ottawa, MECP and MVCA) have been made aware of the project, and the required permits and approvals are either obtained or are forthcoming. It is recommended that this Site Servicing Report along with the Geotechnical Report (under separate cover) be reviewed with the intent of granting the Owner approval to proceed with the development of Morgan's Creek Stage 1.

This report has been prepared for the exclusive use of Minto Communities Inc., for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of Minto Communities Inc. and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Annie Williams, EIT
Civil Engineering Intern

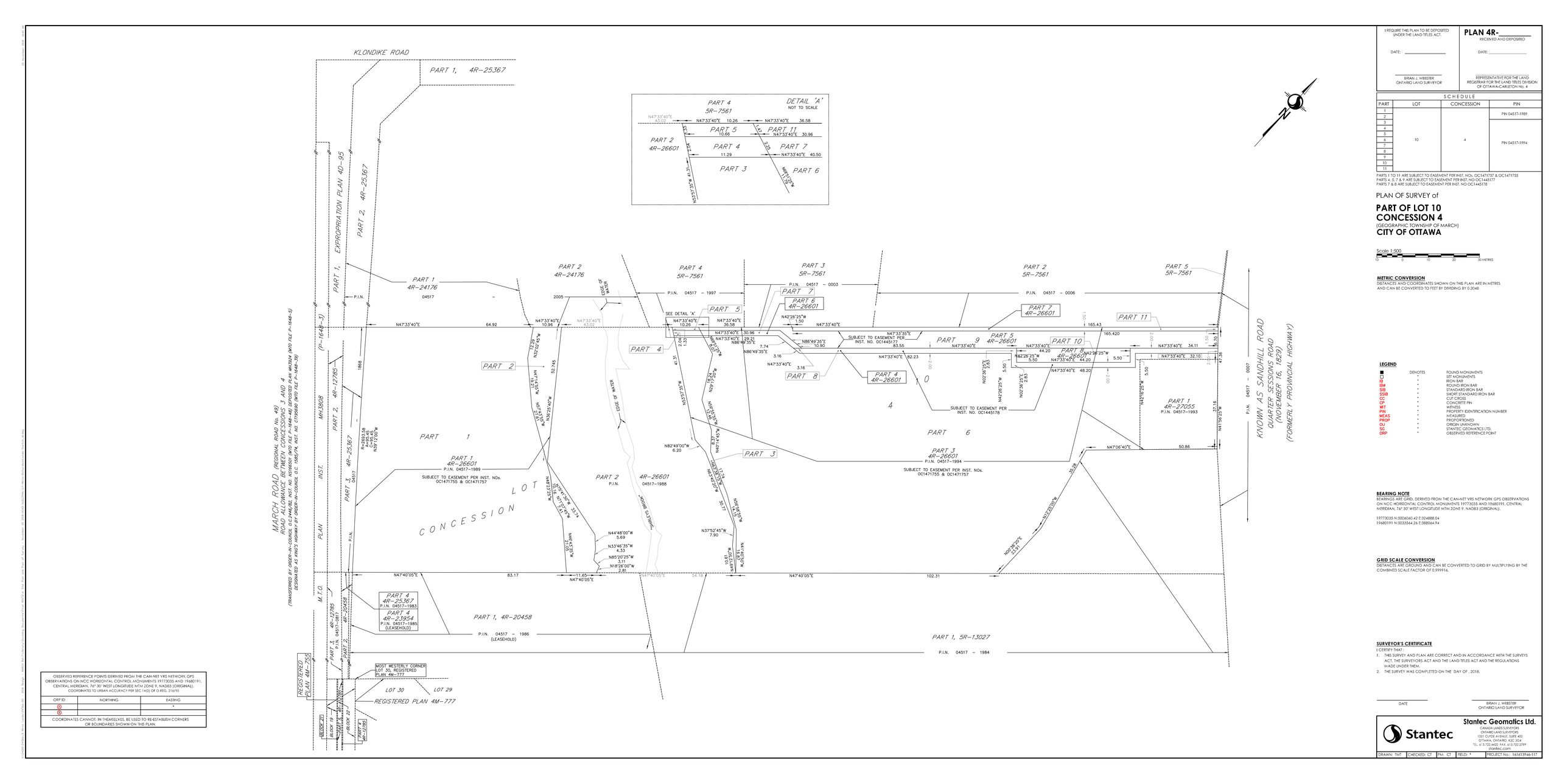
Reviewed by:

Guy Forget, P.Eng., LEED AP
Senior Water Resources Engineer

Appendix 'A'

Background Documents &
Site Servicing Checklist

Plan of Survey



I REQUIRE THIS PLAN TO BE DEPOSITED UNDER THE LAND TITLES ACT.

DATE: _____

_____
BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

PLAN 4R-_____

RECEIVED AND DEPOSITED

DATE: _____

_____
REPRESENTATIVE FOR THE LAND REGISTRAR FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON No. 4

SCHEDULE			
PART	LOT	CONCESSION	PIN
1	10	4	PIN 04517-1989
2			
3			
4			
5			PIN 04517-1994
6			
7			
8			
9			
10			
11			

PARTS 1 TO 11 ARE SUBJECT TO EASEMENT PER INST. NOs. OC1471757 & OC1471755
PARTS 4, 5, 7 & 9 ARE SUBJECT TO EASEMENT PER INST. NO OC1445177
PARTS 7 & 8 ARE SUBJECT TO EASEMENT PER INST. NO OC1445178

PLAN OF SURVEY of

PART OF LOT 10
CONCESSION 4
(GEOGRAPHIC TOWNSHIP OF MARCH)
CITY OF OTTAWA

Scale 1:500
10 0 10 20 30 METRES

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

LEGEND

■	DENOTES	-	FOUND MONUMENTS
□		-	SET MONUMENTS
IB		-	IRON BAR
IB#		-	ROUND IRON BAR
SIB		-	STANDARD IRON BAR
SSIB		-	SHORT STANDARD IRON BAR
CC		-	CUT CROSS
CP		-	CONCRETE PIN
WIT		-	WITNESS
PIN		-	PROPERTY IDENTIFICATION NUMBER
MEAS		-	MEASURED
PROP		-	PROPORTIONED
OU		-	ORIGIN UNKNOWN
SG		-	STANTEC GEOMATICS LTD.
ORP		-	OBSERVED REFERENCE POINT

BEARING NOTE
BEARINGS ARE GRID, DERIVED FROM THE CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL).

19773035 N:5006060.42 E:324888.04
19680191 N:5033564.26 E:388064.94

GRID SCALE CONVERSION
DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999916.

SURVEYOR'S CERTIFICATE
I CERTIFY THAT :

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE DAY OF , 2018.

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

OBSERVED REFERENCE POINTS DERIVED FROM THE CAN-NET VRS NETWORK GPS OBSERVATIONS ON NCC HORIZONTAL CONTROL MONUMENTS 19773035 AND 19680191, CENTRAL MERIDIAN, 76° 30' WEST LONGITUDE MTM ZONE 9, NAD83 (ORIGINAL), COORDINATES TO URBAN ACCURACY PER SEC 14(2) OF O.REG. 216/10

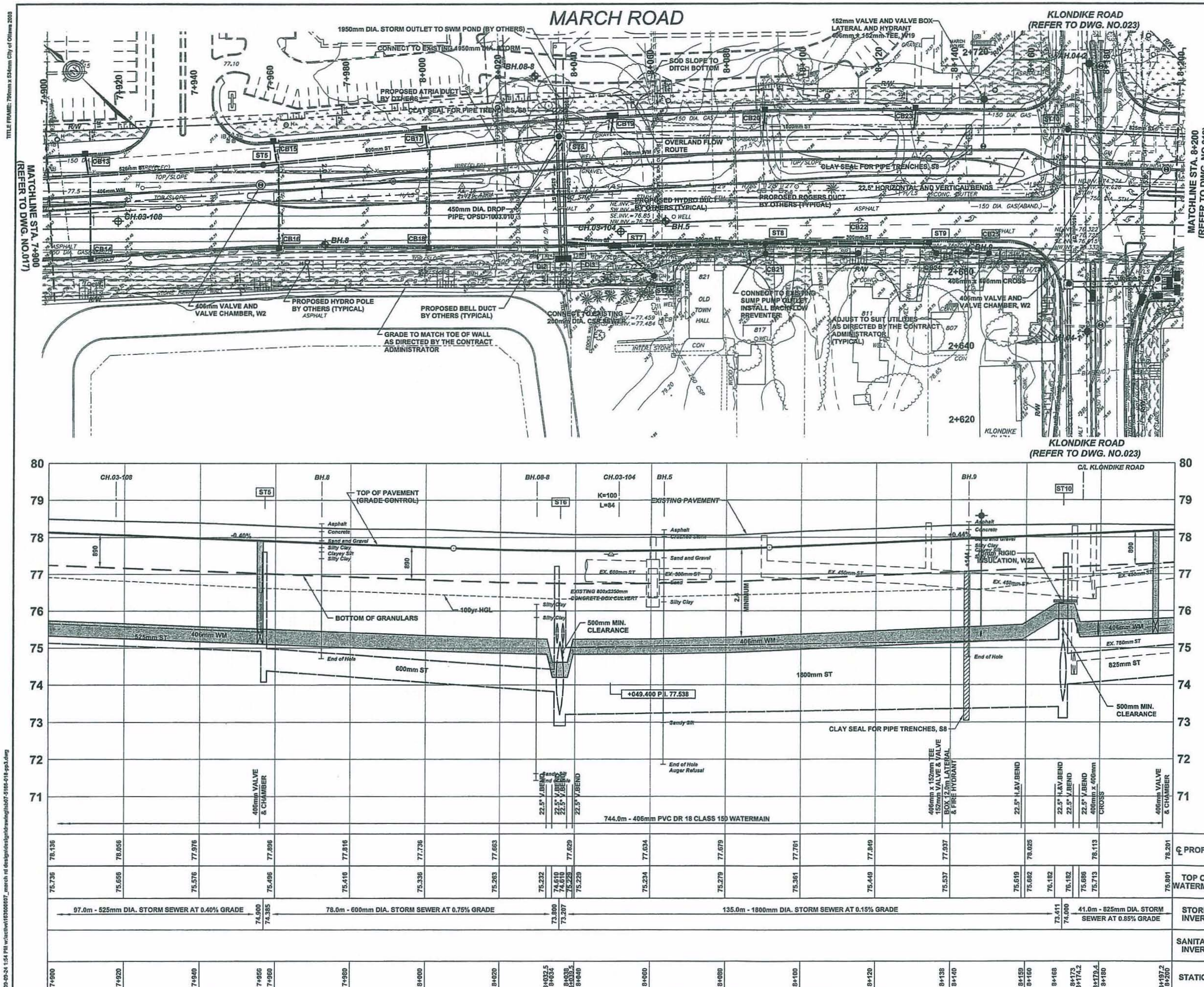
ORP ID	NORTHING	EASTING
①		*
②		

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

Stantec
Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL: 613.722.4420 FAX: 613.722.2799
stantec.com

DRAWN: TMT | CHECKED: CT | PM: CT | FIELD: * | PROJECT No.: 161613946-617

March Road As-Constructed



MARCH ROAD RECONSTRUCTION
MORGAN'S GRANT WAY TO OLD CARP ROAD

PLAN AND PROFILE
STA. 7+900 TO STA. 8+200

Ottawa

Contract No. ISB07-5166 | Dwg. No. 018

Sheet 18 of 59

Asset No.

Asset Group

Des. G.C.	Chk'd. S.G.D.
Dwn. G.R.L.	Chk'd. G.C.
Utility Circ. No.	Index No.

Const. Inspector

Scale: HORIZONTAL 1:500 (0m 5 10 20); VERTICAL 1:50 (0m 1 2)

B.M. MASON, P.ENG.
Design and Construction (Municipal) - West

L. FOLEY, P.ENG.
Senior Engineer Infrastructure Projects

LICENSED PROFESSIONAL ENGINEER G. CHOCHLINSKI PROVINCE OF ONTARIO Sept.25/09

LICENSED PROFESSIONAL ENGINEER S. G. D'AOUST PROVINCE OF ONTARIO 25/09/09

Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

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

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR MOE/COA	S.G.D.	22/06/2009
2	ISSUED FOR MUNICIPAL CONSENT	S.G.D.	21/08/2009
3	ISSUED FOR TENDER	S.G.D.	25/09/2009

NOTE:

1. THE MARCH ROAD SEWER SERVES AS A MAJOR DRAINAGE RELIEF SEWER AND MAY BE SUBJECT TO HIGH HYDRAULIC GRADE LINES (i.e. TO ROADWAY SURFACE). THEREFORE, NO DIRECT SERVICE CONNECTIONS SHOULD BE MADE WITHOUT PROPER ENGINEERING CONSIDERATION. SUMP PUMPS OR SLAB ON GRADE CONSTRUCTION WILL LIKELY BE REQUIRED.

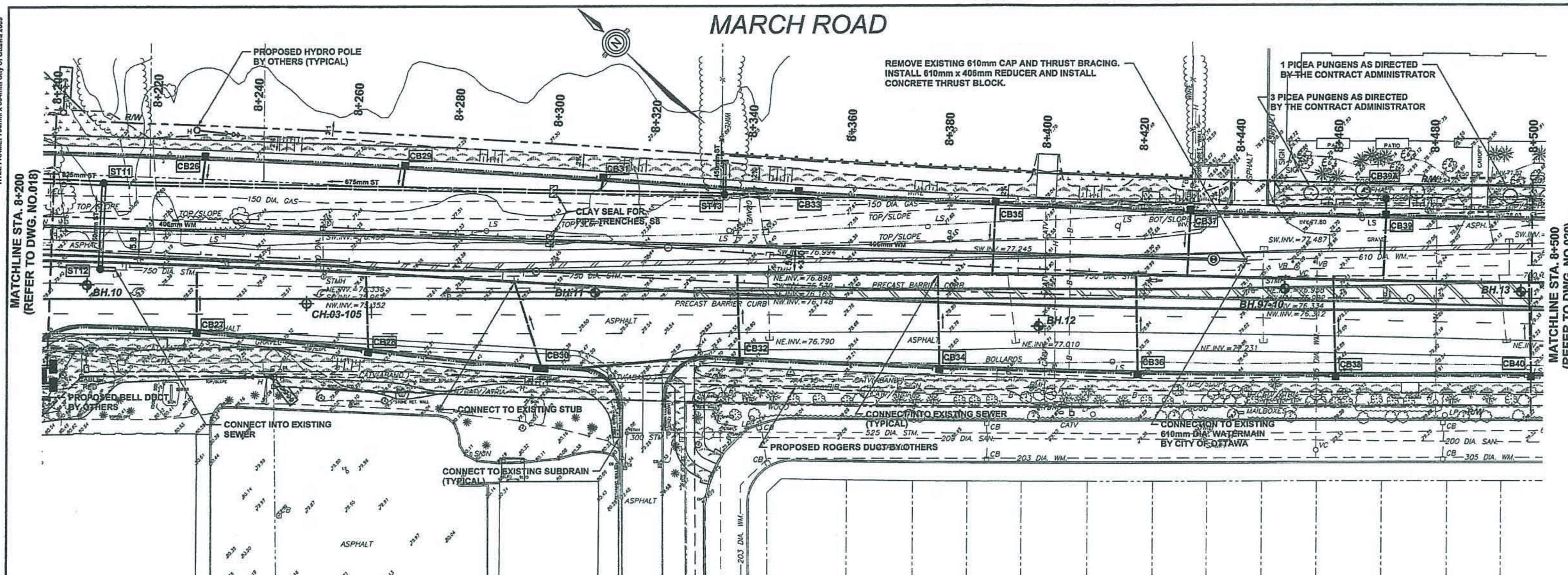
CATCHBASIN & MAINTENANCE HOLE DATA

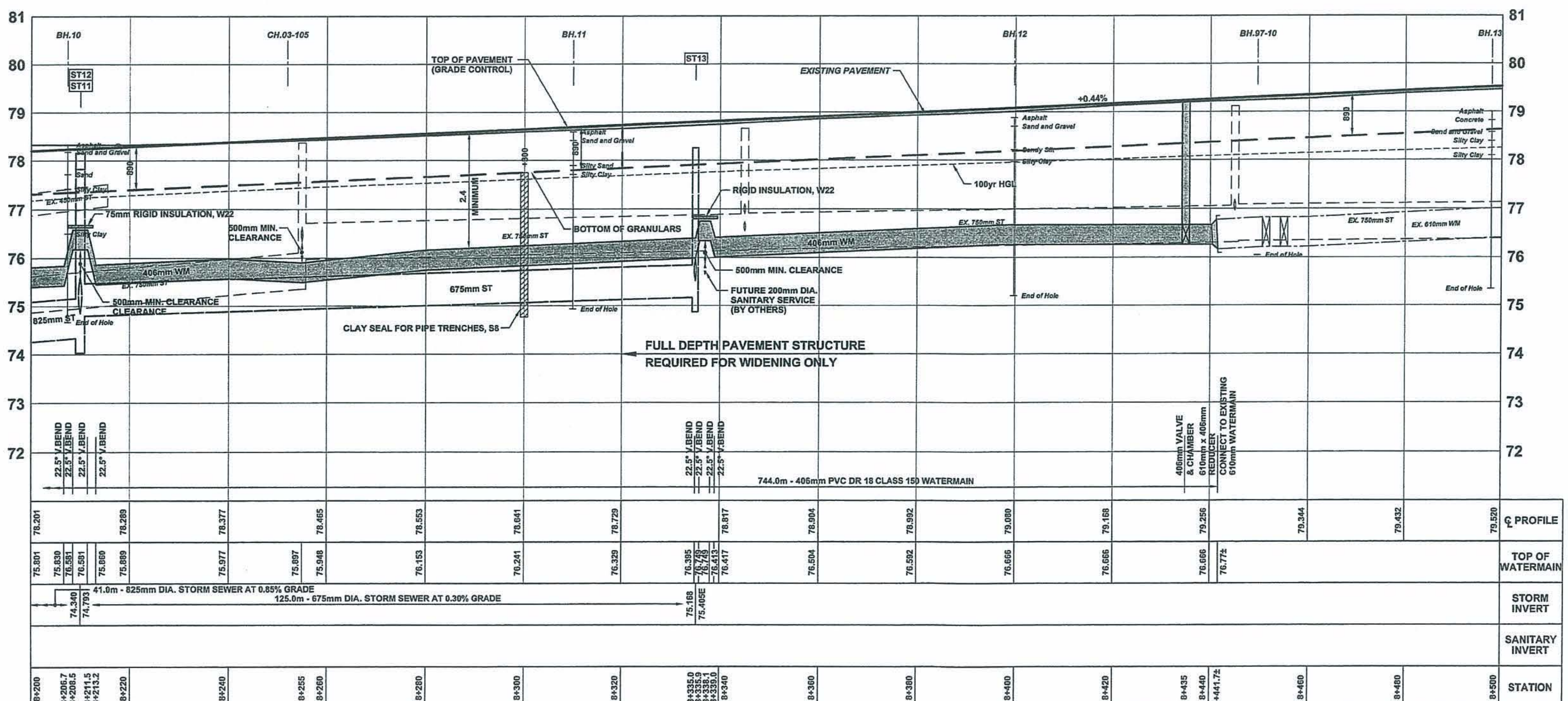
NO.	STATION	OFFSET (m)	TYPE		ELEVATION	
			Structure	Cover	Grate	Low Inv.
CB13	7+910.0	15.25 LT	705.010	S22/S23	77.636	75.838
CB14	7+910.0	11.75 RT	705.010	S22/S23	77.743	76.336
ST5	7+957.0	10.00 LT	701.010	SL	77.607	74.385
CB15	7+960.0	15.50 LT	705.010	S22/S23	77.431	75.631
CB16	7+960.0	11.97 RT	705.010	S22/S23	77.537	76.166
CB17	8+000.0	16.84 LT	705.010	S22/S23	77.230	75.430
CB18	8+000.0	14.04 LT	705.010	S22/S23	77.314	76.036
ST6	8+036.0	14.00 LT	2440x3050	SL	77.212	73.207
DI2	8+035.2	19.00 RT	705.040 TYPE 'A' (4:1)	403.010	77.000	75.563
DI3	8+036.8	19.00 RT	705.040 TYPE 'A' (4:1)	403.010	77.000	75.563
CB19	8+050.0	18.46 LT	705.020	S22/S23(2)	77.070	75.270
ST7	8+050.0	15.25 RT	701.011	S22/S23/S28	77.169	75.659
ST7A	8+060.2	24.50 RT	701.010	S24/S25	78.000	76.700
ST8	8+090.0	15.25 RT	701.010	S28	77.259	75.779
CB20	8+090.0	19.22 LT	705.010	S22/S23	77.140	75.340
ST9	8+134.0	15.25 RT	701.010	S28	77.473	75.911
CB21	8+090.0	19.00 RT	S30	S30	77.782	75.859
CB22	8+115.0	19.00 RT	S31	S31	77.893	76.890
CB23	8+130.0	19.50 LT	705.010	S22/S23	77.308	75.508
CB24	8+136.0	19.00 RT	S30	S30	77.994	76.011
ST10	8+170.0	14.50 LT	2440x2440	SL	77.561	73.411
CB25	8+150.0	19.00 RT	S31	S31	78.146	77.086

STORM SEWER DATA

NO. to NO.		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
					Inlet	Outlet
CB13	SEWER	200	5	SDR 35	75.838	75.738 *
CB14	SEWER	200	22	SDR 35	76.336	75.676
ST4	ST5	525	97	SDR 35	75.288	74.900
ST5	ST6	600	78	CONC 100D	74.385	73.800
CB15	SEWER	200	6	SDR 35	75.631	75.511 *
CB16	SEWER	200	22	SDR 35	76.166	75.496
CB17	SEWER	200	6	SDR 35	75.430	75.310 *
CB18	SEWER	200	27	SDR 35	76.036	75.336
ST11	ST10	825	41	CONC 100D	74.340	74.000
ST10	ST6	1800	135	CONC 100D	73.411	73.207
DI2	ST6 **	525	33	SDR 35	75.563	74.985
DI3	ST6 **	525	33	SDR 35	75.563	74.985
ST6	PIPE	1950	10	CONC 100D	73.207	73.120
CB19	SEWER	200	5	SDR 35	75.270	75.170 *
CB20	SEWER	200	5	SDR 35	75.340	75.240 *
CB23	SEWER	200	6	SDR 35	75.508	75.408 *
CB25	CB24	250	15	HDPE PERF.	77.086	76.936
CB24	ST9	250	5	HDPE PERF.	76.011	75.961
ST9	ST8	300	44	SDR 35	75.911	75.779
ST8	ST7	300	39	SDR 35	75.779	75.659
ST7	SEWER	300	13	SDR 35	75.659	75.620
ST7A	ST7	250	14	SDR 35	76.700	76.420
CB22	CB21	250	25	HDPE PERF.	76.890	76.640
CB21	ST8	250	3	HDPE PERF.	76.640	76.610

* DENOTES INVERT GIVEN AT TOP OF RISER
** DENOTES DROP PIPE AT MAINTENANCE HOLE





MARCH ROAD RECONSTRUCTION
MORGAN'S GRANT WAY TO OLD CARP ROAD

PLAN AND PROFILE
STA. 8+200 TO STA. 8+500

Ottawa

Contract No.	Dwg. No.
ISB07-5166	019

Sheet 19 of 59

Asset No.

Asset Group

B.M. MASON, P.ENG.
Design and Construction (Municipal) - West

L. FOLEY, P.ENG.
Senior Engineer Infrastructure Projects

LICENSED PROFESSIONAL ENGINEER — G. CHOCHLINSKI — Sept. 25/09 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — S. G. D'AOUST — 25/09/09 — PROVINCE OF ONTARIO

Des.	G.C.	Chk'd.	S.G.D.
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Utility Circ. No.		Index No.	

Const. Inspector

Scale:
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REVISIONS

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CATCHBASIN & MAINTENANCE HOLE DATA

NO.	STATION	OFFSET (m)	TYPE		ELEVATION	
			Structure	Cover	Grate	Low Inv.
ST11	8+210.0	14.00 LT	1220x1220	SL	77.825	74.340
ST12	8+210.0	3.80 RT	701.012	SL	78.156	74.750
CB26	8+230.0	19.50 LT	705.010	S22/S23	77.746	75.948
CB27	8+230.0	16.11 RT	705.010	S22/S23	77.850	76.050
CB28	8+265.0	18.02 RT	705.010	S22/S23	77.948	76.448
CB29	8+270.0	19.50 LT	705.010	S22/S23	77.924	76.124
CB30	8+300.0	19.00 RT	705.020	S22/S23(2)	78.071	76.521
CB31	8+310.0	19.45 LT	705.010	S22/S23	78.101	76.301
ST13	8+335.0	18.00 LT	701.010	SL	78.254	75.168
CB32	8+340.0	15.25 RT	705.010	S22/S23	78.359	76.559
CB33	8+350.0	18.75 LT	705.010	S22/S23	78.298	76.498
CB34	8+380.0	15.25 RT	705.010	S22/S23	78.535	76.735
CB35	8+390.0	18.00 LT	705.010	S22/S23	78.497	77.250
CB36	8+420.0	15.25 RT	705.010	S22/S23	78.711	76.911
CB37	8+430.0	17.24 LT	705.010	S22/S23	78.696	77.250
CB38	8+460.0	15.25 RT	705.010	S22/S23	78.887	77.087
CB39	8+470.0	16.52 LT	705.010	S22/S23	78.893	77.450
CB39A	8+470.0	20.50 LT	S31	S31	78.680	77.650
CB40	8+500.0	15.25 RT	705.010	S22/S23	79.063	77.263

STORM SEWER DATA

NO. to NO.		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
					Inlet	Outlet
STUB	ST13	450	7	CONC 140D	75.800	75.520
ST13	ST11	675	125	CONC 100D	75.168	74.793
EXIST.	ST12	750	3	CONC 100D	MATCH	74.880
ST12	ST11	750	18	CONC 100D	74.850	74.750
CB26	SEWER	200	5	SDR 35	75.948	75.848 *
CB27	EXIST.	200	13	SDR 35	76.050	75.790 *
CB28	EXIST.	200	15	SDR 35	76.448	76.298
CB29	SEWER	200	4	SDR 35	76.124	76.044 *
CB30	EXIST.	200	18	SDR 35	76.521	76.341
CB31	SEWER	200	3	SDR 35	76.301	76.241 *
CB32	EXIST.	200	17	SDR 35	76.559	76.389
CB33	ST13	200	15	SDR 35	76.498	76.198
CB34	EXIST.	200	19	SDR 35	76.735	76.545
CB35	EXIST.	200	15	SDR 35	77.250	77.100 *
CB36	EXIST.	200	20	SDR 35	76.911	76.511
CB37	EXIST.	200	13	SDR 35	77.250	77.120 *
CB38	EXIST.	200	20	SDR 35	77.087	76.687
CB39	EXIST.	200	12	SDR 35	77.450	77.330 *
CB39A	CB39	250	4	HDPE PERF.	77.680	77.640
CB40	EXIST.	200	20	SDR 35	77.263	76.863

* DENOTES INVERT GIVEN AT TOP OF RISER

City of Ottawa Pre-Consultation

Tyler Cassidy

From: Kevin A. Harper <KHarper@minto.com>
Sent: September 4, 2018 3:07 PM
To: Lucie Dalrymple; Christopher Gordon (christopher.gordon@cghtransportation.com)
Cc: Thomas Couper; Susan Murphy
Subject: FW: Pre-Consultation Follow-Up: 760 March Road
Attachments: Tech bulletin ISTB-2018-02.pdf; Plan & Study List.pdf; MVCA - Reg Mapping Compilation - August 21, 2018.pdf

Good afternoon to you both. Please find the summary notes from our pre-consult with the City back on August 22. We'll be in touch regarding next steps shortly. Thank you.

Kevin

Kevin A. Harper, AICP, MCIP, RPP, LEED AP
Development Manager - High Rise
MINTO COMMUNITIES - CANADA
200-180 Kent St, Ottawa, ON K1P 0B6
T 613.751.2857
A division of The Minto Group

From: McCreight, Laurel [mailto:Laurel.McCreight@ottawa.ca]
Sent: August-29-18 8:35 AM
To: Kevin A. Harper <KHarper@minto.com>
Subject: Pre-Consultation Follow-Up: 760 March Road

Hi Kevin,

Please refer to the below regarding the Pre-Consultation Meeting held on Wednesday August 22nd, 2018 for the property at 760 March Road for a residential development. I have also attached the Plans & Study List.

General

- Site plan application previously approved and the agreement registered in January 2013
  - Original proposal approved 156 units in 12 buildings

    - Development put on hold in April 2013 due to a product review
- Current proposal introduces a unit increase of 20 (total of 176 units) in 12 buildings
    - Back-to-back stacked townhouses
    - Site plan for the entire property, but development will be phased with the units on March Road end to be developed first
- Application can be treated as revision application, subject to public consultation

Planning/Urban Design

- Upgraded elevations will be required on March and Sandhill
    - Landscaping, masonry, balconies
- How will the amenity areas between the units along the creek be treated?
- Perhaps the amenity area for the units along Sandhill could be considered as a stonedust pathway through the heritage buffer

Engineering

- Please use The Servicing Study Guidelines for Development Applications
- Servicing and site works shall be in accordance with the following documents:
    - Ottawa Sewer Design Guidelines (October 2012)
    - Ottawa Design Guidelines – Water Distribution (2010)
    - Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
    - City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
    - City of Ottawa Environmental Noise Control Guidelines (January, 2016)
    - City of Ottawa Park and Pathway Development Manual (2012)
    - City of Ottawa Accessibility Design Standards (2012)
    - Ottawa Standard Tender Documents (latest version)
    - Ontario Provincial Standards for Roads & Public Works (2013)
- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at mailto:InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455)
- The Stormwater Management Criteria, for the subject site, is to be based on the following:
    - The requirements set by the Shirley's Brook SWM Facility 1-West (report attached);
    - The requirements set by the Shirley's Brook SWM Facility 'C' dated November 2006 completed by Novatech;
    - The requirements set by March Road Reconstruction dated October, 2010 completed by Stantec; **Please provide this report**
    - Flows to the storm sewer in excess of the release rates set by the above report, up to and including the 100-year storm event, must be detained on site; and
    - A calculated time of concentration (Cannot be less than 10 minutes)
- Shirley's Brook Area-Specific Development Charges for Stormwater Management Facilities apply
    - Required fees can be found here
- Please use the following link to access The Facility 1-West document https://www.dropbox.com/s/a2elxlxl1mivv8l/2654_-_Shirley%27s_Brook_-_SWM_Facility_1_-_West%20Complete.pdf?dl=0
- Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:0
    - Location of service (map/plan view) including location of ROW hydrant to be utilized for RFF purposes, if any (Refer to Technical Bulletin-ISTB-2018-02 (dated March 21, 2018) for hydrant capacity and placement requirements (attached))
    - Type of development and the amount of fire flow required (as per FUS, 1999)
    - Average daily demand: ___ L/s
    - Maximum daily demand: ___L/s
    - Maximum hourly daily demand: ___ L/s

- Water Frontage Fees apply and will by applied within the Site Plan Agreement Financial Requirements
- Please contact the local Ottawa District Ministry of the Environment and Climate Change office to discuss if an MOECC Environmental Compliance Approval (Private Sewage Works) amendment or new application will be required for the proposed development. For residential applications contact Charlie Primeau (613) 521-3450, ext. 251
- History of the site servicing was note at the pre-consultation meeting including:
    - The sanitary service lateral for the site area fronting March Road has already been installed during the March Road Reconstruction project
        - The lateral is capped at both ends and extends to Mersey Drive
    - A section of the existing sanitary sewer along Mersey Drive was re-laid by Minto complete with an MOE ECA application, to ensure the lateral for this site can connect to the sewer, as the lateral was installed lower than the previous Mersey Drive sewer elevation
    - Two (2) water laterals have already been installed along March Road as part of the March Road Reconstruction project
    - An MOE ECA application had been filed and accepted for the foundation drain outlet to Shirley's Brook, however the approval has since lapsed
        - This outlet was preferred due to the high HGL on March Road.
- Please contact Gabrielle Schaeffer for any engineering related questions

Transportation

- Follow Traffic Impact Assessment Guidelines – Screening form to start, full Traffic Impact Assessment if any of the triggers on the screening form are satisfied
    - Start this process immediately
    - Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable)
- ROW protection on March between Terry Fox and Richardson is 44.5m even
- Noise Impact Studies required for the following:
    - Road
    - Stationary (due to the proximity to neighbouring exposed mechanical equipment)
- Clear throat requirements for apartments style units that is >100 units on an arterial is 15m
- Sidewalks will be required along the full length of the frontage on Sandhill
- On drawings:
    - Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks
    - Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions)
    - Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    - Show road/lane/aisle widths
    - Show depressed curb locations along pedestrian paths
- Please contact Rosanna Baggs for an transportation related questions

Environmental

- A Blanding's Turtle has been found in Shirley's Brook since the previous approval
    - Within a 2 km radius the riparian lands become a significant habitat
    - Significant habitat is 30 metre with a 55 metre meander belt
    - You can apply for a permit from MNR for a reduced width
- An environmental consultant will be required to address the species at risk
- A tree removal permit is required for any trees to be removed greater than 10 cm in diameter
- The environmental impact statement and tree conservation report can be combined
- Please contact Matthew Hayley for any environmental related questions

MVCA

- Updated regulation mapping was completed in November 2017
- A meander belt hazard of 87 metres was introduced
    - A erosion hazard study/meander belt width study can be completed to determine that actual width of meander belt to be required
    - Can also work with adjacent landowners
- Please contact Niall Oddie at MVCA for any questions

Please do not hesitate to contact me if you have any questions.

Regards,
Laurel

Laurel McCreight MCIP, RPP
Planner
Development Review West
Urbaniste
Examen des demandes d'aménagement ouest

City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 16587
ottawa.ca/planning / ottawa.ca/urbanisme

'

'

Mississippi Valley Conservation Authority
50 YEARS OF CONSERVATION • 1968/2018

Ontario Regulation 153/06

760 March Rd
City of Ottawa

Legend

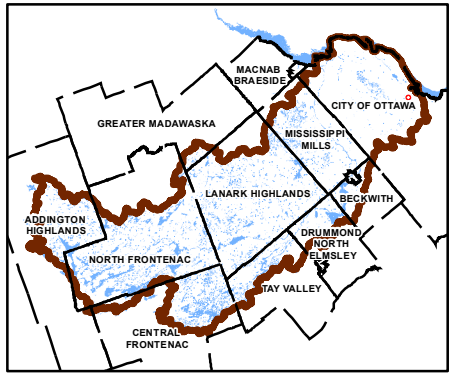
- 1:100 yr Flood Plain
- MVCA Flood Plain (old)
- Meander Belt Erosion Hazard
- Regulation Limit
- MVCA Regulation Limit (old)
- Property Boundary

N
W E
S

1:1,095

0 5 10 20 30
Meters

Projection: UTM Zone18 - NAD 83 Datum



Date: 8/17/2018

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

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

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

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

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	10	1. Site Servicing Plan	2. Site Servicing Brief	S	3
S	10	3. Grade Control and Drainage Plan	4. Geotechnical Study and Meander Belt Width Study	S	3
		5. Composite Utility Plan	6. Groundwater Impact Study		
		7. Servicing Options Report	8. Wellhead Protection Study		
S	6	9. Transportation Impact Brief	10.Erosion and Sediment Control Plan / Brief	S	3
S	3	11.Storm water Management Brief	12.Hydro geological and Terrain Analysis		
S	3	13.Hydraulic Water main Analysis	14.Stationary Noise Study	S	2
	10	15.Roadway Modification Design Plan	16.Confederation Line Proximity Study		
S/A	**Number of copies**	**PLANNING / DESIGN / SURVEY**		**S/A**	**Number of copies**
		17.Draft Plan of Subdivision	18.Plan Showing Layout of Parking Garage		
		19.Draft Plan of Condominium	20.Planning Rationale	S	3
S	10	21.Site Plan	22.Minimum Distance Separation (MDS)		
		23.Concept Plan Showing Proposed Land Uses and Landscaping	24.Agrology and Soil Capability Study		
		25.Concept Plan Showing Ultimate Use of Land	26.Cultural Heritage Impact Statement		
S	10	27.Landscape Plan	28.Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		
S	1	29.Survey Plan	30.Shadow Analysis		
S	3	31.Architectural Building Elevation Drawings (dimensioned)	32.Design Brief (includes the Design Review Panel Submission Requirements)		Available online
		33.Wind Analysis			
S/A	**Number of copies**	**ENVIRONMENTAL**		**S/A**	**Number of copies**
S	3	34.Phase 1 Environmental Site Assessment (update if necessary)	35.Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		
		36.Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37.Assessment of Landform Features		
		38.Record of Site Condition	39.Mineral Resource Impact Assessment		
S	3	40.Tree Conservation Report	41.Environmental Impact Statement / Impact Assessment of Endangered Species		3
		42.Mine Hazard Study / Abandoned Pit or Quarry Study	43.Integrated Environmental Review (Draft, as part of Planning Rationale)		
S/A	**Number of copies**	**ADDITIONAL REQUIREMENTS**		**S/A**	**Number of copies**
S	3	44. Site Light Lighting Plan/Letter	45.		

Meeting Date: August 22, 2018

Application Type: *Site Plan Control*

File Lead (Assigned Planner): Laurel McCreight

Infrastructure Approvals Project Manager: Gabrielle Schaeffer

Site Address (Municipal Address): 760 March Road

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

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

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

MVCA Correspondence

Annie Williams

From: Niall Oddie <NOddie@mvc.on.ca>
Sent: November 27, 2018 9:52 AM
To: Annie Williams
Cc: Nader Nakhaei
Subject: RE: Morgan's Creek - 760 March Road

Categories: Blue Category

Annie,

We've discussed internally and provided that the outlet is only for foundation drains we have no objection.

Thanks,

Niall Oddie MCIP, RPP | Environmental Planner | Mississippi Valley Conservation Authority
10970 Highway 7, Carleton Place, Ontario K7C 3P1
www.mvc.on.ca |t. 613 253 0006 ext. 229| f. 613 253 0122 | noddie@mvc.on.ca

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From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: Tuesday, November 27, 2018 9:41 AM
To: Niall Oddie <NOddie@mvc.on.ca>
Subject: RE: Morgan's Creek - 760 March Road

Hi Niall,

Do you know when we can expect a response?

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Annie Williams
Sent: November 21, 2018 3:48 PM
To: 'NOddie@mvc.on.ca' <NOddie@mvc.on.ca>
Subject: Morgan's Creek - 760 March Road

Hi Niall,

As discussed, please find attached the Site Servicing Plan from August 2012.

MVCA and MECP previously approved. Weeping tile to outlet to Shirley's Brook, and we will re-apply for ECA due to lapse.

Thank you,

City Checklist

MINTO COMMUNITIES INC., MORGAN'S CREEK, 762 MARCH ROAD

DEVELOPMENT SERVICING STUDY CHECKLIST

REFERENCED STUDIES AND REPORTS	REFERENCE
Site Servicing Report, Minto Communities Inc., Morgan's Creek Stage 1, 762 March Road (J.L. Richards & Associates Limited, December 2018)	SR
Kanata North Environmental / Stormwater Management Plan (CH2M Gore & Storrie, 2001)	EMP
March Road Reconstruction - Morgan's Grant Way to Old Carp Road (Halton Terrace Extension) Drainage Design Brief	MR
Shirley's Brook Floodplain Analysis and Stormwater Management Report (Novatech Engineering Consultants Ltd., November 2006)	SBFP
Shirley's Brook SWM Facility 'C' Detailed Design Report (Novatech Engineering Consultants Ltd., November 2006)	SBC
Klondike Road Lands Stormwater Management Study (Novatech Engineering Consultants Ltd., October 2007)	KRSWM
Letter-type Report regarding 'Briar Ridge Phase 2 – Sandhill Road' (IBI Group, June 16, 2009)	BRP2
Geotechnical Investigation, Proposed Residential Development, 760 March Road, Ottawa, Ontario for Minto Communities, Report Number PG2234-2 Revision 1 (Paterson Group, November 9, 2018)	GR

4.1	GENERAL CONTENT	REFERENCE
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	SR (Title Page)
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Site Servicing Plan S1
☒	Plan showing the site and location of all existing services.	Site Servicing Plan S1
☒	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.	SR (Section 1)
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	SR (Section 1, Appendix 'A')

☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	EMP MR KRSWM BRP2
☒	Statement of objectives and servicing criteria.	SR (Section 3, 4, 5)
☒	Identification of existing and proposed infrastructure available in the immediate area.	SR (Section 1) Site Servicing Plan S1
☒	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).	EMP MR KRSWM
☒	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.	SR (Section 5) Grading Plan G1 Ponding Plan SWM
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	SR (Section 2)
☒	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	All Drawings

4.2	**DEVELOPMENT SERVICING REPORT: WATER**	**REFERENCE**
☐	Confirm consistency with Master Servicing Study, if available.	N/A
☒	Availability of public infrastructure to service proposed development.	SR (Section 1) Site Servicing Plan S1
☒	Identification of system constraints.	SR (Section 3)
☒	Identify boundary conditions.	SR (Section 3, Appendix 'B')

☒	Confirmation of adequate domestic supply and pressure.	SR (Section 3, Appendix 'B')
☒	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.	SR (Section 3, Appendix 'B')
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	SR (Section 3, Appendix 'B')
☐	Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design.	N/A
☐	Address reliability requirements, such as appropriate location of shutoff valves.	N/A
☐	Check on the necessity of a pressure zone boundary modification.	N/A
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	SR (Section 3, Appendix 'B')
☒	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.	SR (Section 3, Appendix 'B') Site Servicing Plan S1
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	SR (Section 3)
☒	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	SR (Appendix 'B')

4.3	**DEVELOPMENT SERVICING REPORT: WASTEWATER**	**REFERENCE**
☒	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).	SR (Section 4)
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A

☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the Guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	SR (Section , 4, Appendix 'C')
☒	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.)	BRP2 SR (Section 4)
☒	Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	SR (Appendix 'C')
☒	Description of proposed sewer network, including sewers, pumping stations and forcemains.	SR (Section 4) Site Servicing Plan S1 Sanitary Drainage Plan D-SAN
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations, such as contamination, corrosive environment, etc.	N/A

4.4	**DEVELOPMENT SERVICING REPORT: STORMWATER**	**REFERENCE**
☒	Description of drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property).	EMP MR KRSWM BRP2 SR (Section 5)
☒	Analysis of available capacity in existing public infrastructure.	SBC MR KRSWM BP2

☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Servicing Plan S1 Storm Drainage Plan D-STM Ponding Plan SWM
☒	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.	SR (Section 5)
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	SR (Section 5)
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	SR (Section 5)
☐	Setback from private sewage disposal systems.	N/A
☒	Watercourse and hazard lands setbacks.	SBFP
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	SR (Section 1)
☒	Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists.	SR (Section 5)
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	SR (Section 5, Appendix 'D')
☒	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	EMP MR KRSWM Erosion & Sedimentation Control Plan ESC
☒	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.	SR (Section 5)
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☒	Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	SR (Section 5) Site Servicing Plan S1 Ponding Plan SWM
☐	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.	N/A
☐	Identification of potential impacts to receiving watercourses.	N/A

☐	Identification of municipal drains and related approval requirements.	N/A
☒	Description of how the conveyance and storage capacity will be achieved for the development.	SR (Section 5) Site Servicing Plan S1 Storm Drainage Plan D-STM Ponding Plan SWM
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	SBFP SR (Section 5) Grading Plan G1 Ponding Plan SWM
☒	Inclusion of hydraulic analysis, including hydraulic grade line elevations.	SR (Section 5, Appendix 'D') Plan & Profile Drawings 01-02
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	SR (Section 6) Erosion & Sedimentation Control Plan ESC
☒	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.	SBFP
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5	**APPROVAL AND PERMIT REQUIREMENTS**	**REFERENCE**
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 such 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.	MVCA Approval
☐	Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act.	To Follow
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

4.6	**CONCLUSION CHECKLIST**	**REFERENCE**
☒	Clearly stated conclusions and recommendations.	SR (Section 3, 4, 5)

☐	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.	N/A
☒	All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario.	SR All Drawings

Appendix 'B'

Water Distribution System –
Hydraulic Network Analysis

Water Demand and FUS Calculation

Water Demand Calculations
Morgan's Creek (JLR 24566-001)

Site 1 - March Road		
No. Duplex Units	60	units
Density	2.3	p/p/u
No. Ppl	138	ppl
Average Day Consumption Rate	350	L/c/d
Average Day Demand	**0.56**	**L/s**
Maximum Day Peaking Factor	5.4	x Avg Day (Table 3-3, MOE 2008)
Maximum Day Demand	**3.02**	**L/s**
Peak Hour Peaking Factor	8.1	x Avg Day (Table 3-3, MOE 2008)
Peak Hour Demand	**4.53**	**L/s**

FUS Fire Flow Calculations - SITE 1 (Terrace Block TE-2 - Duplex)

24566-001 Morgan's Creek - 760 March Road

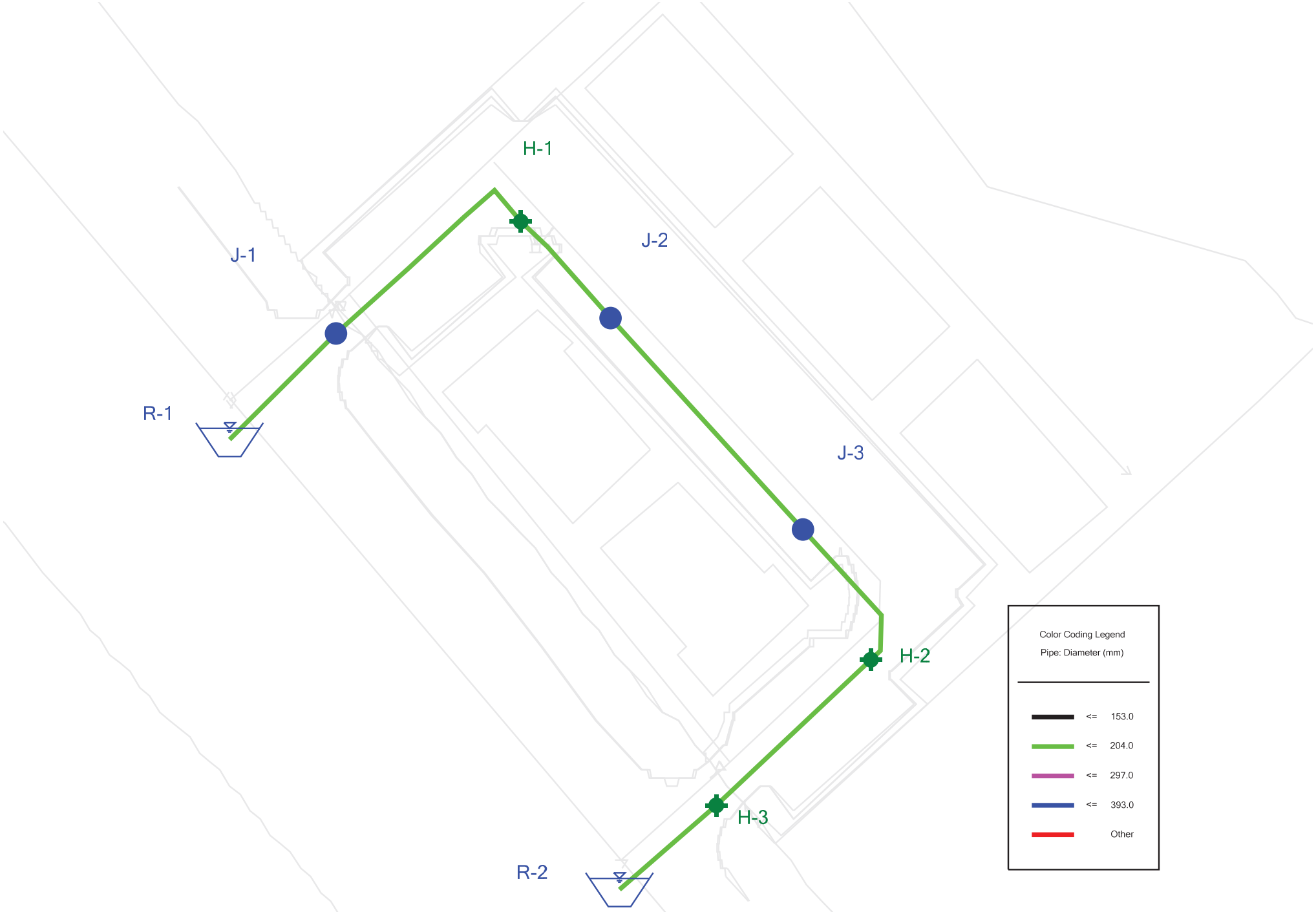
Step	Parameter	Value		Note
A	Type of Construction	Wood Frame		
	Coefficient (C)	1.5		
B	Ground Floor Area	326	m^2	Includes 16 units within fire flow area, separated by less than 3.0 m.
C	Height in storeys	3	storeys	Basements are excluded.
	Total Floor Area	978	m^2	
D	Fire Flow Formula	$F=220C\sqrt{A}$		
	Fire Flow	10320	L/min	
	Rounded Fire Flow	10000	L/min	Flow rounded to nearest 1000 L/min.
E	Occupancy Class	Limited Combustible		Residential buildings have a limited combustible occupancy
	Occupancy Charge	-15%		
	Occupancy Increase or Decrease	-1500		
	Fire Flow	8500	L/min	No rounding applied.
F	Sprinkler Protection	None		
	Sprinkler Credit	0%		
	Decrease for Sprinkler	0	L/min	
G	*North Side Exposure*			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	13.4	m	
	Height of Exposed Wall:	3	storeys	
	Length-Height Factor	40.1	m-storeys	
	Separation Distance	3.8	m	
	North Side Exposure Charge	18%		
	East Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	0.0	m	
	Height of Exposed Wall:	0	storeys	
	Length-Height Factor	0.0	m-storeys	
	Separation Distance	100	m	
	East Side Exposure Charge	0%		
	South Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	13.4	m	
	Height of Exposed Wall:	3	storeys	
	Length-Height Factor	40.1	m-storeys	
	Separation Distance	3.8	m	
	South Side Exposure Charge	18%		
	West Side Exposure			
	Exposing Wall:	Wood Frame		
	Exposed Wall:	Wood Frame		
	Length of Exposed Wall:	9.8	m	
	Height of Exposed Wall:	3	storeys	
	Length-Height Factor	29.5	m-storeys	
	Separation Distance	24.86	m	
	West Side Exposure Charge	8%		
	Total Exposure Charge	44%		The total exposure charge is below the maximum value of 75%.
	Increase for Exposures	3740	L/min	
H	Fire Flow	12240	L/min	
	Rounded Fire Flow	12000	L/min	Flow rounded to nearest 1000 L/min.
City Cap	**Required Fire Flow (RFF)**	**12000**	**L/min**	The City of Ottawa's cap does not apply since these are duplex units.
		200	**L/s**	

Fire Underwriters Survey (FUS) Fire Flow Calculations
In accordance with City of Ottawa Technical Bulletin ISTB-2018-02 dated March 21, 2018

Model Schematic

Morgan's Creek Development

Model Schematic



City Correspondence and Hydraulic Boundary Conditions

Boundary Conditions for 760 March

Information Provided:
Date provided: November 2018

March Road

Scenario	Demand	
	L/min	L/s
Average Daily Demand	33.6	0.56
Maximum Daily Demand	181.2	3.02
Peak Hour	271.8	4.53
Fire Flow Demand #1	13020	217
Fire Flow Demand #2	16980	283

Sandhill Road

Scenario	Demand	
	L/min	L/s
Average Daily Demand	39.6	0.66
Maximum Daily Demand	189	3.15
Peak Hour	287.4	4.79
Fire Flow Demand #1	13980	233
Fire Flow Demand #2	16980	283

Location:

Results:

Connection 1 - March

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.6	74.6
Peak Hour	124.2	64.1
Max Day plus Fire (13,000 l/min)	121.4	60.2
Max Day plus Fire (17,000 L/min)	118.9	56.6

[1] Ground Elevation = 79.1m

Connection 2 - Sandhill

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.6	76.9
Peak Hour	124.2	66.4
Max Day plus Fire (14,000 l/min)	117.7	57.2
Max Day plus Fire (17,000 L/min)	114.4	52.5

[1] Ground Elevation = 77.5m

Notes:

1) Avoid oversizing local watermains to accommodate large required fire flows (refer to Tech Bulletin ISTDB-2014-02). Servicing studies often use a design fire flow rate of 13,000 L/min to evaluate existing and proposed water distribution systems.
2) Connecting site's 1 and 2 with a watermain under Shirley's Brook (refer to site plan) is an attractive option. The watermain will provide sufficient looping and eliminate the "P-Loop" design off Sandhill Road and the need to insert an isolation valve on the existing backbone watermain on March Road (to ensure an uninterrupted supply of water during a planned closure or emergency condition).

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.

Ivan Dzeparoski

From: Annie Williams
Sent: Wednesday, December 12, 2018 12:39 PM
To: Ivan Dzeparoski
Subject: FW: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road
Attachments: 760March_BC_05Dec2018.docx

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: December 5, 2018 1:55 PM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Kevin A. Harper <KHarper@minto.com>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

Attached are the boundary conditions for the 2 connection off March Rd and 2 connections off Sandhill Rd. As stated in the notes, a watermain from March Rd to Sandhill under Shirley's Brook is the preferred design instead of what is currently proposed.

If you wish to discuss, please feel free to contact me.

Regards,
Gabrielle

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Friday, November 30, 2018 9:45 AM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Kevin A. Harper <KHarper@minto.com>; Lucie Dalrymple <ldalrymple@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Since the boundary condition modelling begins on Tuesday, I wanted to provide the minor updates below and attached which correspond with the latest subdivision plan received from Minto. The only change is 60 units in Site 2 (instead of

57). I also re-checked the FUS calculation for Site 2, no change overall. We still wish to request two (2) fire flow boundary conditions for each site, as noted below:

Site 1 (March Road)
Average Day = 0.56 L/s
Maximum Day = 3.02 L/s
Peak Hour = 4.53 L/s
Required Fire Flow (RFF) = 217 L/s AND 283 L/s

Site 2 (Sandhill Road)
Average Day = 0.66 L/s
Maximum Day = 3.15 L/s
Peak Hour = 4.79 L/s
Required Fire Flow (RFF) = 233 L/s AND 283 L/s

This email summarizes the latest information and should be used to run the model on Tuesday.

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

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 2:53 PM
To: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>; Kevin A. Harper <KHarper@minto.com>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Certainly.

Gabrielle

From: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Sent: Thursday, November 29, 2018 2:52 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>; Kevin A. Harper <KHarper@minto.com>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Thank you Gabrielle for the update. We will work around that, but would it be possible for you to ask the modeller to start with our request first think Tuesday upon his return.

Would be greatly appreciated.

Thank you

Lucie

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 1:54 PM
To: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Lucie,

Unfortunately, Tuesday is the earliest our modelling group can get BCs back to me. One modeler is away until then and the other is in meetings all three days (today, tomorrow and Monday). If you wish to proceed, I will accept the first submission with either: using the old BCs, or no boundary conditions/watermain sizing analysis. Additionally, I will accept a revised Water Servicing section and Water Appendix via email after the formal submittal has been made, but before review, comments are issued.

I hope these options help at this time.

Regards,
Gabrielle

From: Lucie Dalrymple <ldalrymple@jlrichards.ca>
Sent: Thursday, November 29, 2018 12:22 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Guy Forget <gforget@jlrichards.ca>; Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Unfortunately, the timing in which the boundary conditions will be available (next Tuesday per you email) presents a significant delivery probable from the team of consultants. We have been coordinating this request with the City since October 26, 2018. There was approximately one month lost due to the uncertainty of the existence of the two watermain stubs off of March Road, which was discussed at the August 22, 2018 pre-consultation meeting and which was confirmed in the meeting minutes issued on August 29th, 2018 (copy attached).

We understand that it is not you personally calculating the boundary condition, so would you please assist us in coordinating with the responsible City staff to see if these boundary conditions provided to JLR no later than end of day tomorrow? It would be greatly appreciated.

There is a lot of coordination efforts on all consultants to prepared a complete submission and when one study cannot be completed at the same time as all others, it presents issues. As Annie mentioned, the submission was to be issued tomorrow (based on a 3 week turn around for the boundary condition requested on October 26, 2018). We managed to push the submission date forward to next Friday, which means that the boundary conditions must be received this week.

Please advise if the BC can be provided sooner than next Tuesday.

We appreciate your assistance.

Thank you,

Lucie

Lucie Dalrymple, P.Eng.
Associate
Senior Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 29, 2018 11:57 AM
To: Annie Williams <awilliams@jlrichards.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

I touched base with our modelling group. I am expecting to receive the BCs Tuesday.

Gabrielle

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Thursday, November 29, 2018 11:43 AM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Per my voicemail from this morning, please let us know when we can expect to receive these boundary conditions.

As mentioned, our original deadline for the March Road design was tomorrow and we have shifted it to next week. We need to prepare our detailed water servicing design within the next few days.

Feel free to give me a call if there is something holding this up.

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Annie Williams
Sent: November 26, 2018 2:05 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Following our phone conversation, I have attached the revised water demand calculations. As noted, the Site 2 plan has changed slightly to accommodate 57 units.

Thank you,

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 26, 2018 11:40 AM
To: Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

I just completed my review. FUS calcs look good. Domestic calcs need revision:

- Since each population is less than 500 person, please use Table 3-3 of the MOE Design Guidelines for Drinking Water Systems to establish peaking factors for both sites. Please either interpolate the peaking factors or utilize the higher peaking factor which is associated with the lower population in the table (i.e. for 138 person you can use the peaking factors for 100 persons since they are higher than the peaking factors for 150 persons)
- The number of units for Site 2 appear to be high. I see 51 units on the plan provided, not 57.

Once I have the revised calcs, I can provide the boundary conditions.

Regards,
Gabrielle

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Friday, November 23, 2018 4:32 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Please let us know if the provided information is sufficient and when we can expect the boundary conditions.

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

From: Annie Williams
Sent: November 22, 2018 10:41 AM
To: 'Schaeffer, Gabrielle' <gabrielle.schaeffer@Ottawa.ca>
Cc: Lucie Dalrymple <ldalrymple@jlrichards.ca>; Guy Forget <gforget@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

Minto has slightly revised their layout on the Sandhill site so I have revised the domestic demand calculations (attached).

We would also like to request a second boundary condition for fire flow on each of the sites for 17,000 L/min (283 L/s). The City has indicated previously that the boundary conditions can be interpolated should further revisions to the draft plan occur.

Let me know if you have any questions and when we can expect to receive the boundary conditions.

Thank you,

From: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Sent: November 20, 2018 10:08 AM
To: Annie Williams <awilliams@jlrichards.ca>
Subject: RE: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Annie,

Thanks for your voicemail yesterday. I was unaware that water services were already installed for this site (at least fronting March). As of right now, I will proceed with the proposed double connection to March as previous proposed, however I am waiting on approval from operations so we're not in the clear yet.

Please provide me with supporting calcs for your domestic demand calculations. We're trying to minimize the number of boundary condition requestes we run so we're doing the water review up front and just doing a check that the circumstances are the same in application review.

Regards,
Gabrielle

From: Annie Williams <awilliams@jlrichards.ca>
Sent: Friday, October 26, 2018 4:13 PM
To: Schaeffer, Gabrielle <gabrielle.schaeffer@Ottawa.ca>
Cc: McCreight, Laurel <Laurel.McCreight@ottawa.ca>; Guy Forget <gforget@jlrichards.ca>; Lucie Dalrymple

<ldalrymple@jlrichards.ca>; Thomas Couper <TCouper@minto.com>; Kevin A. Harper <KHarper@minto.com>
Subject: Request for Hydraulic Boundary Conditions - Morgan's Creek - 760 March Road

Hi Gabrielle,

We would like to obtain updated hydraulic boundary conditions in support of a Site Plan Application for Minto's development of a residential site (Morgan's Creek) located at 760 March Road in the City of Ottawa (refer to attached Site Plan).

The City previously provided hydraulic boundary conditions for this site back in 2011 (attached). Approvals for the site were granted under Site Plan control; however, the site was never developed. Since that time, the Site Plan has been slightly revised though the general concept remains as follows:

The site is bisected by Shirley's Brook with the western portion (Site 1) fronting onto March Road and the eastern portion (Site 2) fronting onto Sandhill Road. Site 1 includes 60 terrace (duplex) units and is proposed to be serviced from two (2) connections to the existing March Road 400 mm diameter watermain. Site 2 includes 51 row townhouse units and is proposed to be serviced from two (2) connections to the existing 300 mm diameter watermain on Sandhill Road.

We request hydraulic boundary conditions for both Site 1 and Site 2 along the existing watermains at the proposed site entrances (as depicted on the Site Plan).

Based on the City Design Guidelines, the following demands are anticipated:

Site 1
Average Day = 0.56 L/s
Maximum Day = 1.40 L/s
Peak Hour = 3.07 L/s
Required Fire Flow (RFF) = 217 L/s

Site 2
Average Day = 0.56 L/s
Maximum Day = 1.40 L/s
Peak Hour = 3.07 L/s
Required Fire Flow (RFF) = 233 L/s

Furthermore, if static conditions are expected to fluctuate between existing and future build-out conditions, we would like to obtain both.

The RFF was calculated in accordance with the City Design Guidelines for Water Distribution and associated Technical Bulletins, including the latest ISTB-2018-02. Detailed calculations are attached.

Should you have any questions or require any further information, please do not hesitate to contact me.

Thank you,

Annie Williams, EIT
Civil Engineering Intern

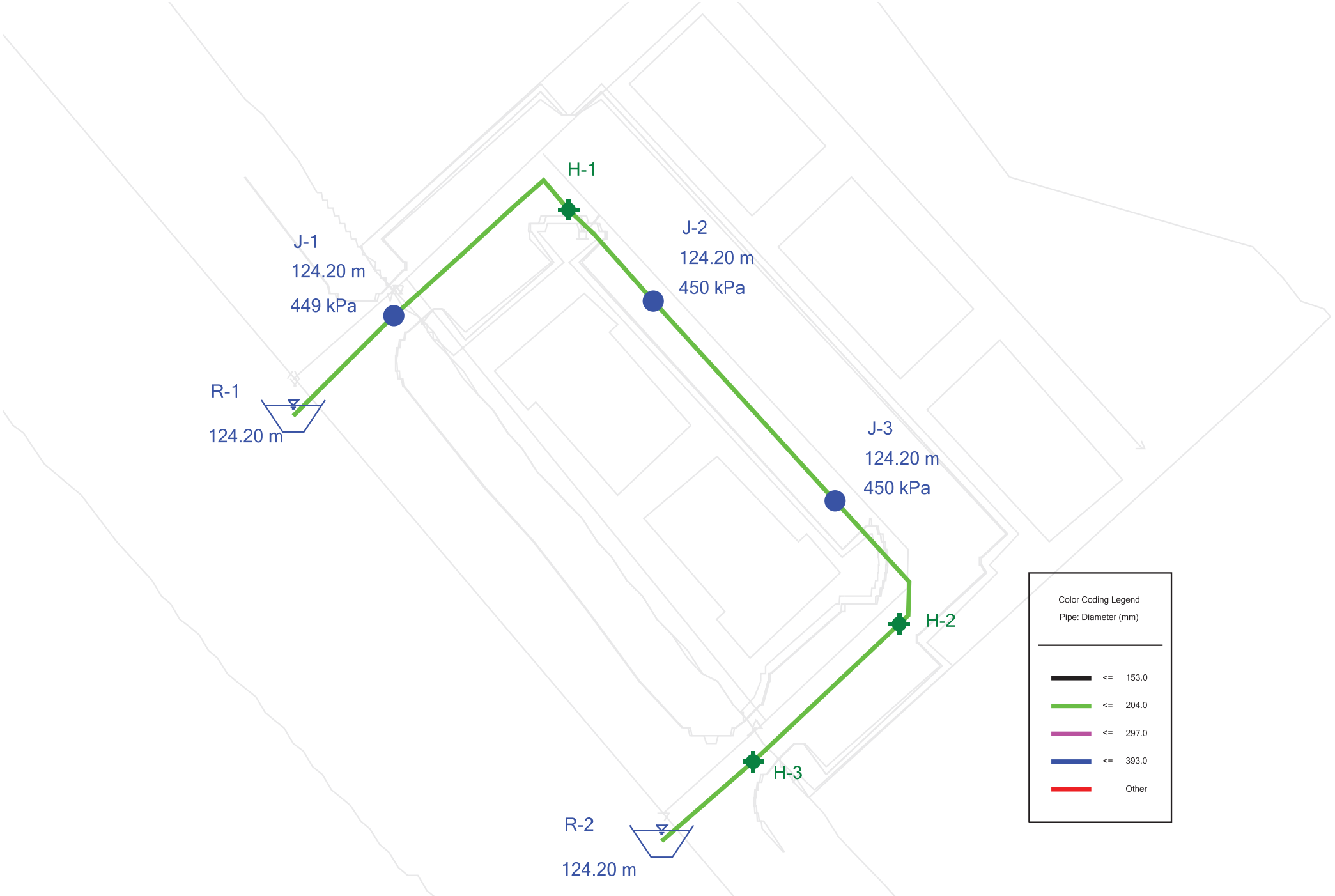
J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Tel: 613-728-3571 Fax: 613-728-6012

'

Simulation Results – Peak Hour Demand

Morgan's Creek Development

Peak Hour Demand



Morgan's Creek Development

Peak Hour Demand

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-3	78.24	2.26	124.20	450
J-2	78.26	2.26	124.20	450
J-1	78.33	0.00	124.20	449

Morgan's Creek Development

Peak Hour Demand

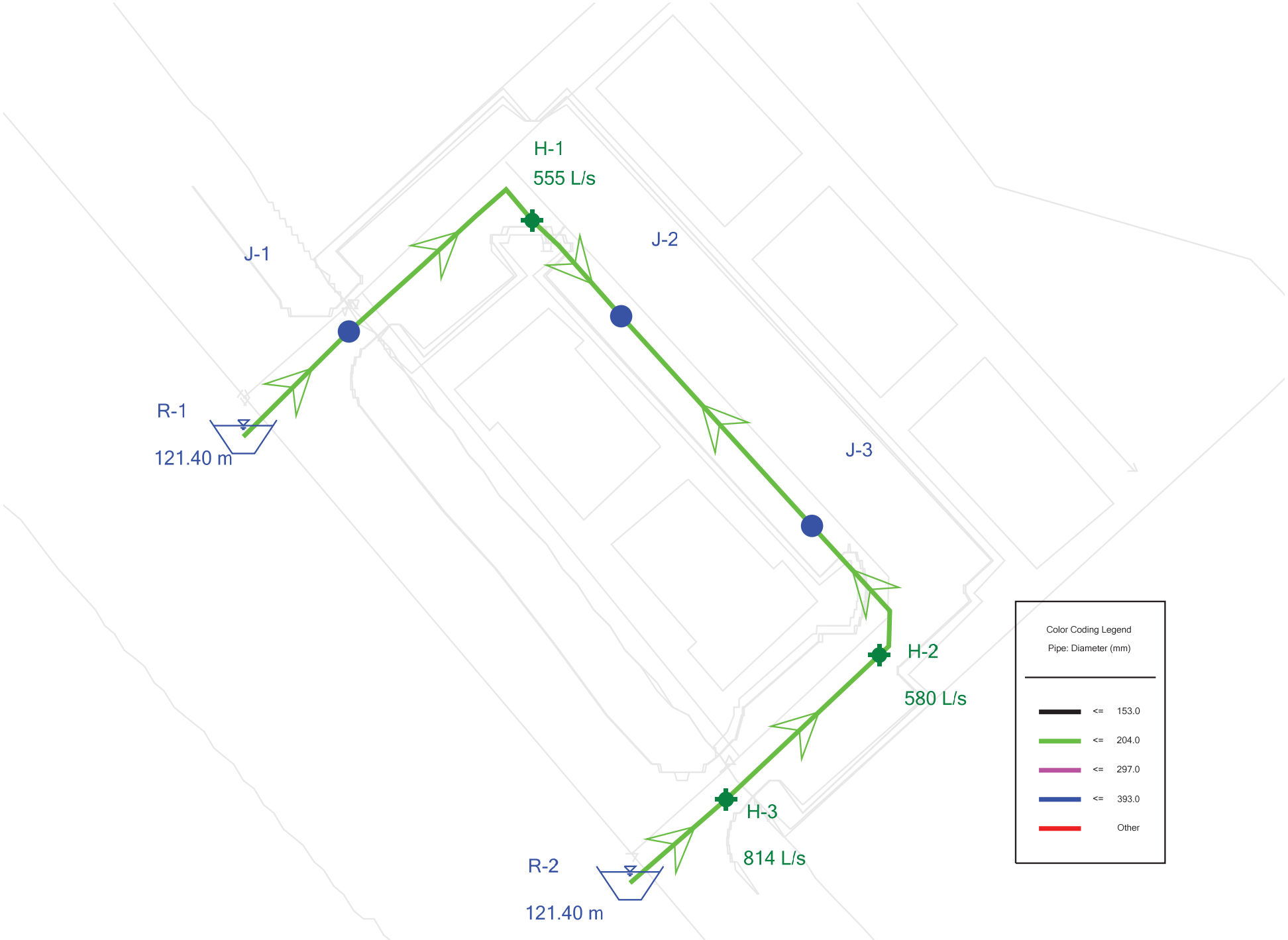
Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Flow (L/s)	Velocity (m/s)
P-17(1)	17	204.0	PVC	110.0	124.20	124.20	2.22	0.07
P-17(2)	36	204.0	PVC	110.0	124.20	124.20	-0.04	0.00
P-22	32	204.0	PVC	110.0	124.20	124.20	2.22	0.07
P-18	21	204.0	PVC	110.0	124.20	124.20	-2.30	0.07
P-23	27	204.0	PVC	110.0	124.20	124.20	2.30	0.07
P-14	19	204.0	PVC	110.0	124.20	124.20	2.22	0.07
P-21	16	204.0	PVC	110.0	124.20	124.20	-2.30	0.07

Simulation Results – Maximum Day plus Fire Flow

Morgan's Creek Development

Max Day Demand + Fire Flow (13,000 L/min)



Morgan's Creek Development

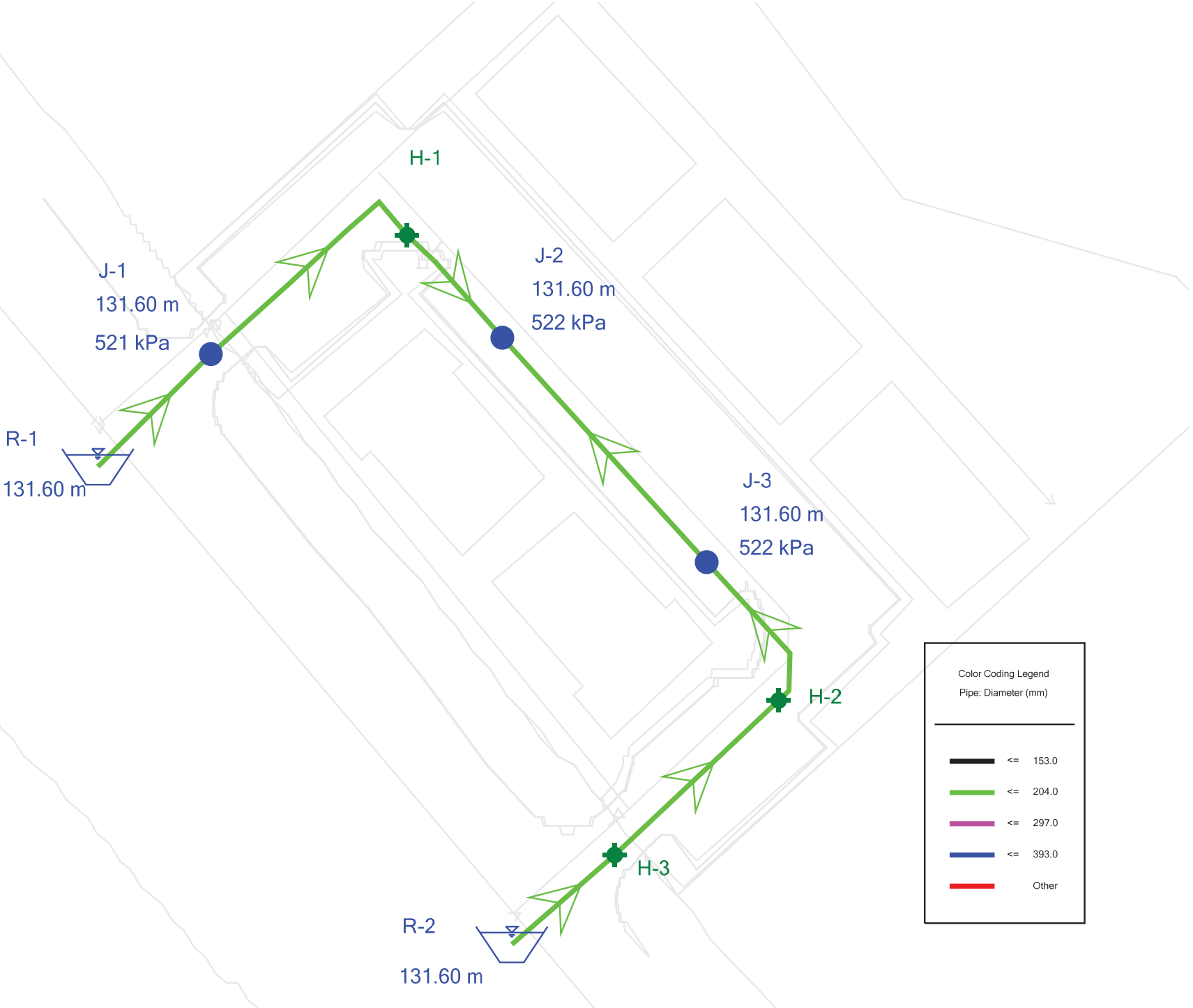
Max Day Demand + Fire Flow (13,000 L/min)

Label	Fire Flow (Needed) (L/s)	Fire Flow (Available) (L/s)	Flow (Total Available) (L/s)	Satisfies Fire Flow Constraints?	Pressure (Residual Lower Limit) (kPa)	Pressure (Calculated Residual) (kPa)	Junction w/ Minimum Pressure (System)
H-1	217	555	555	True	140	140	J-2
H-2	217	580	580	True	140	140	J-3
H-3	217	814	814	True	140	140	H-2

Simulation Results – High Pressure Check

Morgan's Creek Development

High Pressure Check



Morgan's Creek Development

High Pressure Check

Junction Table

Label	Elevation (m)	Demand (L/s)	Hydraulic Grade (m)	Pressure (kPa)
J-3	78.24	0.28	131.60	522
J-2	78.26	0.28	131.60	522
J-1	78.33	0.00	131.60	521

Morgan's Creek Development
High Pressure Check

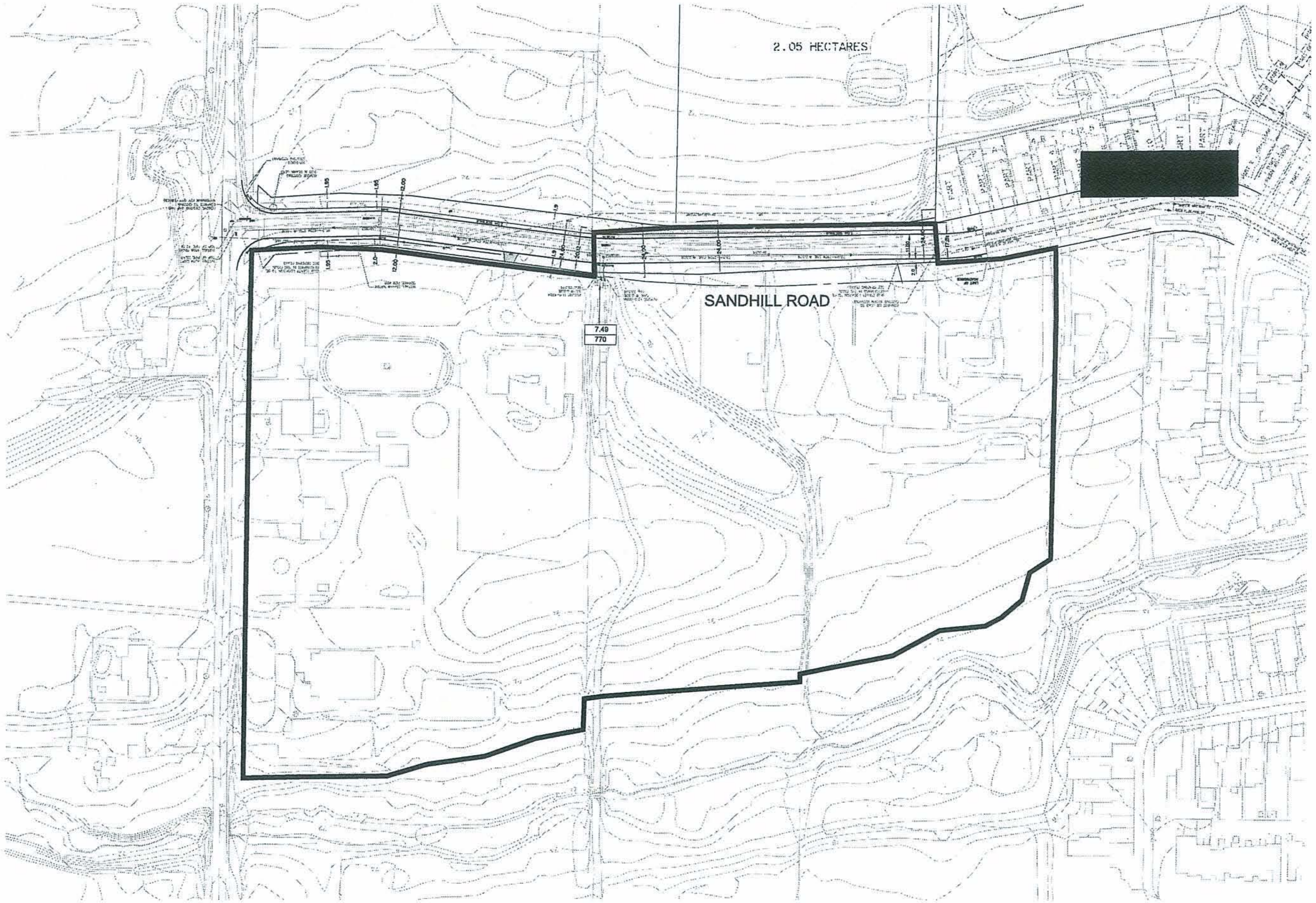
Pipe Table

Label	Length (Scaled) (m)	Diameter (mm)	Material	Hazen-Williams C	Hydraulic Grade (Start) (m)	Hydraulic Grade (Stop) (m)	Flow (L/s)	Velocity (m/s)
P-17(1)	17	204.0	PVC	110.0	131.60	131.60	0.28	0.01
P-17(2)	36	204.0	PVC	110.0	131.60	131.60	0.00	0.00
P-22	32	204.0	PVC	110.0	131.60	131.60	0.28	0.01
P-18	21	204.0	PVC	110.0	131.60	131.60	-0.28	0.01
P-23	27	204.0	PVC	110.0	131.60	131.60	0.28	0.01
P-14	19	204.0	PVC	110.0	131.60	131.60	0.28	0.01
P-21	16	204.0	PVC	110.0	131.60	131.60	-0.28	0.01

Appendix 'C'

Sanitary Sewer Design

IBI Group, Sanitary Design



LEGEND:

7.49 — AREA IN HECTARES
770 — POPULATION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR APPROVAL		08:03:04

TENTH LINE DEVELOPMENT INC.

IBI GROUP
1770 Woodward Drive
Suite 100
Ottawa, Ontario
Canada K2C 0P8
Tel (613)225-1311
FAX (613)225-9868

Project Title

BRIAR RIDGE
PHASE 2

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title

SANITARY DRAINAGE
AREA PLAN
SANDHILL ROAD

Scale
1:1000

Design: L.M.E.	Date: MARCH '09
Drawn: M.M.	Checked: R.W.W.
Project No.: 10518	Drawing No.: 501-1

IBI Group

333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: Briar Ridge Phase 2 - Sandhill Road
LOCATION: City of Ottawa
CLIENT: Tenth Line Development Inc.

LOCATION			RESIDENTIAL									INSTITUTIONAL COMMERCIAL INDUSTRIAL							INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN						
			UNIT TYPES					POPULATION		CUMULATIVE FLOW		AREA (ha)																
Street	From MH	To MH	Singles	Semis	Towns	Stacked	Area (Ha.)	INDIV.	CUM.	Peaking Factor	Peak Flow (l/s)	INSTITUTIONAL Indiv	INSTITUTIONAL Cumm.	COMMERCIAL Indiv	COMMERCIAL Cumm.	INDUSTRIAL Indiv	INDUSTRIAL Cumm.	Pk. Flow (l/s)	Incr. Area (Ha.)	Cum. Area (Ha.)	Flow (l/s)	(l/s)	Capacity (l/s)	Pipe Size (mm)	Length (m)	Slope (%)	Velocity m/sec	Avail. Cap. L/s	Avail. Cap. (%)
External Area	Stub	300A					7.49	770.0	770.0	3.87	12.07							0.00	7.49	7.49	2.10	14.17	33.98	250	10.0	0.30	0.67	19.81	58.31%
Sandhill Road	300A	301A						0.0	770.0	3.87	12.07							0.00	0.00	7.49	2.10	14.17	33.98	250	73.5	0.30	0.67	19.81	58.31%
Sandhill Road	301A	*Ex. 10A*						0.0	770.0	3.87	12.07							0.00	0.00	7.49	2.10	14.17	33.98	250	75.0	0.30	0.67	19.81	58.31%
Sandhill Road	*Ex 10A*	*Ex. 9A*					0.43	32.0	802.0	3.86	12.54							0.00	0.43	7.92	2.22	14.76	33.98	*250*	*99.0*	*0.30*	0.67	19.22	56.57%

Designed:	LME		
Checked:			
		REVISION	DATE
Dwg Reference: 10518-501-1	**File Ref:** 10518.5.7	**Date:** 2009-03-09	**Sheet No.** 1 of 1

Population Per Unit: 3.4 For Singles
2.8 Townhouses/Semis

Avg. Per Capita Flow Rate: 350 l/day
Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = pop'n in thousands

ICI Rates		Peak Factor
Institution	30000 l/ha/day	1.5
Commercial	50000 l/ha/day	1.5
Industrial	35000 l/ha/day	Moe Guidelines

Infiltration Allowance: 0.13 l/sec/Ha

Assumed pipe loss coefficient = 0.013

Omniplex Sanitary Info from DSEL

Dec. 15th, 2018

Omnipex
788 March Road
ProposedSanitary Flow

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 0.66 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**0.22**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4		0
Semi-detached and duplex	2.7		0
Townhouse	2.7		0
Stacked Townhouse (Duplex)	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	96	135
2 Bedroom	2.1	88	185
3 Bedroom	3.1	12	38
Average	1.8		0

Total Pop	**358**	
Average Domestic Flow	**1.16**	**L/s**
Peaking Factor	**3.44**	
Peak Domestic Flow	**3.99**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**	**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	50,000 L/ha/d		0.00

Average I/C/I Flow	**0.00**
Peak Institutional / Commercial Flow	0.00
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**0.00**

** assuming a 12 hour commercial operation*

*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**1.16 L/s**
Total Estimated Peak Dry Weather Flow Rate	**3.99 L/s**
Total Estimated Peak Wet Weather Flow Rate	**4.20 L/s**

JLR 2012 Sanitary Design Sheet Submission

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK

760 MARCH ROAD
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR PROJECT NO.: 24566

0.95 L/s peak flow Allocation for 788 March Rd.

2.66 L/s peak flow Allocation for Morgan's Creek Development

Commercial/Institutional Flow =	50,000	L/day/ha
q =	350	L/cap/d
i =	0.28	L/s/ha
TOWNS HOUSING	2.7	pers/unit
STACKS HOUSING	2.7	pers/unit
SINGLES HOUSING	3.4	pers/unit
Manning's Coefficient (n) =	0.013	

SANITARY SEWER DESIGN SHEET
Designed: K.F.
Checked By: L.D.
Date: May 2012

STREET	SAN MH #		RESIDENTIAL								COM/INST			RES+ COM + INFILTR.		SEWER DATA					UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS					CUMULATIVE		PEAKING	POP.				PEAK EXTR.	PEAK DES.															
			SINGLES	STACKS	TOWNS	POP.	AREA	POP.	AREA	FACTOR	FLOW	AREA	CUM. AREA	COM/INST FLOW	FLOW	FLOW	DIA.	SLOPE	CAPAC.	VEL. (full)	LENGTH	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line		Obvert	Invert	Cover
	FROM	TO	units	units	units	pers	ha	pers	ha		L/s	ha	L/s	L/s	L/s	L/s	mm	%	L/s	m/s	m										
FLOW TO 250mmΦ SANITARY - SANDHILL ROAD																															
Morgan's Creek - Private Road	5	4		20		54	0.25	54	0.25	4.00	0.88				0.07	0.95	200	0.33	19.66	0.61	28.40	76.50	0.02	74.81	74.61	1.69	76.75		74.71	74.51	2.04
Morgan's Creek - Private Road	4	3		24		65	0.29	119	0.5						0.15	2.08	200	0.33	19.66	0.61	50.70	76.75	0.02	74.69	74.49	2.06	76.55		74.53	74.33	2.02
Morgan's Creek - Private Road	3	2		16		43	0.27	162	0.8						0.23	2.85	200	0.33	19.66	0.61	57.70	76.55	0.02	74.51	74.31	2.04	76.50		74.32	74.12	2.18
Morgan's Creek - Private Road	2	1		28		76	0.43	238	1.2						0.35	4.20	200	0.33	19.66	0.61	74.20	76.50	0.02	74.30	74.10	2.20	76.85		74.05	73.85	2.80
Morgan's Creek Private Road/ Sandhill Road	1	EX. 300A		12		32	0.24	270	1.4						0.41	4.79	200	0.41	21.91	0.68	99.10	76.85		74.03	73.83	2.82	76.90		73.63	73.43	3.28
Sandill Road	EX. 300A	Ex. 301A			4	11	0.11	281	1.5						0.45	5.00	250	0.29	33.64	0.66	72.80	76.90		73.68	73.43	3.23	77.90		73.46	73.21	4.44
				100	4	270	1.48																								

SANDHILL ROAD- AS BUILT INFORMATION
Ex. Inv @ SANMH 300A (SE) 73.425
Ex. Obv @ SANMH 300A(SE) 73.625
Information taken from IBI Group As-Built Plans - Briar Ridge Phase 2
DWG No. 109-1 , Rev 5 (As-built) - Sandhill Road (Sta. 1+000 to Klondike)

LOW TO SANITARY - MARCH ROAD/ MERSEY DRIVE																															
Morgan's Creek - Private Road	8	7		56		151	0.71	151	0.71	4.00	2.45				0.20	2.65	200	0.35	20.24	0.62	75.10	78.60	0.06	76.40	76.20	2.20	78.35		76.14	75.94	2.21
Morgan's Creek - Private Road	7	6					0.05	151	0.76	4.00	2.45				0.21	2.66	200	0.35	20.24	0.62	31.90	78.35	0.06	76.08	75.88	2.27	78.30		75.97	75.77	2.33
Commercial Site - 788 March RD	*Future Site*	*6*										*0.83*	*0.83*	*0.72*	*0.23*	*0.95*	*Detailed Design of Commercial Site located at 788 March Road to be completed in future*														
Morgan's Creek Private Rd /March Rd/ Mersey Dr	6	9						151	0.76	4.00	2.45		0.83	0.72	0.45	3.62	200	0.67	28.04	0.86	47.08	78.30	0.03	75.91	75.71	2.39	78.70		75.59	75.39	3.11
Mersey Drive	9	10						151	0.76	4.00	2.45		0.83	0.72	0.45	3.62	200	0.35	20.24	0.62	38.80	78.70		75.56	75.36	3.14	79.02		75.42	75.22	3.59
Mersey Drive	*124*	*10*				*4*	*0.14*	*4*	*0.14*	*4.00*	*0.06*				*0.04*	*0.10*	*200*	*0.55*	*25.38*	*0.78*	*33.00*	*79.27*		*75.60*	*75.40*	*3.66*	*79.02*		*75.42*	*75.22*	*3.60*
Mersey Drive	*10*	*123*				*24*	*0.30*	*179*	*1.20*	*4.00*	*2.90*		*0.83*	*0.72*	*0.57*	*4.19*	*200*	*0.55*	*25.38*	*0.78*	*63.30*	*79.02*		*75.42*	*75.22*	*3.60*	*79.46*		*75.07*	*74.87*	*4.39*
Mersey Drive	*123*	*108*				*32*	*0.42*	*211*	*1.62*	*4.00*	*3.42*				*0.45*	*3.88*	*200*	*0.59*	*26.28*	*0.81*	*109.20*	*79.46*		*75.07*	*74.87*	*4.40*	*80.00*		*74.42*	*74.22*	*5.58*
Mersey Drive	*122*	*121*				*24*	*0.38*	*24*	*0.38*	*4.00*	*0.39*				*0.11*	*0.50*	*200*	*3.78*	*66.52*	*2.05*	*63.50*	*84.45*		*80.40*	*80.20*	*4.05*	*81.82*		*78.00*	*77.80*	*3.82*
Mersey Drive	*121*	*120*				*24*	*0.28*	*48*	*0.66*	*4.00*	*0.78*				*0.18*	*0.96*	*200*	*2.53*	*54.43*	*1.68*	*68.00*	*81.82*		*77.90*	*77.70*	*3.92*	*80.27*		*76.18*	*75.98*	*4.09*
Argent Private	*3*	*2*		*12*		*32*	*0.26*	*32*	*0.26*	*4.00*	*0.53*				*0.07*	*0.60*	*200*	*0.90*	*32.46*	*1.00*	*52.70*	*84.25*	*0.06*	*81.66*	*81.46*	*2.59*	*84.20*		*81.19*	*80.99*	*3.01*
Argent Private	*2*	*1A*			*16*	*43*	*0.33*	*76*	*0.59*	*4.00*	*1.23*				*0.17*	*1.39*	*200*	*0.90*	*32.46*	*1.00*	*89.20*	*84.20*	*0.60*	*81.13*	*80.93*	*3.07*	*82.45*		*80.33*	*80.13*	*2.12*
Argent Private	*3*	*4*		*28*		*76*	*0.41*	*76*	*0.41*	*4.00*	*1.23*				*0.11*	*1.34*	*200*	*0.90*	*32.46*	*1.00*	*69.30*	*84.25*	*0.06*	*80.71*	*80.51*	*3.54*	*82.80*		*80.09*	*79.89*	*2.71*
Argent Private	*4*	*1A*		*20*		*54*	*0.28*	*130*	*0.69*	*4.00*	*2.10*				*0.19*	*2.29*	*200*	*0.40*	*21.64*	*0.67*	*74.90*	*82.80*		*80.03*	*79.83*	*2.77*	*82.45*		*79.73*	*79.53*	*2.72*
Argent Private	*1A*	*1*					*0.02*	*205*	*1.30*	*4.00*	*3.33*				*0.36*	*3.69*	*200*	*0.90*	*32.46*	*1.00*	*18.50*	*82.45*	*0.50*	*79.73*	*79.53*	*2.72*	*82.45*		*79.56*	*79.36*	*2.89*
Commercial Plaza	*1*	*120A*						*205*	*1.30*	*4.00*	*3.33*				*0.36*	*3.69*	*250*	*0.98*	*61.42*	*1.21*	*44.80*	*82.45*	*3.05*	*79.11*	*78.86*	*3.34*	*80.39*		*78.67*	*78.42*	*1.72*
Klondike Rd/ MG Phase 13/ Commercial Plza	*Upstream*	*120A*						*2432*	*38.86*	*3.52*	*34.66*	*1.69*	*4.62*	*4.01*	*12.18*	*50.85*	*300*	*0.30*	*55.26*								*80.39*		*75.61*	*75.31*	*4.78*
Klondike Commercial Plaza	*120A*	*120*						*2637*	*40.16*	*3.49*	*37.28*		*4.62*	*4.01*	*12.54*	*53.83*	*300*	*0.97*	*99.36*	*1.36*	*15.80*	*80.39*		*75.62*	*75.31*	*4.77*	*80.25*		*75.47*	*75.17*	*4.78*
Westmoreland Avenue	*120*	*117*				*20*	*0.33*	*2705*	*41.15*	*3.48*	*38.14*		*4.62*	*4.01*	*12.82*	*54.96*	*300*	*0.42*	*65.32*	*0.90*	*70.60*	*80.27*	*0.01*	*75.47*	*75.17*	*4.80*	*80.40*		*75.17*	*74.87*	*5.23*
Whithorn Avenue	*116*	*119*				*8*	*0.14*	*8*	*0.14*	*4.00*	*0.13*				*0.04*	*0.17*	*200*	*2.00*	*48.39*	*1.49*	*8.10*	*83.34*	*0.10*	*79.26*	*79.06*	*4.08*	*83.30*		*79.10*	*78.90*	*4.20*
Whithorn Avenue	*119*	*118*				*24*	*0.22*	*32*	*0.36*	*4.00*	*0.52*				*0.10*	*0.62*	*200*	*2.69*	*56.11*	*1.73*	*37.20*	*83.30*	*0.30*	*79.00*	*78.80*	*4.30*	*82.32*		*78.00*	*77.80*	*4.32*
Whithorn Avenue	*118*	*117*				*44*	*0.50*	*76*	*0.86*	*4.00*	*1.23*				*0.24*	*1.47*	*200*	*2.21*	*50.87*	*1.57*	*81.10*	*82.32*	*0.75*	*77.70*	*77.50*	*4.62*	*80.40*		*75.91*	*75.71*	*4.49*
Westmoreland Avenue	*117*	*110*				*24*	*0.31*	*2805*	*42.32*	*3.47*	*39.40*		*4.62*	*4.01*	*13.14*	*56.55*	*300*	*0.42*	*65.50*	*0.90*	*68.80*	*80.40*	*0.03*	*75.16*	*74.86*	*5.24*	*80.80*		*74.87*	*74.57*	*5.93*
Spalding Avenue	*111*	*110*				*12*	*0.33*	*12*	*0.33*	*4.00*	*0.19*				*0.09*	*0.29*	*200*	*1.91*	*47.29*	*1.46*	*46.00*	*81.25*	*0.78*	*76.50*	*76.30*	*4.75*	*80.80*		*75.62*	*75.42*	*5.18*
Westmoreland Avenue	*110*	*109*				*16*	*0.30*	*2833*	*42.95*	*3.46*	*39.75*		*4.62*	*4.01*	*13.32*	*57.08*	*300*	*0.36*	*60.32*	*0.83*	*66.30*	*80.80*	*0.02*	*74.84*	*74.54*	*5.96*	*80.80*		*74.60*	*74.30*	*6.20*
Mersey Drive	*Upstream*	*109*				*120*	*2.01*	*120*	*2.01*	*4.00*	*1.94*				*0.56*	*2.51*	*200*	*1.00*	*34.22*								*81.85*		*77.20*	*77.00*	*4.65*
Mersey Drive	*109*	*108*				*24*	*0.33*	*2977*	*45.29*	*3.45*	*41.55*		*4.62*	*4.01*	*13.98*	*59.54*	*300*	*0.46*	*68.74*	*0.94*	*68.70*	*80.80*	*0.02*	*74.58*	*74.28*	*6.22*	*79.90*		*74.26*	*73.96*	*5.64*
March Road Easement (West Side)	*108*	*101*						*3188*	*46.91*	*3.42*	*44.17*		*4.62*	*4.01*	*14.43*	*62.61*	*375*	*0.32*	*103.89*	*0.91*	*12.40*	*80.00*	*0.06*	*74.25*	*73.87*	*5.76*	*80.00*		*74.21*	*73.83*	*5.80*
March Road Easement (West Side)	*Upstream*	*101*				*156*	*2.01*	*156*	*2.01*	*4.00*	*2.53*				*0.56*	*3.09*	*200*	*0.58*	*26.08*								*80.00*		*74.38*	*74.18*	*5.62*

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK

760 MARCH ROAD

CITY OF OTTAWA

MINTO COMMUNITIES INC.

JLR PROJECT NO.: 24566

Commercial/Institutional Flow =	50,000	L/day/ha
q =	350	L/cap/d
i =	0.28	L/s/ha
TOWNS HOUSING	2.7	pers/unit
STACKS HOUSING	2.7	pers/unit
SINGLES HOUSING	3.4	pers/unit
Manning's Coefficient (n) =	0.013	

SANITARY SEWER DESIGN SHEET

Designed: K.F.

Checked By: L.D.

Date: May 2012

STREET	SAN MH #		RESIDENTIAL													COM/INST			RES+ COM + INFILTR.		SEWER DATA					UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS					CUMULATIVE		PEAKING	POP.								PEAK EXTR.	PEAK DES.															
	FROM	TO	SINGLES units	STACKS units	TOWNS units	POP. pers	AREA ha	POP. pers	AREA ha	FACTOR	FLOW L/s		AREA ha	CUM. AREA L/s	COM/INST FLOW L/s	FLOW L/s	FLOW L/s	DIA. mm	SLOPE %	CAPAC. L/s	VEL. (full) m/s	LENGTH m	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line		Obvert	Invert	Cover
March Road Crossing	*101*	*15A*						*3188*	*46.91*	*3.42*	*44.17*			*4.62*	*4.01*	*14.43*	*62.61*	*375*	*0.30*	*100.18*	*0.88*	*47.00*	*80.00*	*0.02*	*74.15*	*73.77*	*5.85*	*79.41*		*74.00*	*73.63*	*5.41*
Briar Brook Subdivision	*15A*	*8C*						*3188*	*46.91*	*3.42*	*44.17*			*4.62*	*4.01*	*14.43*	*62.61*	*375*	*0.31*	*101.84*	*0.89*	*63.20*	*79.41*		*73.98*	*73.61*	*5.43*	*78.20*		*73.79*	*73.41*	*4.41*

LEGEND

DENOTES EXISTING SEWERS

DENOTES PROPOSED SEWERS

DENOTES SEWERS FOR THE KLONDIKE CROSSING (SUBMITTED JULY 2011) OR FUTURE SEWERS

KLONDIKE COMMERCIAL SITE- AS BUILT INFORMATION	
Ex. Inv @ SAN MH 120 (Westmoreland Ave)	**75.167**
Ex. Obv @ SAN MH 120 (Westmoreland Ave)	**75.472**
Information taken from JLR As-Built Plans -Klondike Commercial Site (Morgan's Grant)	
DWG No. 20668-S1, Rev. 18 (As-Built) - Klondike Commercial Site	

MARCH ROAD- AS BUILT INFORMATION
Ex. Inv @ INLET (East Blvd) = 75.69
Ex. Inv @ OUTLET (West Blvd) = 75.40
As-built Length 43.18, Slope = 0.67 %
Information taken from Stantec As-Built Plans - March Road Reconstruction
ISB07-5166 - Dwg. No. 19 , Rev 5 (As-built) - March Rd (Sta 8+200 to 8+500)

MERSEY DRIVE- AS BUILT INFORMATION
Ex. Inv @ MH 124(SW) = 75.40
Ex. Inv @ MH 123 (NW) = 74.87
Information taken from JLR As-Built Plans - Mersey Drive (Morgan's Grant Phase 4)
DWG No. 16087-11 , Rev 8 (As-built) - Mersey Drive (Sta 0+285 to Sta 0+480.9)

Sanitary Stub Correspondence

Guy Forget - RE: March Road - Drainage Area & Stormwater Design Sheet

From: "Chamberlain, Gordon" <gordon.chamberlain@stantec.com>
To: Guy Forget <GForget@JLRICHARDS.CA>
Date: 10/12/2010 2:30 PM
Subject: RE: March Road - Drainage Area & Stormwater Design Sheet
CC: "Foley, Luke" <Luke.Foley@ottawa.ca>, "Lay, Jack" <jack.lay@stantec.com>
Attachments: 760-788 March Rd Sanitary Servcing Plan.pdf

Hi Guy:

Below is the basis which was used for the 200mm dia. pipe.
It comes from a high level assessment and input on possible development provided by the City.

The available capacity of the downstream sewers (outlet) need to be confirmed.

"According to the City's electronic mapping (attached), the corner property (788 March Road) is zoned commercial, LC7(1523), the second (760 March Road) is zoned DR. Based on the input from the City, the second property is expected to be residential and anticipated to be medium to high density once fully developed.

Given the design flows for sanitary servicing these sites are estimated as follows:

i) Commercial lot (788 March Road): Area = 0.83ha
= 50,000 x 1.5 x 0.83/86,400 + 0.28 x 0.83 = 0.72 l/s + 0.23 l/s
= 0.95 l/s

ii) Residential lot (760 March Road): Area = 0.69ha
Medium Density = 540persons/ha High Density = 1800persons/ha
Medium density sanitary flow
= pop'n x 350 l/cap.da x 1/86,400 x PF + 0.28 l/s/ha x Area
= ((540x0.69) x 350 / 86,400) x (1+ 14/(4+((540*.69)/1000)^0.5)) x 1 + 0.28 x 0.69
= (372.6 x 350 / 86,400) x 4 x 1 + 0.19
= 6.23 l/s

High density sanitary flow
= pop'n x 350 l/cap.da x 1/86,400 x PF + 0.28 l/s/ha x Area
= ((1800x0.69) x 350 / 86,400) x (1+ 14/(4+((1800*.69)/1000)^0.5)) x 1 + 0.28 x 0.69
= (1242 x 350 / 86,400) x 3.737 x 1 + 0.28 x 0.69
= 19.0 l/s

The estimated total Sanitary demand for these two properties, based on the above, ranges between 7.18 l/s and 19.95 l/s assuming medium and high density residential, respectively, at 760 March Road."

The City has installed the 200mm dia. pipe (stubbed) across March Road to potentially avoid a road cut. Unfortunately, I don't have asbuilt information.

Hope this helps.

L. Gordon Chamberlain, P. Eng.
Transportation Engineer
Stantec
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 724-4390
Fx: (613) 722-2799
gordon.chamberlain@stantec.com

From: Guy Forget [mailto:GForget@JLRICHARDS.CA]
Sent: Tuesday, October 12, 2010 11:40 AM
To: Chamberlain, Gordon
Subject: RE: March Road - Drainage Area & Stormwater Design Sheet

Hi Gordon,

Have you had a chance to look into the future 200 mm diameter sanitary connection?

Guy

Guy Forget, P.Eng., LEED®AP
Associate
Senior Water Resources Engineer
J.L. Richards & Associates Limited
Tel: (613)728-3572 Ext. 1279
Fax: (613)728-6012
email: gforget@jlrichards.ca
web: www.jlrichards.ca

>>> "Chamberlain, Gordon" <gordon.chamberlain@stantec.com> 10/8/2010 1:20 PM >>>
Hi Guy:

I'm out of the office today and won't be able to provide the info requested until Tuesday.

Gord

From: Guy Forget [GForget@JLRICHARDS.CA]
Sent: Friday, October 08, 2010 6:26 AM
To: Chamberlain, Gordon
Subject: Re: March Road - Drainage Area & Stormwater Design Sheet

Hi Gord,

If possible, can you send me a copy of the Sanitary Drainage Plan for the same stretch of the roadway. I just want to confirm the limits of the areas included in the 200 mm diameter sanitary sewer connection, adjacent to ST13 (labeled by others).

Thanks again for your help on this matter.

Guy

Guy Forget, P.Eng., LEED®AP
Associate
Senior Water Resources Engineer
J.L. Richards & Associates Limited
Tel: (613)728-3572 Ext. 1279
Fax: (613)728-6012
email: gforget@jlrichards.ca
web: www.jlrichards.ca

>>> "Chamberlain, Gordon" <gordon.chamberlain@stantec.com> 10/7/2010 11:46 AM >>>

Hi Guy:

Attached are pdfs of the Drainage Area plan and Sewer design sheet relevant to the area discussed.

Should you need anything else or further clarification, please let me know.

L. Gordon Chamberlain, P. Eng.
Transportation Engineer
Stantec
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 724-4390
Fx: (613) 722-2799
gordon.chamberlain@stantec.com
stantec.com

Guy Forget - As-built elevations for 200 dia. Sanitary line

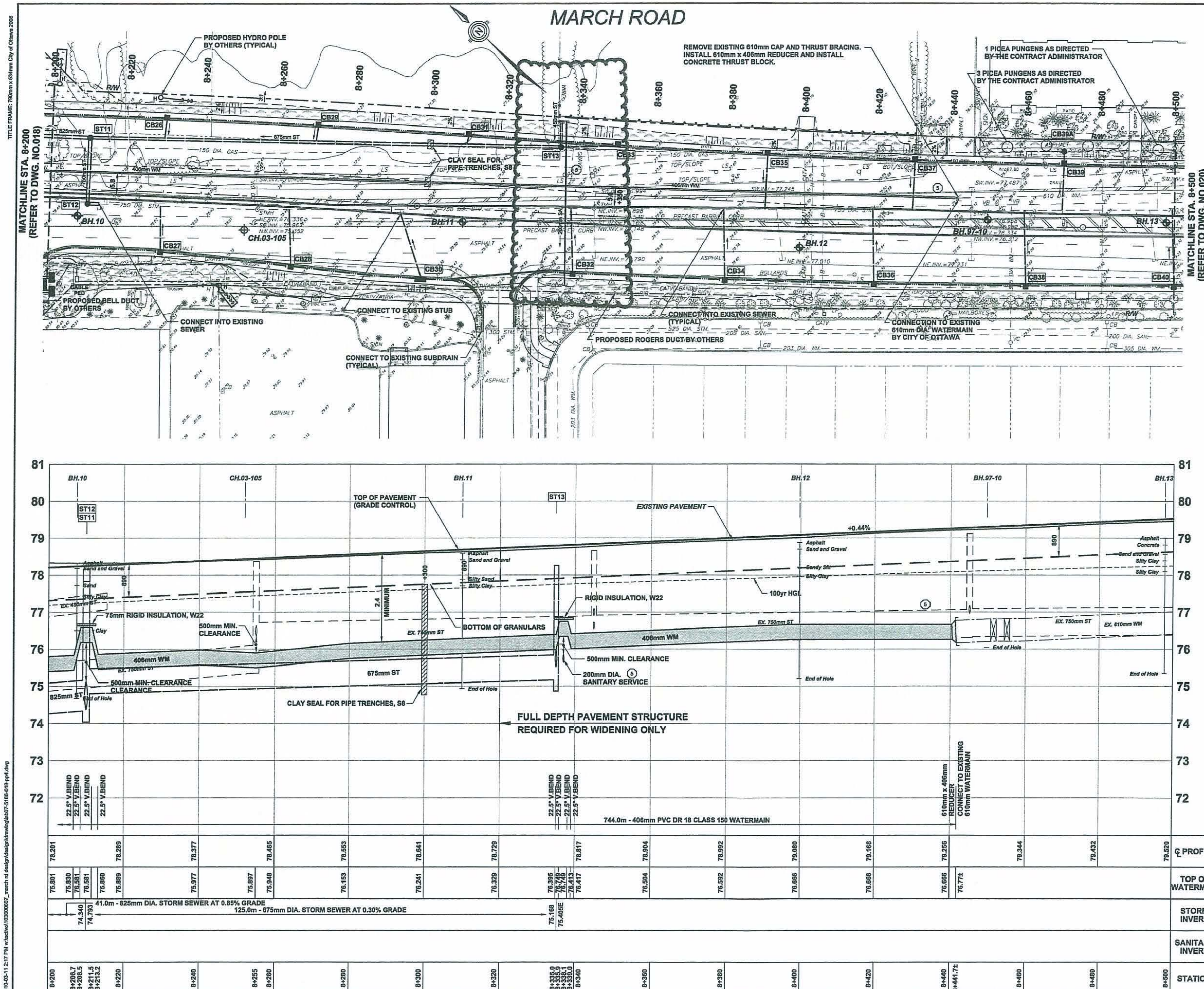
From: "Jakowec, Paul" <Paul.Jakowec@stantec.com>
To: "Mask, Richard" <Richard.Mask@ottawa.ca>
Date: 10/14/2010 2:22 PM
Subject: As-built elevations for 200 dia. Sanitary line

Rick,

The elevations are 75.69m(east side) and 75.40m(west side Sta 8 + 334.4 o/s 2.8 m from e.p). The sanitary was supposed to go further to the west but the contractor did not want to get too close to the bell duct. They were short by 1.0m . As I had mentioned to you in August, the sanitary is lower then the existing sanitary manhole that this line was to be tied into.

Paul

Paul Jakowec
Transportation Technologist
Stantec
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 722-4420
Fx: (613) 722-2799
Paul.Jakowec@stantec.com
stantec.com



MARCH ROAD RECONSTRUCTION
MORGAN'S GRANT WAY TO OLD CARP ROAD

PLAN AND PROFILE
STA. 8+200 TO STA. 8+500

Ottawa

Contract No. ISB07-5166 | Dwg. No. 019

Sheet 19 of 59

Asset No.

Asset Group

B.M. MASON, P.ENG.
Design and Construction (Municipal) - West

L. FOLEY, P.ENG.
Senior Engineer Infrastructure Projects

LICENSED PROFESSIONAL ENGINEER — G. CHOCHLINSKI — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — S. G. D'AOUST — PROVINCE OF ONTARIO

Des. G.C. | Chk'd. S.G.D.
Dwn. G.R.L. | Chk'd. G.C.
Utility Circ. No. | Index No.
Const. Inspector

Scale: HORIZONTAL 1:500 (0m 5 10 20); VERTICAL 1:50 (0m 1 2)

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

Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

REVISIONS No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR MOE/COA	S.G.D.	22/06/2009
2	ISSUED FOR MUNICIPAL CONSENT	S.G.D.	21/08/2009
3	ISSUED FOR TENDER	S.G.D.	25/09/2009
4	ISSUED FOR CONSTRUCTION	S.G.D.	10/11/2009
(5)	REVISED SEWER AND WATERMAIN	G.C.	10/03/2010

NOTE:

1. THE MARCH ROAD SEWER SERVES AS A MAJOR DRAINAGE RELIEF SEWER AND MAY BE SUBJECT TO HIGH HYDRAULIC GRADE LINES (I.e. TO ROADWAY SURFACE). THEREFORE, NO DIRECT SERVICE CONNECTIONS SHOULD BE MADE WITHOUT PROPER ENGINEERING CONSIDERATION. SUMP PUMPS OR SLAB ON GRADE CONSTRUCTION WILL LIKELY BE REQUIRED.

CATCHBASIN & MAINTENANCE HOLE DATA

NO.	STATION	OFFSET (m)	TYPE		ELEVATION	
			Structure	Cover	Grate	Low Inv.
ST11	8+210.0	14.00 LT	1220x1220	SL	77.825	74.340
ST12	8+210.0	3.80 RT	701.012	SL	78.156	74.470
CB26	8+230.0	19.50 LT	705.010	S22/S23	77.748	75.948
CB27	8+230.0	16.11 RT	705.010	S22/S23	77.850	76.050
CB28	8+265.0	18.02 RT	705.010	S22/S23	77.948	76.448
CB29	8+270.0	19.50 LT	705.010	S22/S23	77.924	76.124
CB30	8+300.0	19.00 RT	705.020	S22/S23(2)	78.071	76.521
CB31	8+310.0	19.45 LT	705.010	S22/S23	78.101	76.301
ST13	8+335.0	18.00 LT	701.011	SL	78.254	75.168
CB32	8+340.0	15.25 RT	705.010	S22/S23	78.359	76.559
CB33	8+350.0	18.75 LT	705.010	S22/S23	78.298	76.498
CB34	8+380.0	15.25 RT	705.010	S22/S23	78.535	76.735
CB35	8+390.0	18.00 LT	705.010	S22/S23	78.497	77.250
CB36	8+420.0	15.25 RT	705.010	S22/S23	78.711	76.911
CB37	8+430.0	17.24 LT	705.010	S22/S23	78.696	77.250
CB38	8+460.0	15.25 RT	705.010	S22/S23	78.887	77.087
CB39	8+470.0	16.52 LT	705.010	S22/S23	78.893	77.450
CB39A	8+470.0	20.50 LT	S31	S31	78.680	77.680
CB40	8+500.0	15.25 RT	705.010	S22/S23	79.063	77.263

STORM SEWER DATA

NO. to NO.		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
					Inlet	Outlet
STUB	ST13	450	7	CONC 140D	75.800	75.520
ST13	ST11	675	125	CONC 100D	75.168	74.793
EXIST.	ST12	750	3	CONC 100D	MATCH	74.880
ST12	ST11	750	18	CONC 100D	74.470	74.370
CB26	SEWER	200	5	SDR 35	75.948	75.848 *
CB27	EXIST.	200	13	SDR 35	76.050	75.790 *
CB28	EXIST.	200	15	SDR 35	76.448	76.298
CB29	SEWER	200	4	SDR 35	76.124	76.044 *
CB30	EXIST.	200	18	SDR 35	76.521	76.341
CB31	SEWER	200	3	SDR 35	76.301	76.241 *
CB32	EXIST.	200	17	SDR 35	76.559	76.389
CB33	ST13	200	15	SDR 35	76.498	76.198
CB34	EXIST.	200	19	SDR 35	76.735	76.545
CB35	EXIST.	200	15	SDR 35	77.250	77.100 *
CB36	EXIST.	200	20	SDR 35	76.911	76.511
CB37	EXIST.	200	13	SDR 35	77.250	77.120 *
CB38	EXIST.	200	20	SDR 35	77.087	76.687
CB39	EXIST.	200	12	SDR 35	77.450	77.330 *
CB39A	CB39	250	4	HDPE PERF.	77.680	77.640
CB40	EXIST.	200	20	SDR 35	77.263	76.863

* DENOTES INVERT GIVEN AT TOP OF RISER

(5) SANITARY SEWER DATA

COORDINATES		SIZE (mm)	LENGTH (m)	CLASS	INVERTS	
Inlet	Outlet				Inlet	Outlet
N 5,023,959.300 E 349,394.345	N 5,023,929.583 E 349,361.353	200	45	SDR 35	75.696	75.474

Sanitary Design Sheet

MORGAN'S CREEK

760 MARCH ROAD

CITY OF OTTAWA

MINTO COMMUNITIES INC.

JLR PROJECT NO.: 24566

SANITARY SEWER DESIGN SHEET

Designed: A.T.

Checked By: L.D.

Date: December 19th, 2018

SAN MH #		SEWER DATA					UPSTREAM					DOWNSTREAM				
FROM	TO	DIA. mm	SLOPE %	CAPAC. L/s	VEL. (full) m/s	LENGTH m	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line	Obvert Drop	Obvert	Invert	Cover
1	2	200	0.35	20.24	0.62	87.4	78.57		76.93	76.73	1.64	78.52		76.63	76.42	1.89
2	5	200	0.35	20.24	0.62	22.22	78.52		76.63	76.42	1.89	78.52		76.55	76.35	1.97
3	5	200	0.35	20.24	0.62	87.39	78.41		76.85	76.65	1.56	78.52		76.55	76.35	1.97
5	6	200	0.35	20.24	0.62	35.41	78.52		76.55	76.35	1.97	78.35	0.52	76.43	76.22	1.92
4	6	200	0.35	20.24	0.62	72.57	78.80		76.68	76.48	2.12	78.35	0.52	76.43	76.23	1.92
Omniplex	6	200	0.35	20.24	0.62	4.05	78.30		76.49	76.29	1.81	78.35	0.57	76.48	76.27	1.87
6	stub	200	0.86	31.73	0.98	1.86	78.35		75.91	75.71	2.44	78.30		75.89	75.69	2.41

MARCH ROAD- AS BUILT INFORMATION
Ex. Inv @ INLET (East Blvd) = 75.69
Ex. Inv @ OUTLET (West Blvd) = 75.40
As-built Length 43.18, Slope = 0.67 %
Information taken from Stantec As-Built Plans - March Road Reconstruction
ISB07-5166 - Dwg. No. 19 , Rev 5 (As-built) - March Rd (Sta 8+200 to 8+500)

Residential Flow Allocation		
Number of Units	60	units
Occupancy	2.7	Pers/unit
Flow Allocation	280	L/cap/day
Peaking Factor (Harmon Formula)	3.54	
Total Residential Flow Allocation	1.86	L/s
Infiltration		
Total Area	0.77	ha
I/I Allocation	0.33	L/s/ha
Total Infilitration	0.25	L/s
Total Peak Flow	**2.11**	**L/s**

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR PROJECT NO.: 24566

Commercial/Institutional Flow =	28,000	L/day/ha
q =	280	L/cap/d
i =	0.33	L/s/ha
TOWNS HOUSING	2.7	pers/unit
STACKS HOUSING	2.7	pers/unit
SINGLES HOUSING	3.4	pers/unit
Manning's Coefficient (n) =	0.013	

SANITARY SEWER DESIGN SHEET
Designed: A.T.
Checked By: L.D.
Date: December 2016

LEGEND
DENOTES EXISTING SEWERS

STREET	SAN MH #		RESIDENTIAL									COM/INST			RES+ COM + INFILTR.		SEWER DATA					UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS					CUMULATIVE		PEAKING	POP.		CUM.	COM/INST	PEAK EXTR.	PEAK DES.				VEL.											
	FROM	TO	SINGLES units	STACKS units	TOWNS units	POP. pers	AREA ha	POP. pers	AREA ha	FACTOR	FLOW L/s	AREA ha	AREA L/s	FLOW L/s	FLOW L/s	FLOW L/s	DIA. mm	SLOPE %	CAPAC. L/s	(full) m/s	LENGTH m	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line		Obvert	Invert	Cover
FLOW TO SANITARY - MARCH ROAD/ MERSEY DRIVE																														
Morgan's Creek - Stage 1	Stage 1	6			60	162	0.77	162	0.77	3.54	1.86				0.25	2.11	See JLR 2018 Sanitary Design Sheet													
Commercial Site - 788 March RD	Future Site	6				358	0.66	358	0.66	3.44	3.99		0.00	0.00	0.22	4.20	Detailed Design of Commercial Site located at 788 March Road to be completed in future													
Morgan's Creek Private Rd /March Rd/ Mersey Dr	6	9				0		520	1.43	3.37	5.68		0.00	0.00	0.47	6.15	200	0.67	28.04	0.86	59.01	78.30		75.902	75.702	2.40	78.70		75.506	75.306	3.19
Mersey Drive	9	10				0	0.00	520	1.43	3.37	5.68		0.00	0.00	0.47	6.15	200	0.32	19.36	0.60	60.00	78.70		75.506	75.306	3.19	78.98		75.314	75.114	3.67
Mersey Drive	124	10				4	0.14	4	0.14	3.76	0.05		0.00		0.05	0.09	200	0.55	25.38	0.78	55.00	79.27		75.600	75.400	3.66	78.98		75.297	75.097	3.68
Mersey Drive	10	123				24	0.30	548	1.87	3.36	5.97		0.00	0.00	0.62	6.59	200	0.55	25.38	0.78	41.30	78.98		75.297	75.097	3.68	79.46		75.070	74.870	4.39
Mersey Drive	123	108				32	0.42	580	2.29	3.35	6.30				0.76	7.06	200	0.59	26.28	0.81	109.20	79.46		75.065	74.865	4.40	80.00		74.421	74.221	5.58
Mersey Drive	122	121				24	0.38	24	0.38	3.70	0.29				0.13	0.41	200	3.78	66.52	2.05	63.50	84.45		80.400	80.200	4.05	81.82		78.000	77.800	3.82
Mersey Drive	121	120				24	0.28	48	0.66	3.65	0.57				0.22	0.79	200	2.53	54.43	1.68	68.00	81.82		77.900	77.700	3.92	80.27		76.179	75.979	4.09
Argent Private	3	2		12		32	0.26	32	0.26	3.68	0.39				0.09	0.47	200	0.90	32.46	1.00	52.70	84.25	0.06	81.664	81.464	2.59	84.20		81.189	80.989	3.01
Argent Private	2	1A			16	43	0.33	76	0.59	3.62	0.89				0.19	1.08	200	0.90	32.46	1.00	89.20	84.20	0.60	81.129	80.929	3.07	82.45		80.327	80.127	2.12
Argent Private	3	4		28		76	0.41	76	0.41	3.62	0.89				0.14	1.02	200	0.90	32.46	1.00	69.30	84.25	0.06	80.710	80.510	3.54	82.80		80.086	79.886	2.71
Argent Private	4	1A		20		54	0.28	130	0.69	3.57	1.50				0.23	1.73	200	0.40	21.64	0.67	74.90	82.80		80.026	79.826	2.77	82.45		79.727	79.527	2.72
Argent Private	1A	1				0	0.02	205	1.30	3.52	2.34				0.43	2.77	200	0.90	32.46	1.00	18.50	82.45	0.50	79.727	79.527	2.72	82.45		79.560	79.360	2.89
Commercial Plaza	1	120A				0		205	1.30	3.52	2.34				0.43	2.77	250	0.98	61.42	1.21	44.80	82.45	3.05	79.109	78.860	3.34	80.39		78.670	78.420	1.72
Klondike Rd/ MG Phase 13/ Commercial Plza	Upstream	120A				0		2432	38.86	3.01	23.76	1.69	4.62	2.25	14.35	40.35	300	0.30	55.26								80.39		75.613	75.313	4.78
Klondike Commercial Plaza	120A	120				0		2637	40.16	2.99	25.57		4.62	2.25	14.78	42.59	300	0.97	99.36	1.36	15.80	80.39		75.620	75.313	4.77	80.25		75.467	75.167	4.78
Westmoreland Avenue	120	117				20	0.33	2705	41.15	2.98	26.16		4.62	2.25	15.11	43.51	300	0.42	65.32	0.90	70.60	80.27	0.01	75.467	75.167	4.80	80.40		75.171	74.871	5.23
Whithorn Avenue	116	119				8	0.14	8	0.14	3.74	0.10		0.00	0.00	0.05	0.14	200	2.00	48.39	1.49	8.10	83.34	0.10	79.262	79.062	4.08	83.30		79.100	78.900	4.20
Whithorn Avenue	119	118				24	0.22	32	0.36	3.68	0.38		0.00	0.00	0.12	0.50	200	2.69	56.11	1.73	37.20	83.30	0.30	79.000	78.800	4.30	82.32		78.000	77.800	4.32
Whithorn Avenue	118	117				44	0.50	76	0.86	3.62	0.89		0.00	0.00	0.28	1.18	200	2.21	50.87	1.57	81.10	82.32	0.75	77.700	77.500	4.62	80.40		75.908	75.708	4.49
Westmoreland Avenue	117	110				24	0.31	2805	42.32	2.97	27.03		4.62	2.25	15.49	44.77	300	0.42	65.50	0.90	68.80	80.40	0.03	75.160	74.860	5.24	80.80		74.870	74.570	5.93
Spalding Avenue	111	110				12	0.33	12	0.33	3.73	0.14		0.00	0.00	0.11	0.25	200	1.91	47.29	1.46	46.00	81.25	0.78	76.499	76.300	4.75	80.80		75.620	75.420	5.18
Westmoreland Avenue	110	109				16	0.30	2833	42.95	2.97	27.28		4.62	2.25	15.70	45.22	300	0.36	60.32	0.83	66.30	80.80	0.02	74.840	74.540	5.96	80.80		74.603	74.303	6.20
Mersey Drive	Upstream	109				120	2.01	120	2.01	3.58	1.39		0.00	0.00	0.66	2.05	200	1.00	34.22								81.85		77.200	77.000	4.65
Mersey Drive	109	108				24	0.33	2977	45.29	2.96	28.52		4.62	2.25	16.47	47.24	300	0.46	68.74	0.94	68.70	80.80	0.02	74.580	74.280	6.22	79.90		74.261	73.961	5.64
March Road Easement (West Side)	108	101				0	0.00	3557	47.58	2.90	33.46		4.62	2.25	17.23	52.94	375	0.32	103.89	0.91	12.40	80.00	0.06	74.245	73.870	5.76	80.00		74.205	73.830	5.80
March Road Easement (West Side)	Upstream	101				156	2.01	156	2.01	3.55	1.79		0.00	0.00	0.66	2.46	200	0.58	26.08								80.00		74.384	74.184	5.62
March Road Crossing	101	15A				0	0.00	3557	47.58	2.90	33.46		4.62	2.25	17.23	52.94	375	0.30	100.18	0.88	47.00	80.00	0.02	74.145	73.770	5.85	79.41		74.004	73.629	5.41
Briar Brook Subdvision	15A	8C				0	0.00	3557	47.58	2.90	33.46		4.62	2.25	17.23	52.94	375	0.31	101.84	0.89	63.20	79.41		73.982	73.609	5.43	78.20		73.786	73.411	4.41

Checks

10.73

KLONDIKE COMMERCIAL SITE- AS BUILT INFORMATION	
Ex. Inv @ SAN MH 120 (Westmoreland Ave)	75.167
Ex. Obv @ SAN MH 120 (Westmoreland Ave)	75.472
Information taken from JLR As-Built Plans -Klondike Commercial Site (Morgan's Grant)	
DWG No. 20668-S1, Rev. 18 (As-Built) - Klondike Commercial Site	

MARCH ROAD- AS BUILT INFORMATION
Ex. Inv @ INLET (East Blvd) = 75.69
Ex. Inv @ OUTLET (West Blvd) = 75.40
As-built Length 43.18, Slope = 0.67 %
Information taken from Stantec As-Built Plans - March Road Reconstruction
ISB07-5166 - Dwg. No. 19 , Rev 5 (As-built) - March Rd (Sta 8+200 to 8+500)

MERSEY DRIVE- AS BUILT INFORMATION
Ex. Inv @ MH 124(SW) = 75.40
Ex. Inv @ MH 123 (NW) = 74.87
Information taken from JLR As-Built Plans - Mersey Drive (Morgan's Grant Phase 4)
DWG No. 16087-11 , Rev 8 (As-built) - Mersey Drive (Sta 0+285 to Sta 0+480.9)

Appendix 'D'

Storm Sewer and Stormwater Management Design

Storm Design Sheet

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR PROJECT NO.: 24566

STORM SEWER DESIGN SHEET
1:5 YEAR IDF CURVE

Designed: A.T.
Checked By: L.D.

Date: Dec 2018

5 YEAR IDF CURVE
Manning's Coefficient (n) = 0.013

STREET	MANHOLE NUMBER		AREAS (ha)						1:5 YR PEAK FLOW GENERATION					Q_d/Q_{cap}	SEWER DATA						UPSTREAM				DOWNSTREAM			
	From	To	0.50	0.65	0.70	0.80	0.85	0.90	2.78AR	2.78AR CUMM	Time min	Intens. mm/hr	Peak Flow (l/s)		Dia (mm)	Slope %	Q full (l/s)	V full (m/s)	Length (m)	Flow Time (min)	Pr. Center Line	Obvert	Invert	Cover	Pr. Center Line	Obvert	Invert	Cover
FLOW TO 675mmΦ STORM - MARCH ROAD																												
	CB3	508				0.06			0.13	0.13	10.00	104.19	13.90	3%	450	0.20	133.02	0.81	24.19	0.50	78.20	76.37	75.92	1.83	78.45	76.32	75.87	2.13
Private Road	508	507					0.24		0.57	0.70	10.50	101.64	71.20	16%	450	0.20	133.02	0.81	84.68	1.74	78.45	76.32	75.87	2.13	78.35	76.15	75.70	2.20
Private Road	507	506					0.09		0.21	0.91	12.24	93.69	85.56	19%	450	0.20	133.02	0.81	30.53	0.63	78.35	76.15	75.70	2.20	78.35	76.09	75.64	2.26
March Road	506	Ex. STUB							0.00	0.91	12.87	91.15	83.24	18%	450	1.07	307.67	1.87	3.80	0.03	78.35	76.09	75.64	2.26	78.35	76.05	75.60	2.30
March Road	Ex. STUB	MH 13							0.00	0.91	12.90	91.01	83.12	18%	450	1.07	307.67	1.87	7.00	0.06	78.35	76.05	75.60	2.30	78.25	75.98	75.52	2.28
											12.96																	
			TOTAL AREA (ha)					0.39																				

MARCH ROAD- AS CONSTRUCTED INFORMATION
Ex. ST MH 13 - INV (NE) (East Blvd) = 75.521
Ex. STUB Inv (East Blvd)) = 75.596
As-built Length 7, Slope = 1.07%
Information taken from Stantec As-Built Plans - March Road Reconstruction
ISB07-5166 - Dwg. No. 19 , Rev 5 (As-built) - March Rd (Sta 8+200 to 8+500)

Stantec Design Sheet

LEGEND:

- MH3 — 0.391ha | 0.162ha | C=0.9 | C=0.3 — AREA IDENTIFICATION, AREA HECTARE, RUNOFF COEFFICIENT
- 4 — PROPOSED STORM SEWER, MANHOLE, FLOW DIRECTION AND IDENTIFICATION NUMBER
- DRAINAGE AREA LIMIT
- 170 / STMH — EXISTING STORM SEWER, MANHOLE, FLOW DIRECTION AND IDENTIFICATION NUMBER

Stantec

LICENSED PROFESSIONAL ENGINEER — J. G. D'AOUST — PROVINCE OF ONTARIO

Horizontal: 30m 15 0 10 20 40m

NO.	REVISION	BY	DATE
1	REVISED DRAINAGE AREAS	J.G.L.	12/15/08
2	ISSUED FOR MOE/CCA	S.G.D.	6/22/09

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

MARCH ROAD RECONSTRUCTION
MORGAN'S GRANT WAY TO OLD CARP ROAD

MINOR SYSTEM DRAINAGE PLAN

B.M. MASON, P.ENG.	S. STODDARD, P.ENG.
Design and Construction (Municipal) – West	Senior Engineer Infrastructure Projects
Dsn: G.R.L. Chkd: S.G.D.	Des: S.G.D. Chkd: J.G.L.

Ottawa

CONTRACT NO. 163600607
DWG. NO. DA1
SHEET 1 OF 1
Date: JUNE 2009
Scale: 1:1000

STORM SEWER TO SWM POND

SWM Pond (BY OTHERS)

MH155 — 0.830ha — C=0.8

ST14 — 0.312ha | 0.104ha | C=0.9 | C=0.3

MH158 — 0.195ha | 0.040ha | C=0.9 | C=0.3

MH160 — 0.158ha | 0.060ha | C=0.9 | C=0.3

MH165 — 0.154ha | 0.044ha | C=0.9 | C=0.3

MH1 — 0.519ha | 0.197ha | C=0.9 | C=0.3

MH2 — 0.318ha | 0.133ha | C=0.9 | C=0.3

MH3 — 0.251ha | 0.142ha | C=0.9 | C=0.3

MH155 — 0.748ha | 0.183ha | C=0.9 | C=0.3

MH155 — 0.740ha | C=0.6

MATCHLINE 'A'

OLD CARP ROAD

Morgan's Grant Pond

BRECKENRIDGE CRESCENT

WOODCHASE STREET

MH154 — 0.108ha | 4.620ha | C=0.2 | C=0.6

MH154 — 0.141ha | C=0.7

WEATHERSTON STREET

KLONDIKE ROAD

CONNECT EXISTING KLONDIKE ROAD 750mm DIA. STORM SEWER

MH154 — 0.480ha | C=0.65

BRECKENRIDGE CRESCENT

FLAMBOROUGH WAY

MH155 — 0.690ha — C=0.8

MH170 — 0.305ha | 0.059ha | C=0.9 | C=0.3

MH175 — 0.345ha | 0.168ha | C=0.9 | C=0.3

MH181 — 0.345ha | 0.168ha | C=0.9 | C=0.3

MH155 — 0.197ha | 0.007ha | C=0.9 | C=0.3

MH191 — 0.374ha | 0.060ha | C=0.9 | C=0.3

MARCH ROAD

MH196 — 0.303ha | 0.100ha | C=0.9 | C=0.3

MH200 — 0.313ha | 0.060ha | C=0.9 | C=0.3

SHIRLEY'S BROOK DRIVE

TERRY FOX DRIVE

STORM SEWER DESIGN WORKSHEET - MINOR FLOW ANALYSIS

LOCATION			AREAS (ha)				INDIV.	ACCUM.	TIME	RAIN-	PEAK	SEWER DATA							
STREET	FROM	TO	R=0.60	R=0.30	R=0.80	R=0.90	2.78 AR	2.78 AR	OF CONC.	FALL INT. I	FLOW Q (L/s)	TYPE OF PIPE	NOM. DIA. (mm)	SLOPE (%)	LENGTH (m)	FULL CAP. (L/s)	CAP. VEL. (m/s)	TIME OF FLOW (min)	Q/Qcap
MARCH ROAD																			
Existing Storm Sewer - Area 9A	200	196		0.060		0.313	0.83	0.83	10.0	122.1	102	Conc.	375	1.00	80	183	1.60	0.8	0.56
Existing Storm Sewer - Area 9	196	191		0.100		0.303	0.84	1.67	10.8	117.2	196	Conc.	450	1.10	105	312	1.90	0.9	0.63
Existing Storm Sewer - Area 8	191	185		0.060		0.374	0.99	2.66	11.8	112.2	299	Conc.	450	1.10	78	312	1.90	0.7	0.96
Existing Storm Sewer - Area 7	185	181		0.007		0.197	0.50	3.16	12.4	108.8	344	Conc.	675	0.16	107	351	0.95	1.9	0.98
Existing Storm Sewer - Area 6	181	175		0.188		0.325	0.97	4.13	14.3	100.5	415	Conc.	675	0.25	110	438	1.19	1.5	0.95
Existing Storm Sewer - Area 5	175	170		0.050		0.310	0.82	4.95	15.9	94.7	468	Conc.	750	0.16	100	465	1.02	1.6	1.01
Existing Storm Sewer - Area 4	170	165		0.059		0.305	0.81	5.76	17.5	89.3	514	Conc.	750	0.18	100	493	1.08	1.5	1.04
Existing Storm Sewer - Area 3	165	160		0.044		0.154	0.42	6.18	19.0	84.8	524	Conc.	750	0.21	90	532	1.17	1.3	0.98
Existing Storm Sewer - Area 2	160	157		0.060		0.158	0.44	6.62	20.3	81.4	539	Conc.	750	0.95	45	1132	2.48	0.3	0.48
	157	158					0.00	6.62	20.6	80.6	534	Conc.	750	0.50	20	821	1.80	0.2	0.65
Properties east of Klondike-March intersection (5-year)	ST14	158			1.520		3.38	3.38	10.0	104.2	352								
NE half of March Rd (10-yr)	ST14	158		0.104		0.312	0.87	0.87	10.0	122.1	106								
Total to ST14	ST14	158								Total	458	Conc.	675	0.30	125	480	1.30	1.6	0.95
	158	155		0.040		0.195	0.52	8.01	20.8	80.2	995	Conc.	825	0.85	60	1381	2.50	0.4	0.72
KLONDIKE ROAD (minor contribution from 750mm from MG)	1314	154				Controlled discharge from JLR design (w/ ICDs)					367		750	0.20	71	519	1.14	1.0	0.71
	154	156									367		750	1.30	45	1324	2.90	0.3	0.28
KLONDIKE ROAD (Major contribution from DICB at Intersection)	2 DICB	156a		Flow split between 4 leads determined using solvermatching U/S HGLs								2 Leads	610	1.25	6	748	2.48	0.0	0.00
	2 DICB	156a										2 Leads	525	4.50	6	952	4.26	0.0	0.00
										Total	0								
	156a	156									0	Conc.	1500	0.70	23	6170	3.38	0.1	0.00
	156	155									367	Conc.	1650	0.70	42	7955	3.60	0.2	0.05
	155	4	0.74	0.189		0.448	2.51	10.53	21.2	79.2	1,553	Conc.	1800	0.15	136	4644	1.77	1.3	0.33
MARCH ROAD (North of Klondike)	1	2		0.197		0.519	1.46	1.46	10.0	122.1	179	Conc.	450	0.46	110	202	1.23	1.5	0.89
	2	3		0.133		0.318	0.91	2.37	11.5	113.6	269	Conc.	525	0.40	97	284	1.27	1.3	0.95
	3	4		0.142		0.231	0.70	3.07	12.8	107.3	329	Conc.	600	0.75	78	555	1.90	0.7	0.59
MARCH Rd SAG Station 8+050 - (Major from March southbound)		DICB																	
MARCH Rd SAG Station 8+050 - (Major from 0.8 ha property on corner)		DICB																	
MARCH Rd SAG Station 8+050 - (carry over from intersection)		DICB																	
Sum of Above (to DICB)	2 DICB	4									0	twin leads	525	1.75	33	594	2.66	0.2	0.00
Storm Sewer to Diversion Chamber	4	STMH211					0.00	13.59	22.5	76.3	1,756	Conc.	1950	0.15	22	5749	1.87	0.2	0.31
To Pond (neglecting 900mm normal flow pipe to forebay)	STMH211	Pond									1,756	Conc.	1800	0.44	16	7954	3.03	0.1	0.22

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity in millimeters per hour (mm/h)
R = Runoff Coefficient

Notes:
1) 10 yr storm design
2) Accommodates future road widening
3) Mannings n=0.013
n=0.011 PVC
4) 100yr CB Capture = 100% of 10-yr

Designed MT

Checked: SGD

Dwg. Reference:

PROJECT: MARCH ROAD RECONSTRUCTION
Solandt Road to Old Carp Road

LOCATION:
TERRY FOX DRIVE to OLD CARP ROAD

File Ref.: 1636-00607/300 | Date: 09-Jul-09 | Sheet No.:

STORM SEWER DESIGN WORKSHEET - MINOR FLOW ANALYSIS

LOCATION			AREAS (ha)				INDIV.	ACCUM.	TIME OF	RAIN-FALL	PEAK FLOW	SEWER DATA									SEWER DATA						
												TYPE	NOM.	ACT.	SLOPE	LENGTH	FULL CAP.	CAP. VEL.	TIME OF	Q/Qcap	MH ELEVATION		INVERT		OBVERT		CO\
STREET	FROM	TO	R=0.60	R=0.30	R=0.80	R=0.90	2.78 AR	2.78 AR	CONC.	I	Q (L/s)	OF PIPE	DIA. (mm)	DIA. (m)	(%)	(m)	(L/s)	(m/s)	FLOW (min)		U/S (m)	D/S (m)	U/S (m)	D/S (m)	U/S (m)	D/S (m)	U/S (m)
MARCH ROAD																											
Existing Storm Sewer - Area 9A	200	196		0.060		0.313	0.83	0.83	10.0	122.1	122	Conc.	375	0.381	1.00	80	183	1.60	0.8	0.67	83.4	82.541	81.000	80.200	81.381	80.581	2.019
Existing Storm Sewer - Area 9	196	191		0.100		0.303	0.84	1.67	10.8	117.2	236	Conc.	450	0.457	1.10	105	312	1.90	0.9	0.76	82.541	81.2	80.130	78.970	80.587	79.427	1.954
Existing Storm Sewer - Area 8	191	185		0.060		0.374	0.99	2.66	11.8	112.2	358	Conc.	450	0.457	1.10	78	312	1.90	0.7	1.15	81.2	80.7	78.690	77.840	79.147	78.297	2.053
Existing Storm Sewer - Area 7	185	181		0.007		0.197	0.50	3.16	12.4	108.8	413	Conc.	675	0.686	0.16	107	351	0.95	1.9	1.18	80.700	80.100	77.000	76.830	77.686	77.516	3.014
Existing Storm Sewer - Area 6	181	175		0.188		0.325	0.97	4.13	14.3	100.5	498	Conc.	675	0.686	0.25	110	438	1.19	1.5	1.14	80.100	79.616	76.830	76.550	77.516	77.236	2.584
Existing Storm Sewer - Area 5	175	170		0.050		0.310	0.82	4.95	15.9	94.7	562	Conc.	750	0.762	0.16	100	465	1.02	1.6	1.21	79.616	79.141	76.480	76.320	77.242	77.082	2.374
Existing Storm Sewer - Area 4	170	165		0.059		0.305	0.81	5.76	17.5	89.3	617	Conc.	750	0.762	0.18	100	493	1.08	1.5	1.25	79.141	78.688	76.320	76.140	77.082	76.902	2.059
Existing Storm Sewer - Area 3	165	160		0.044		0.154	0.42	6.18	19.0	84.8	629	Conc.	750	0.762	0.21	90	532	1.17	1.3	1.18	78.688	78.420	76.140	75.950	76.902	76.712	1.786
Existing Storm Sewer - Area 2	160	157		0.060		0.158	0.44	6.62	20.3	81.4	647	Conc.	750	0.762	0.95	45	1132	2.48	0.3	0.57	78.420	78.360	75.350	74.923	76.112	75.685	2.308
	157	158					0.00	6.62	20.6	80.6	641	Conc.	750	0.762	0.50	20	821	1.80	0.2	0.78	78.420	78.360	74.850	74.750	75.612	75.512	2.808
Properties east of Klondike-March intersection (5-year)	ST14	158			1.520		3.38	3.38	10.0	104.2	352																
NE half of March Rd (10-yr)	ST14	158		0.104		0.312	0.87	0.87	10.0	122.1	127																
Total to ST14	ST14	158								Total	479	Conc.	675	0.686	0.30	125	480	1.30	1.6	1.00	78.254	77.825	75.168	74.793	75.854	75.479	2.400
	158	155		0.040		0.195	0.52	8.01	20.8	80.2	1,123	Conc.	825	0.838	0.85	60	1381	2.50	0.4	0.81	78.200	78.400	74.641	74.131	75.479	74.969	2.721
KLONDIKE ROAD (minor contribution from 750mm from MG)	1314	154				1:100-yr discharge from JLR design (w/ ICDs)					367		750	0.762	0.20	71	519	1.14	1.0	0.71	80.350	78.600	76.693	76.551	77.455	77.313	2.895
	154	156									367		750	0.762	1.30	45	1324	2.90	0.3	0.28	78.600	78.200	76.000	75.415	76.762	76.177	1.838
KLONDIKE ROAD (Major contribution from DICB at Intersection)	2 DICB	156a		Flow split between 4 leads determined using solvermatching U/S HGLs							2,005	2 Leads	610	0.620	1.25	3	748	2.48	0.0	0.89	77.500	78.200	75.950	75.913	76.570	76.532	0.930
											0																
	2 DICB	156a									1,375	2 Leads	525	0.533	4.50	4	952	4.26	0.0	0.72	77.500	78.200	76.000	75.820	76.533	76.353	0.967
										Total	3,380																
	156a	156									3,380	Conc.	1500	1.524	0.70	23	6170	3.38	0.1	0.55	78.200	78.400	74.231	74.070	75.755	75.594	2.445
	156	155									3,747	Conc.	1650	1.676	0.70	42	7955	3.60	0.2	0.47	78.200	78.400	73.857	73.563	75.534	75.240	2.666
	155	4	0.74	0.189		0.448	2.51	10.53	21.2	79.2	5,100	Conc.	1800	1.829	0.15	136	4644	1.77	1.3	1.10	78.360	78.633	73.411	73.207	75.240	75.036	3.120
MARCH ROAD (North of Klondike)	1	2		0.197		0.519	1.46	1.46	10.0	122.1	214	Conc.	450	0.457	0.46	110	202	1.23	1.5	1.06	78.530	78.060	75.870	75.364	76.327	75.821	2.203
	2	3		0.133		0.318	0.91	2.37	11.5	113.6	323	Conc.	525	0.533	0.40	97	284	1.27	1.3	1.14	78.060	77.430	75.288	74.900	75.821	75.433	2.239
	3	4		0.142		0.231	0.70	3.07	12.8	107.3	395	Conc.	600	0.610	0.75	78	555	1.90	0.7	0.71	77.430	77.230	74.385	73.800	74.995	74.410	2.435
MARCH Rd SAG Station 8+050 - (Major from March southbound)		DICB									207																
MARCH Rd SAG Station 8+050 - (Major from 0.8 ha property on corner)		DICB									181																
MARCH Rd SAG Station 8+050 - (carry over from intersection)		DICB									780																
Sum of Above (to DICB)	2 DICB	4									1,168	twin leads	525	0.533	1.75	33	594	2.66	0.2	0.98	77.000	78.633	75.563	74.986	76.096	75.519	0.904
Storm Sewer to Diversion Chamber	4	STMH211					0.00	13.59	22.5	76.3	6,512	Conc.	1950	1.981	0.15	22	5749	1.87	0.2	1.13	78.633		73.133	73.100	75.114	75.081	3.519
To Pond (neglecting 900mm normal flow pipe to forebay)	STMH211	Pond									6,512	Conc.	1800	1.829	0.44	16	7954	3.03	0.1	0.82	78.633		73.070	73.000	74.899	74.829	3.734

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity in millimeters per hour (mm/h)
R = Runoff Coefficient

Notes:
1) **10** yr storm design
2) Accommodates future road widening
3) Mannings n=0.013
n=0.011 PVC
4) 100yr CB Capture = **120%** of 10-yr

Designed MT

Checked: SGD

Dwg. Reference:

PROJECT: MARCH ROAD RECONSTRUCTION
Solandt Road to Old Carp Road

LOCATION: TERRY FOX DRIVE to OLD CARP ROAD

File Ref.: 1636-00607/300 Date: 09-Jul-09 Sheet No.:

STORM SEWER DESIGN WORKSHEET - MINOR FLOW ANALYSIS

LOCATION			/ER D/S	HYDRAULIC GRADE LINE ANALYSIS												
STREET	FROM	TO	(m)	R_h	A (m^2)	V (m/s)	$V^2/2g$ (m)	f'	H_f (m)	K Exit	K Entrance	Kbend Benched	K Losses (m)	Total HL (m)	U/S HGL (m)	U/S HGL FREEBOARD (HGL-T/G)(m)
MARCH ROAD																
Existing Storm Sewer - Area 9A	200	196	1.960	0.095	0.114	1.07	0.058	0.0290	0.357				0.000	0.357	80.68	2.72
Existing Storm Sewer - Area 9	196	191	1.773	0.114	0.164	1.43	0.105	0.0273	0.658				0.000	0.658	80.02	2.52
Existing Storm Sewer - Area 8	191	185	2.403	0.114	0.164	2.18	0.243	0.0273	1.132				0.000	1.132	78.89	2.31
Existing Storm Sewer - Area 7	185	181	2.584	0.171	0.369	1.12	0.064	0.0239	0.237				0.000	0.237	78.65	2.05
Existing Storm Sewer - Area 6	181	175	2.380	0.171	0.369	1.35	0.093	0.0239	0.355				0.000	0.355	78.41	1.69
Existing Storm Sewer - Area 5	175	170	2.059	0.191	0.456	1.23	0.077	0.0231	0.234				0.000	0.234	78.06	1.56
Existing Storm Sewer - Area 4	170	165	1.786	0.191	0.456	1.35	0.093	0.0231	0.282				0.000	0.282	77.82	1.32
Existing Storm Sewer - Area 3	165	160	1.708	0.191	0.456	1.38	0.097	0.0231	0.264				0.000	0.264	77.54	1.15
Existing Storm Sewer - Area 2	160	157	2.676	0.191	0.456	1.42	0.103	0.0231	0.140				0.000	0.140	77.28	1.14
	157	158	2.848	0.191	0.456	1.41	0.101	0.0231	0.061				0.000	0.061	77.14	1.28
Properties east of Klondike-March intersection (5-year)	ST14	158														
NE half of March Rd (10-yr)	ST14	158														
Total to ST14	ST14	158	2.346	0.171	0.369	1.30	0.086	0.0239	0.373	0.5		0.3	0.069	0.442	77.52	0.73
	158	155	3.431	0.210	0.552	2.04	0.211	0.0223	0.338	0.5			0.106	0.443	77.08	1.12
KLONDIKE ROAD (minor contribution from 750mm from MG)	1314	154	1.287	0.191	0.456	0.80	0.033	0.0231	0.071				0.000	0.071	76.95	3.40
	154	156	2.023	0.191	0.456	0.80	0.033	0.0231	0.045	0.5			0.017	0.061	76.88	1.72
KLONDIKE ROAD (Major contribution from DICB at Intersection)	2 DICB	156a	1.668	0.155	0.302	3.32	0.563	0.0177	0.048	1.0	0.5		0.844	0.892	77.90	-0.40
								check 77.90 + 0.111 grate losses <= to 78.05 m which is elevation to keep 1 lane of March Rd. free - OK							
	2 DICB	156a	1.847	0.133	0.223	3.08	0.483	0.0186	0.067	1.0	0.5		0.724	0.791	77.80	-0.30
								check 77.80 + 0.212 grate losses <= to 78.05 m which is elevation to keep 1 lane of March Rd. free - OK							
	156a	156	2.806	0.381	1.824	1.85	0.175	0.0183	0.048	0.5		0.3	0.140	0.188	77.01	1.19
	156	155	3.160	0.419	2.207	1.70	0.147	0.0177	0.065	0.5		0.3	0.118	0.183	76.82	1.38
	155	4	3.597	0.457	2.627	1.94	0.192	0.0172	0.246	0.5		0.3	0.154	0.400	76.63	1.73
MARCH ROAD (North of Klondike)	1	2	2.239	0.114	0.164	1.31	0.087	0.0273	0.572				0.000	0.572	77.68	0.85
	2	3	1.997	0.133	0.223	1.45	0.106	0.0260	0.503				0.000	0.503	77.11	0.95
	3	4	2.820	0.152	0.292	1.35	0.093	0.0248	0.296	0.5		0.3	0.075	0.371	76.61	0.82
MARCH Rd SAG Station 8+050 - (Major from March southbound)		DICB														
MARCH Rd SAG Station 8+050 - (Major from 0.8 ha property on corner)		DICB														
MARCH Rd SAG Station 8+050 - (carry over from intersection)		DICB														
Sum of Above (to DICB)	2 DICB	4	3.114	0.133	0.223	2.61	0.348	0.0260	0.559	0.5	0.5		0.348	0.907	77.14	-0.14
								check 77.14 + 0.038 grate losses <= to 77.50 m which is elevation to keep 1 lane of March Rd free - OK							
Storm Sewer to Diversion Chamber	4	STMH211		0.495	3.083	2.11	0.227	0.0168	0.042	0.3			0.068	0.111	76.23	2.40
To Pond (neglecting 900mm normal flow pipe to forebay)	STMH211	Pond		0.457	2.627	2.48	0.313	0.0172	0.047	1.0	0.3		0.407	0.454	76.12	2.51
								100 year water level in proposed Shirley's Brook pond (Option 4)						75.67	DME April 15, 2009	

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity in millimeters per hour (mm/h)
R = Runoff Coefficient

$$h_L = f\frac{L}{d}\frac{V^2}{2g} \qquad f' = \frac{8g}{c^2} \qquad c = \frac{1}{n}R_h^{1/6}$$

IBI Group, Storm Sewer Design Sheet

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

STORM SEWER DESIGN SHEET

PROJECT: Briar Ridge Phase 2 - Sandhill Road
LOCATION: City of Ottawa
CLIENT: Tenth Line Development Inc.

LOCATION			AREA (Ha)								RATIONAL DESIGN FLOW					LEVEL OF SERVICE				ICD RESTRICTED FLOW							SEWER DATA						
STREET	FROM MH	TO MH	C= 0.20	C= 0.30	C= 0.45	C= 0.50	C= 0.60	C= 0.65	INDIV. 2.78AC	ACCUM. 2.78AC	INLET (min.)	TIME IN PIPE	TOTAL (min.)	I (mm/Hr)	PEAK FLOW (L/s)	AREA (ha) INDIV.	AREA (ha) ACCUM.	FLOW (L/s) INDIV.	FLOW (L/s) ACCUM.	INLET (L/s) 6.0	8.0	10.0	14.0	21.0	INDIV. FLOW (L/s)	ACCUM. FLOW (L/s)	CAP. (L/s)	LENGTH (M)	PIPE (mm)	SLOPE (%)	VEL. (M/s)	AVAIL. CAP. (L/s)	AVAIL. CAP. (%)
OUTLET TO KLONDIKE ROAD																																
External Area	STUB	302			7.18				8.98	8.98	15.00	0.08	15.08	83.56	**750.34**	7.18	7.18	610.30	**610.30**					25	525.00	**525.00**	**831.87**	11.0	675	0.90	2.252	81.52	9.80%
Sandhill Road	302	301					0.30		0.50	9.48	15.08	0.74	15.83	83.30	**789.65**	0.30	7.48	25.50	**635.80**					4	84.00	**609.00**	**831.87**	100.5	675	0.90	2.252	42.22	5.07%
Sandhill Road	301	*Ex. 159*					0.17		0.28	9.76	15.83	0.49	16.32	81.27	**793.18**	0.17	7.65	14.45	**650.25**					2	42.00	**651.00**	**831.87**	66.7	675	0.90	2.252	38.68	4.65%
Klondike Road *	*Ex. 159*	*Ex. 158*				5.09		0.48	7.94	17.70	*20.67*	0.72	21.39	66.53	**1,177.66**												**1,197.97**	*94.0*	*825*	*0.64*	2.171	20.31	1.70%
OUTLET TO SANDHILL ROAD																																
Sandhill Road **	*Ex. 10*	*Ex. 9*			0.91		0.17		1.42	1.42	*22.84*	1.45	24.29	61.54	**87.38**												**175.99**	*93.0*	*450*	*0.35*	1.072	88.61	50.35%

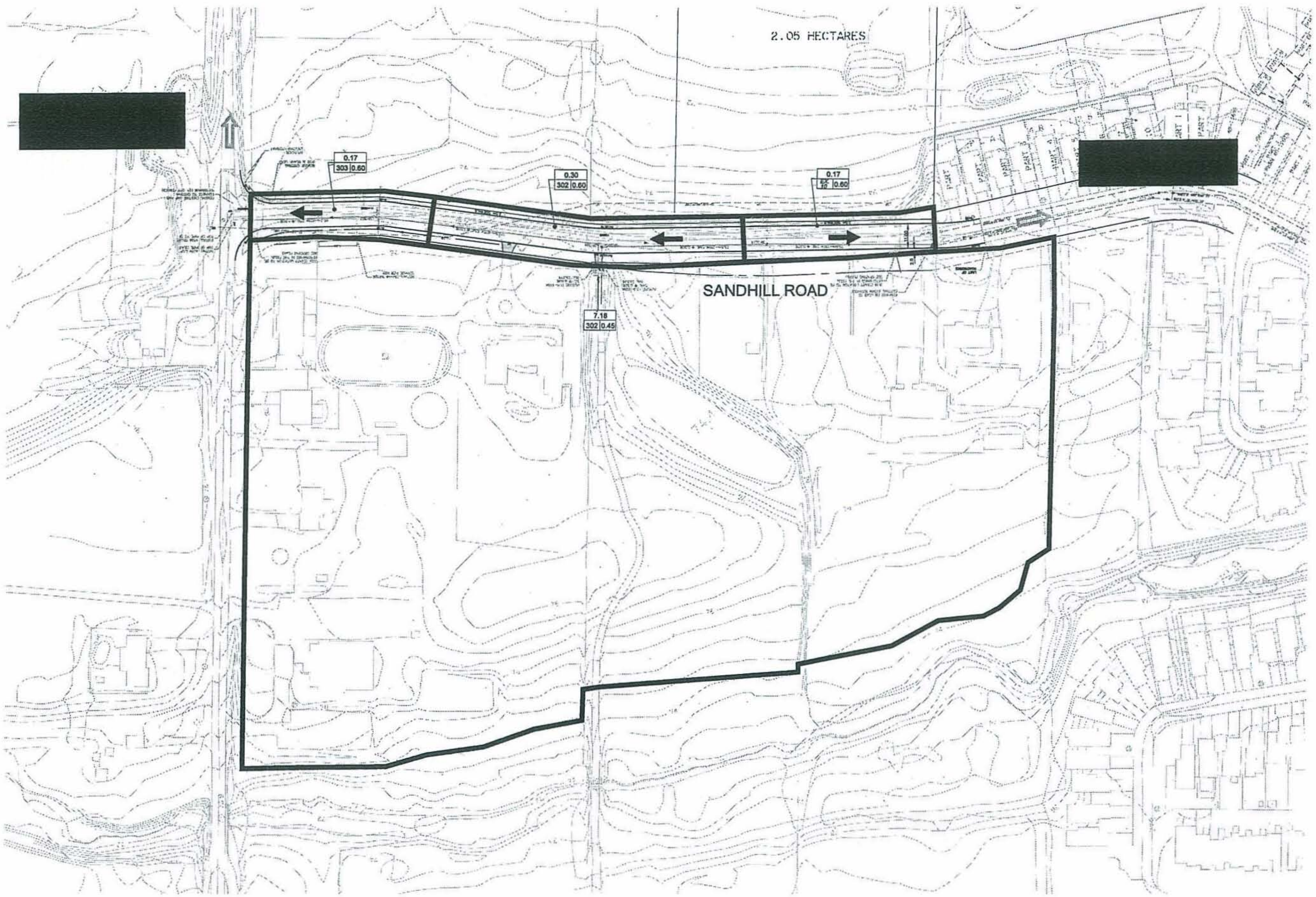
* *Refer to Storm Sewer Design Sheet, SWM Facility 'C' - Klondike Road, May 18, 2007 by Novatech Engineering Consultants Ltd.*

** *Refer to Storm Sewer Design Sheet, Briarbrook Subdivision Blocks 4 and 5, March 1993 by CCL*

Designed: LME			Q = 2.78AIC, where:	Level of Service= 85.00 L/s/Ha
Checked:			Q = Peak Flow in Litres per Second (l/s) A = Area in Hectares (ha.) I = Rainfall Intensity in Millimeters per Hour (mm/hr) [I=998.071/((TC+6.053)^0.814]	
	Revision	Date		
Dwg. Reference: 10518-500-1	**File Ref:** 10518- 5.7	**Date:** 2009-03-09	**Sheet No:** 1 of 1	

Assumed CB Head= 1.5 m [1:5 yr]

Mannings Coefficient (n) = 0.013



LEGEND:

0.30 — AREA IN HECTARES
302 | 0.60 — "C" COEFFICIENT
— RECEIVING MANHOLE

MAJOR SYSTEM ROUTE

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR APPROVAL		08:03:04

TENTH LINE DEVELOPMENT INC.

IBI GROUP
1770 Woodward Drive
Suite 100
Ottawa, Ontario
Canada K2C 0P8
Tel (613)225-1311
FAX (613)225-9868

Project Title

BRIAR RIDGE
PHASE 2

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
PROVINCE OF ONTARIO

N

Drawing Title

STORM DRAINAGE
AREA PLAN
SANDHILL ROAD

Scale 1:1000

Design L.M.E.	Date MARCH '09
Drawn M.M.	Checked R.W.W.
Project No. 10518	Drawing No. 500-1

PCSWMM Parameters

MODEL REPORT – APPENDIX D
PCSWMM PARAMETER DESCRIPTIONS

MINTO COMMUNITIES INC.
MORGAN'S CREEK STAGE 1
762 MARCH ROAD

E1.0 SUBCATCHMENTS

Parameter	Units	Description
Name	-	The name of the subcatchments are based on their outlets and have the suffix _SUB.
Tag	-	Tags have not been incorporated.
Rain Gauge	-	The storm type selected for the model run. The following storm files are used: **Distribution** — **Return Period** 3 hour Chicago — 1:100
Outlet	-	The downstream major system node to which the subcatchment drains.
Area	ha	The area is calculated internally by PCSWMM.
Width / Flow Length	m	Width is calculated to be approximately twice the lot segment length.
Slope	%	A representative value of 2% is used for all subcatchments based on crossfalls and average grading.
Imperv	%	The percentage of impervious area is determined based on the runoff coefficient (C-Factor), which was calculated using the layout of proposed development and the percentage area of impervious and pervious surfaces.
N Imperv	-	A constant of 0.013 is selected as the Manning's N for impervious surfaces such as roads, sidewalk and parking areas. The value is representative of smooth impervious surface as per Table 3-5 of the EPA Storm Water Management Model Reference Manual Vol I – Hydrology (EPA, 2016).

Parameter	Units	Description
N Perv	-	A constant of 0.25 is selected as the Manning's N for pervious areas. The value is representative of light to tense turf land cover as per Table 3-5 of the EPA Storm Water Management Model Reference Manual Vol I – Hydrology (EPA, 2016).
DStore Imperv	mm	A constant of 1.57 mm is used as the impervious depression storage as per the City of Ottawa Sewer Design Guidelines 2012 Section 5.4.5.4.
DStore Perv	mm	A constant of 4.67 mm is used as the pervious depression storage as per the City of Ottawa Sewer Design Guidelines 2012 Section 5.4.5.4.
Zero Imperv	%	Determines areas where it is considered that there is no depression storage. Not applied in this model.
Subarea Routing	-	The constant 'IMPERVIOUS' is entered to simulate the subarea of impervious surface, such as the rear part of roofs, which may flow over pervious areas prior to discharging to the outlet of the subcatchment.
Percent Routed	%	The percentage of impervious catchment area within each subcatchment that is routed across the pervious area.
Drying Time	days	The time for a fully saturated soil to completely dry is set at 7 days although the parameter is not used in the analysis.
Horton Infiltration Parameters	-	The Horton approach is used to simulate infiltration losses. As per recommendation of the Ottawa Sewer Design Guidelines F_o=76.2mm, F_c=13.2 mm/hr and K of 4.14 1/hr are used.

The parameters Curb Length, Snow Pack, LID Controls, Groundwater and Erosion are not used in the model.

E2.0 LINK ELEMENTS

E2.1 Conduits

Parameter	Units	Description
Name	-	Minor system conduits (storm sewer pipes) are named after the storm sewer reach between two maintenance hole structures (ex., MH133-MH110);
Inlet Node	-	Upstream node of the link element.

<table>
<tr><th>Parameter</th><th>Units</th><th>Description</th></tr>
<tr><td>Outlet Node</td><td>-</td><td>Downstream node of the link element.</td></tr>
<tr><td>Tag</td><td>-</td><td>Conduits are tagged based on the type of flow system (minor or major system flow), and on flow routing criteria (i.e., street, storm sewer, etc.).
<table>
<tr><th>Conduit Type</th><th>Flow Routing</th><th>Tag</th></tr>
<tr><td>Storm Sewer</td><td>Pipe Flow</td><td>Storm_Sewer/Existing_Storm</td></tr>
<tr><td>CB Lead</td><td>Pipe Flow</td><td>CB_Lead</td></tr>
</table></td></tr>
<tr><td>Length</td><td>m</td><td>Length is auto-calculated in PCSWMM.</td></tr>
<tr><td>Roughness</td><td>-</td><td>The roughness coefficient of 0.013 is used for all minor system conduits Where the conduit is part of the major system the roughness is contained within the transect and this value is not read by the model.</td></tr>
<tr><td>Inlet Elevation</td><td>m</td><td>Elevation of conduit invert at the inlet.</td></tr>
<tr><td>Outlet Elevation</td><td>m</td><td>Elevation of conduit invert at the outlet.</td></tr>
<tr><td>Initial Flow</td><td>m³/s</td><td>No initial flows are applied to conduits in the model.</td></tr>
<tr><td>Flow Limit</td><td>m³/s</td><td>No flow limits are applied in the model</td></tr>
<tr><td>Entry Loss Coeff.</td><td>-</td><td>No entrance losses are applied to conduits representing pipes;</td></tr>
<tr><td>Exit Loss Coeff.</td><td>-</td><td>For the minor system the exit loss coefficient is based on the angle of change in flow direction at the upstream manhole as per the values below (read from City of Ottawa Sewer Design Guidelines Appendix 6-B). Exit losses to a large receiving water body are set as 1. No losses are applied to the major system.
<table>
<tr><th>Angle °</th><th>Loss Coeff.</th></tr>
<tr><td>0</td><td>0.020</td></tr>
<tr><td>10</td><td>0.045</td></tr>
<tr><td>15</td><td>0.150</td></tr>
<tr><td>20</td><td>0.118</td></tr>
<tr><td>30</td><td>0.210</td></tr>
<tr><td>40</td><td>0.325</td></tr>
<tr><td>50</td><td>0.460</td></tr>
<tr><td>60</td><td>0.635</td></tr>
<tr><td>70</td><td>0.840</td></tr>
<tr><td>80</td><td>1.065</td></tr>
<tr><td>90</td><td>1.320</td></tr>
</table></td></tr>
<tr><td>Average Loss Coeff.</td><td>-</td><td>The average loss coefficient is not used in this model.</td></tr>
<tr><td>Seepage Rate</td><td>mm/hr</td><td>There is no seepage applied to conduits in this model.</td></tr>
</table>

Parameter	Units	Description
Flap Gate	-	No flap gates are applied to the model conduits.
Cross Section	-	Minor system conduits have the cross section as per the City of Ottawa Sewer Design Guideline (OSDG) for the pipe sizes and shapes for concrete pipes.
Geometry	m	The geometry of the conduit for cross sections other than irregular. For minor systems the single value is the pipe diameter.
Barrels	-	The number of identical sewers within the conduit, usually 1.
Transect	-	Not used in this model.
Shape Curve	-	Not used in this model
Culvert Code	-	Not used in this model

E2.2 Orifices

Parameter	Units	Description / Values
Name	-	An Orifice is used to model the Inlet Control Device placed in MH 506, Named ICD
Inlet Node	-	Upstream node of the orifice link.
Outlet Node	-	Downstream node of the orifice link.
Tag	-	The orifice is tagged "Inlet_Control_Device".
Type	-	Orifice in the Model is a side orifices
Cross Section	-	The orifices used to simulate the ICD has a circular cross section.
Height	m	The ICD orifice has a height of 0.12m, set to achieve the allowable release rate.
Width	m	All circular orifices have a width of 0.
Inlet Elevation	m	The inlet invert elevations are set based the inlet of elevation of the upstream node/junctions.

Parameter	Units	Description / Values
Discharge Coefficient	-	The discharge coefficient is set to 0.61.
Flap Gate	-	Flap gate was not used for the orifice links.
Time to Open/Close	H	N.A.

E3.0 NODE ELEMENTS

E3.1 Junctions

For standard manholes the Storage node type is used. A Junction node type is used to link the orifice to MH506. Nodes and have no storage or spatial dimensions, other than elevation, associated with them.

Parameter	Units	Description / Values
Name	-	Minor system nodes are described below under Section A3.2.
Tag	-	The tag ICD is used
Inflows	-	No additional inflows in the system are simulated through junction nodes.
Treatment	-	No treatment is modelled.
Invert Elevation	m	Invert of MH506 is used.
Rim Elevation	m	Rim elevation set based on the height of the upstream pipe diameter.
Depth	m	The depth is internally calculated in PCSWMM as the difference between the invert and rim elevations.
Initial Depth	m	Initial depths are set as the difference between the invert elevation and 1:100 year HGL in the existing March Rd. sewer network.
Surcharge Depth	m	A surcharge depths of 10m is used.
Ponded Area	m^2	No ponded areas are set in the model.

E3.2 Storage

Parameter	Units	Description / Values
Name	-	Storage nodes are used to represent maintenance hole structures of the storm sewer network. The maintenance hole nodes have the prefix 'MH' and their associated ID number (ex., MH101); Storage nodes are also used to represent catch basins and the surface sags They are labelled with the suffix _STORAGE.
Tag	-	Storage nodes representing manholes are tagged 'maintenance_hole'.
Inflows	-	No inflows are used in the model
Treatment	-	No treatment is modelled.
Invert Elevation	m	For minor system junctions the invert is the elevation extracted from the proposed design of the storm sewer system.
Rim Elevation	m	For minor system junctions the RIM elevation is the elevation from the road surface at nodes plus the depth of the surface transects to allow for transfer of flow between the major and minor systems through the outlet link.
Depth	m	The depth is internally calculated in PCSWMM as the difference between the invert and rim elevations.
Initial Depth	m	Initial depths are set as the difference between the invert elevation and the 1:100 year HGL level in the existing March Road Storm Sewer.
Ponded Area	m^2	No ponded areas are set in the model.
Evaporation Factor	fraction	No evaporation is considered in design event analysis.
Storage Curve	-	For maintenance holes, the storage curve is functional with a constant area which represents the floor area of the required manhole depending on the connecting pipe sizes. For catch basins, the storage curve is tabular where a relationship between elevation and area is specified. The bottom elevation represents the catch basin lead invert. The storage provided includes the storage from the catch basin and from the parking lot sag from top of grate to the maximum spill elevation. The sag storage from the parking lot is exported from contour lines created in autoCAD Civil 3D.

E3.3 Outfalls

Parameter	Units	Description / Values
Name	-	There is a single outfall node in the model. The outfall represents the boundary condition during a 1:100year storm event in the existing March Rd Sewer. The 1:100year HGL level was extracted from as-constructed drawings provided in Appendix D.
Tag	-	The outfall node does not have a Tag.
Inflows	-	No external inflows are applied at the outfall node.
Treatment	-	No treatment is modelled.
Invert Elevation	m	Invert elevation for the Outfall node is taken from as constructed drawings presented in Appendix 'D'.
Rim Elevation	m	RIM elevation for the outfall node is not used in the model as such a value of 0 is attributed.
Tide Gate	-	No backflow is prevented in the model outfall and therefore 'No' is selected.
Route To	-	Parameter is left blank as flow from the Outfall is not directed to an adjacent subcatchment.
Type	-	Type 'FIXED' is selected in the model.

Modeling Parameters

Subcatchment ID	Tag	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)	Percent Routed (%)	Max. Infil. Rate (mm/hr)	Min. Infil. Rate (mm/hr)	Decay Constant (1/hr)	Drying Time (days)
SUB_CB3		0.062	70.000	8.814	2.0	85.7	0.013	0.25	1.57	4.7	100	76.2	13.2	4.14	7
SUB_CB1		0.092	98.000	9.398	2.0	92.9	0.013	0.25	1.57	4.7	100	76.2	13.2	4.14	7
SUB_CB2		0.237	105.220	22.477	2.0	92.9	0.013	0.25	1.57	4.7	100	76.2	13.2	4.14	7

SWMM Calculations

Morgan's Creek

STORMWATER MANAGEMENT CALCULATIONS

Runoff Coefficients - Unrestricted Areas (MARCH, SHIRLEYS)

UNRESTRICTED AREAS						
LOCATION	DRAINING TO	Total Area (ha)	AREA w/ C = 0.2	AREA w/ C = 0.9	Actual "C"	Used "C"
UNCONTROLLED	MARCH RD.	0.07	0.03	0.04	0.61	**0.65**
UNCONTROLLED	SHIRLEY'S BROOK	0.31	0.18	0.09	0.39	**0.45**
TOTALS		0.38 ha				

NOTES:

1. The coffiecients were calculated on a proportional bases, using % of area of non-hard surface @ C=0.2 and % of area of hard surface @ a C=0.9

Runoff Coefficients - Restricted Areas

RESTRICTED AREAS						
LOCATION		Total Area (ha)	AREA w/ C = 0.2	AREA w/ C = 0.9	Actual "C"	Used "C"
CB3	**508-507**	0.06	0.01	0.05	0.81	**0.80**
CB2	**508-507**	0.24	0.02	0.22	0.84	**0.85**
CB1	**507-506**	0.09	0.01	0.08	0.82	**0.85**
TOTALS		0.39 ha				

NOTES:

1. The coffiecients were calculated on a proportional bases, using % of area of non-hard surface @ C=0.2 and % of area of hard surface @ a C=0.9

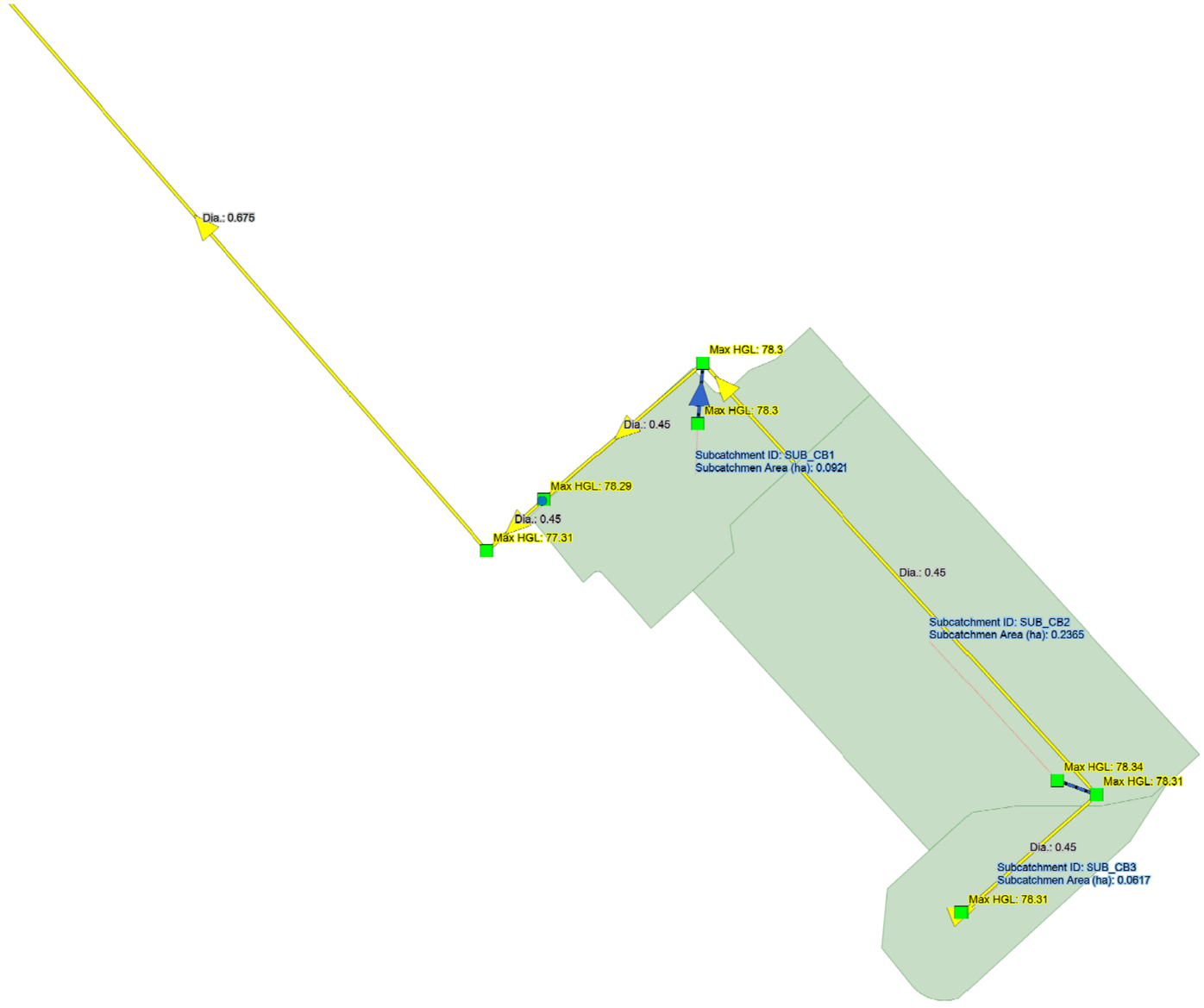
Acceptable Release Rate (0.77ha x 70 L/s/ha.) = 53.9 L/s
(Based on SWM Facility 1 - West, Design Brief, David McManus Engineering Ltd., April 15, 2009)

Unrestricted Release rate to March Road.

1:100 year Rainfall Intensity (10 min. Tc)	178.56	mm/hr
Unrestricted Area outletting to March Road	0.07	ha.
Runoff Coefficient	0.65	
1:100 year Uncontrolled Peak Fow	22.59	L/s

Acceptable Release Rate	53.9	L/s
- Unrestricted areas outletting to March Rd.	22.59	L/s
March Road Restricted Release Rate	31.31	L/s

Model Schematic



Legend

- Junctions
- Storages

Conduits

- Storm Sewer
- CB Leads
- Orifices
- Subcatchments

N

50 m

PROJECT:

MORGAN'S CREEK STAGE 1

762 MARCH RD., OTTAWA, ONTARIO

DRAWING:

MODEL SCHEMATIC

DESIGN:	AT
DRAWN:	AT
CHECKED:	BP
JLR NO.:	24566-001
DRAWING NO.:	APPENDIX 'D'

Appendix 'E'

Project Drawings

CANADA'S BEST MANAGED COMPANIES

www.jlrichards.ca

Ottawa

864 Lady Ellen Place
Ottawa ON Canada
K1Z 5M2
Tel: 613 728-3571

ottawa@jlrichards.ca

Kingston

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424

kingston@jlrichards.ca

Sudbury

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174

sudbury@jlrichards.ca

Timmins

834 Mountjoy Street S
Timmins ON Canada
P4N 7C5

Tel: 705 360-1899
timmins@jlrichards.ca

North Bay

200-175 Progress Road
North Bay ON Canada
P1A 0B8
Tel: 705 495-7597

northbay@jlrichards.ca

Hawkesbury

326 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287

hawkesbury@jlrichards.ca

Guelph

107-450 Speedvale Ave.
West Guelph ON Canada
N1H 7Y6
Tel: 519 763-0713

guelph@jlrichards.ca

J.L.Richards
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