TAGGART REALTY MANAGEMENT

ADEQUACY OF PUBLIC SERVICING REPORT
116393-5.2.2.1

2893 Navan Road

CITY OF OTTAWA

IBI

Prepared for TAGGART REALTY MANAGEMENT
by IBI Group
November 13, 2018

Table of Contents

Table of Contents (continued)

Table of Contents (continued)

1 INTRODUCTION

1.1 Objective

IBI Professional Services Inc. (hereinafter referred to as IBI, or IBI Group) has been retained by Taggart Realty Management to prepare this Adequacy of Public Services Report in support of the proposal rezoning for its **4.87 ha** property located at 2893 and 3053 Navan Road. Hobin Architecture Inc. in collaboration with Fotenn Consultants have prepared a concept site plan which demonstrates the functionality of the subject lands based on comments received during the pre-consultation process with City staff, refer to **Appendix A** for a copy of the plan.

At the time of writing this report, Taggart Realty Management was in discussions with the City of Ottawa to acquire the properties of 2973 Navan Road, 3079 Navan Road and 2690 Page Road.

This report will provide stakeholders with functional level design constraints in support of the proposed development sufficient to approve the re-zoning of the subject lands.

1.2 Location

The subject properties are located in the City of Ottawa, within the former City of Gloucester and within the East Urban Community (EUC). It is bound to the north by Brian Coburn Boulevard, to the east by existing residential lands and Page Road, to the south and west by existing residential lands and Navan Road. The site is located opposite of the future transit station and transitway which will run parallel to Brian Coburn Boulevard. Refer to **Figure 1.1** below for key map.

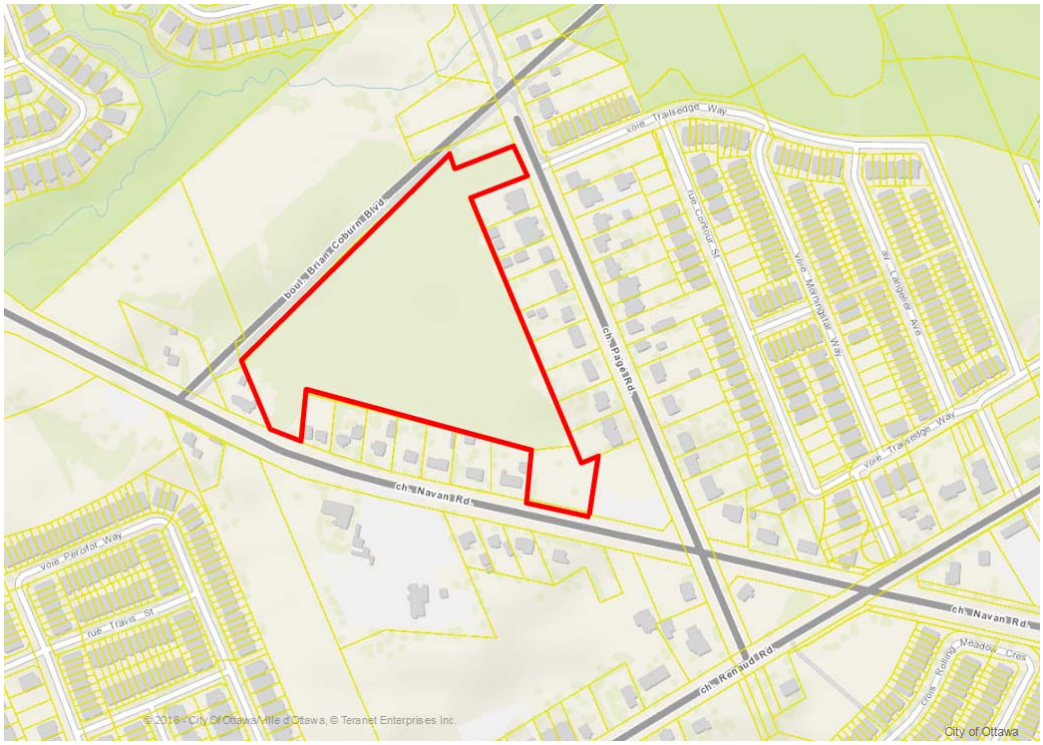


Figure 1.1 – Key Map of Subject Lands

The subject lands are inclusive in the EUC Master Servicing Study Update prepared by Stantec.

1.3 Proposed Development

Taggart Realty Management is proposing to re-zone the subject lands from Development Reserve to commercial retail. The current concept plan proposes 1 grocery store, 1 large and 1 small block of mixed commercial retail units, 1 gas bar and 3 restaurants.

The Main entrance to the subject lands is proposed off Brian Coburn Boulevard, with two secondary accesses off Brian Coburn Boulevard and two secondary accesses off Navan Road.

As previously noted, that subject lands are in close proximity to the future transit station on the north side of Brian Coburn Boulevard and existing nearby reactional use pathways, integration of the cycling and pedestrian network within the subject lands is important.

During the pre-consultation meeting with City staff, the City indicated that it was interested in selling 2973 Navan Road, in order to improve the entrance features to the community and site.

1.4 Previous Studies

The subject lands are included within the Gloucester East Urban Community study area. The prescribed servicing requirement for the subject lands are contained within the Gloucester East Urban Community (EUC) Infrastructure Servicing Update prepared by Stantec Consulting Limited, March 2005.

2 WATER DISTRIBUTION

2.1 Existing Conditions

The subject site is located within Pressure Zone 2E of the City of Ottawa's water distribution system. An existing 300 mm watermain is located within the Navan Road ROW and within the Page Road ROW.

2.2 Design Criteria

2.2.1 Water Demands

As previously noted, the development consists of 3 restaurants, 1 gas bar with automatic car washing facilities, 1 large multi-unit retail block and a large grocery store. Commercial flows were computed based the City of Ottawa Water Distribution Design Guidelines. A watermain demand calculation sheet is included in **Appendix A** and the total water demands are summarized as follows:

Average Day	0.27 l/s
Maximum Day	0.41 l/s
Peak Hour	0.73 l/s

2.2.2 System Pressure

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

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

2.2.3 Fire Flow Rate

As per the Ottawa Design Guidelines, the fire flow rate has been calculated using the Fire Underwriters Survey (FUS) method. The FUS method takes into account the type of building construction, the building occupancy, the use of sprinklers and the exposures to adjacent structures. Calculations were performed for building 5 & 6. Assuming non-combustible building construction and a sprinkler system, a fire flow rate of 11,000 l/min (183.3 l/s) was calculated for the two largest commercial building. A copy of the calculations is included in **Appendix A**.

2.3 Proposed Water Distribution System

2.3.1 Hydraulic Model

A computer model for the subject site has been created using the H_20 Map version 6.0 program produced by MWH soft. The model includes the proposed watermains to service the site and connections to existing mains.

Boundary conditions have been provided at the two connections to the Navan watermain by the City of Ottawa. The boundary conditions provide the hydraulic head of each design scenario outlined in Section 2.2.2. A copy of the boundary conditions is included in **Appendix A**.

2.3.2 Proposed Water Plan

Figure 2.1 shows the water distribution plan for the site. A 200 mm diameter watermain is proposed to loop through the site with two connections to the existing 300 mm diameter watermain on Navan Road.

Results of the hydraulic analysis for the site are included in **Appendix A** and summarized as follows:

SCENARIO	RESULT
Basic Day (Max HGL) Pressure (kPa)	442.5 – 481.1
Peak Hour Pressure (kPa)	404.7 – 443.9
Minimum Design Fire Flow @140 kPa Residual Pressure (l/s)	204.8

A comparison of the results and design criteria is summarized as follows:

Maximum Pressure	Under basic day conditions all nodes are less than 552 kPa (80 psi), therefore pressure control is not required for this site.
Minimum Pressure	The lowest pressure during peak hour conditions is 404.7 kPa which exceeds the minimum 276 kPa (40 psi) requirement.
Fire Flow	Under the maximum day plus fire scenario the minimum design fire flow is 204.8 l/s which exceeds the requirement of 183.3 l/s.

2.3.3 Watermain Frontage Charges

The City of Ottawa has noted that watermain frontage fees of $190.00 per meter of frontage will be applied to Navan Road frontage at time of Site Plan Application approval.

3 WASTEWATER DISPOSAL

3.1 Existing Conditions and Previous Studies

The subject lands are located within the study limits of the Gloucester East Urban Community (EUC). The Trailsedge subdivisions, constructed by Richcraft Homes and Minto Homes, involved the design and construction of sanitary sewers on Renaud Road.

The subject lands are tributary to the Forrest Valley Pump Station, located on Renaud Road West of Navan Road. The lands also form part of area 13B in the overall EUC sewer network as proposed by Stantec in the March 2005 update. Area 13B is a large area that includes tributary flows from multiple land parcels on the north and south side of Navan Road.

An excerpt from the Gloucester EUC update, SAN drainage area plan (Stantec, March 2005) has been provided below in **Figure 3.1** below to demonstrate the extents of the subject lands. The full drainage area plan and sanitary design sheet has been included in **Appendix B.**

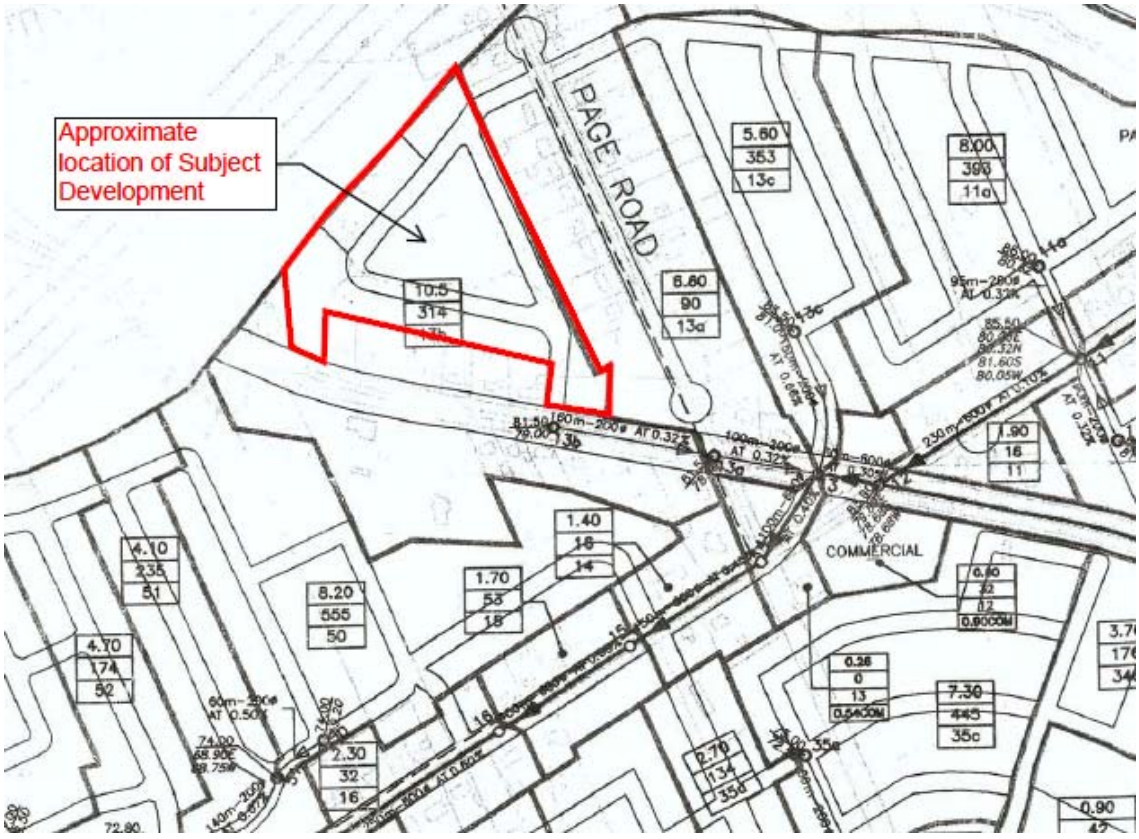


Figure 3.1 –Location of Subject Lands on Stantec EUC Sanitary Drainage Area Plan

The site is 4.87Ha, and therefore are approximately **46.4%** of the drainage area 13b in the EUC (10.5Ha). The drainage area 13b is considered residential lands in the EUC. The population allowance for drainage area 13b is 314 people, therefore the subject lands proportion of the total population is **145.6** (46.4% x 314pop).

The EUC was completed based on outdated City of Ottawa design criteria. The criteria used to provide servicing for the subject lands is based on a residential design flow of 350L/pop/day, a Harmon Peaking factor coefficient of 1, and an infiltration allowance of 0.28 L/s.

Therefore, the design flows for the subject lands can be determined as follows:

AREA ID	POP	PEAKING FACTOR	DESIGN FLOW	AREA	EXT. @0.28L/S	TOTAL FLOW
13B	145.6	4.00	2.36	4.87	1.36	3.72

Therefore, the allowable peak design flow from the subject lands is **3.72L/s**.

3.2 Design Criteria

The sanitary flows for the subject lands are determined based on current City of Ottawa design criteria as per Technical Bulletin ISTB-2018-01, which includes, but is not limited to the following:

3.2.1 Design Flow:

Average Commercial/Institution Flow	-	28,000 l/Ha/day
Peak Commercial/Institution Factor	-	1.0
Infiltration Allowance	-	0.33 l/sec/Ha

3.3 Proposed Wastewater Disposal System

As previously noted, the proposed wastewater disposal system within the study limits of the Gloucester EUC. All existing downstream sewers have been sized for sanitary flows generated from the subject lands.

3.3.1 Proposed Wastewater Flow Calculations

As mentioned in the introduction, the proposed development consists of 1 grocery store, 1 large commercial retail building, 3 restaurants, 1 small commercial retail and 1 gas bar with automated car wash. Below is a table summarizing the proposed waste water flows:

AREA	AVERAGE FLOW	PEAK FACTOR	ICI FLOW	EXT. @0.33L/S	TOTAL FLOW
4.87	28,000	1	1.57	1.61	**3.18**

The calculated flows from the proposed commercial lands is less than the allocated flows to site for in the EUC master servicing study. Therefore, the proposed development can be accommodated by the existing infrastructure downstream.

3.3.2 Proposed Wastewater Plan

Sanitary sewers immediately adjacent to the subject lands have not been constructed. The nearest Sanitary sewer is located within Renaud Road.

An extension of a local level sanitary sewer along Navan Road will be required to service the subject development. The MSS indicates that a 200mm diameter sewer was to be extended from the intersection of Navan Road and Renaud Road. The as-built sewer, and design drawings indicate that a 600mm diameter stub was left. A 250mm diameter sanitary sewer is proposed to connect to the 600mm stub with a new manhole. There is a potential crossing conflict located at Page Road and Navan Road. Based on the as-built record drawings for Page Road, there is an existing 250mm sanitary sewer and 2 forcemains (300mm and 400mm) which are all constructed at roughly the same height. It is proposed to cross over the existing sanitary infrastructure, and extend the sewers at a minimum gradient until the first entrance to the subject lands. During site

plan approval application, a special review will be required by the Utility Services Branch at the City of Ottawa to review the sanitary crossings. Refer to as-built record drawings provided in **Appendix B**.

Within the proposed development, the sanitary sewer will follow the alignment of the proposed internal road to provide service to the each of the buildings.

The proposed automatic car wash facility within the gas bar area will consist of an internal oil and grit separator to treat discharge prior to release into the sanitary sewer system.

There are no external lands contributing to the internal sanitary sewers. The sanitary sewers to be extended on Navan Road will be designed for all residual areas from the Gloucester EUC tributary area 13B established in the MSS.

4 STORMWATER MANAGEMENT

4.1 Existing Conditions and Previous Studies

The subject lands are tributary to Mud Creek, a branch of Greens Creek which outlets to the Ottawa River. The Gloucester EUC (Stantec, March 2005 update) established the stormwater management plan for the subject lands. The stormwater solution presented in the MSS consists of using site controls, dual drainage design and end of pipe stormwater management facility. Minor system flows are tributary to the Mud Creek, through the existing SWM facility (otherwise referred to as Pond #3). Major system flow from the subject lands are also tributary to the SWM pond and Mud Creek.

Subject lands are identified in the EUC Storm drainage area plan excerpt **Figure 4.1** below. The full drainage area plan and design sheet from the MSS has been included in **Appendix C**.

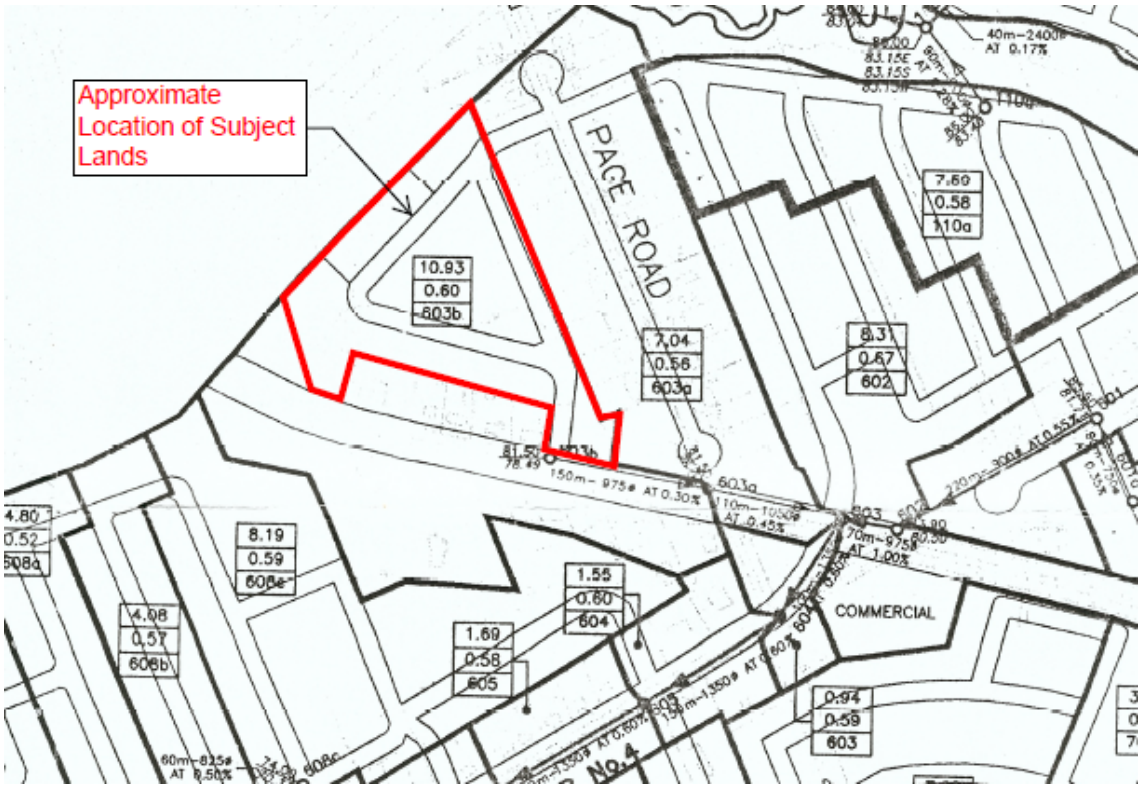


Figure 4.1 - Location of Subject Lands on Stantec EUC Storm Drainage Area Plan

The end of pipe stormwater management facility discharges directly to the Mud Creek, and is designed to provide an enhanced level of protection (80% removal of TSS)

During pre-consultation meetings with the City, the City of Ottawa verbally communicated that there are downstream erosion concerns in Mud Creek within the NCC lands. In the absence of the Mud Creek Cumulative Impact Study, and recommendations, the City of Ottawa requires the subject lands to follow the requirements of the Ministry of Environment, Climate and Parks' Draft Runoff Volume Control Target (RVCt) hierarchy to confirm the runoff control design criteria for the site. The volume to be controlled following the aforementioned hierarchy, is based on the 90th percentile rainfall, which includes all events up to the 26mm rainfall for the Ottawa area. Where runoff cannot be infiltrated, storage shall be provided to slow the release via onsite infiltration low impact development (LID) measures.

4.2 Dual Drainage Design

The subject lands will be designed to be consistent with the findings of the MSS, City of Ottawa sewer design Guidelines (OSDG October 2012), the OSDG guidelines of September 2016 Technical Bulletin PIEDTB-2016-01, and the February 2014 Technical Bulletin ISDTP-2014-1.

The site will be designed with dual drainage features, accommodating minor and major system flows. During frequent storm events, the effective runoff of a catchment area is directly released via catch basin inlets to the network of storm sewers, called the minor system. During less frequent storm events, the balance of the flow (in excess of the minor flow) is accommodated by a system of street segments, and in some cases oversized storm sewers, called the major system.

The parking areas and drive aisles within the subject lands will consist of a mix of saw-tooth and continuous grade profiles. In several instances the finished grade will be designed to provide continuous slopes to maximize the use of bioswales to pre-treat runoff prior to discharging into underground infiltration galleries. Where possible, saw-toothing will be implemented to facilitate capture and storage. Inlet control devices (ICD's) are proposed across the site to maximize the use of available on-site storage and control surcharge to the minor system.

The commercial buildings on site are assumed to have flat roofs, where stormwater management is possible during infrequent events. The rooftop storm leaders will restrict flows during infrequent events and discharge into underground infiltration galleries prior to discharging into the storm sewer network.

The final design of the subject lands will demonstrate that minor system capture and major flow conveyance is consistent with the findings of the MSS.

On-site stormwater management will restrict flow to the minor system to the 5 year capture rate at the designed area and run-off coefficient established in the MSS (Area 603b, C=0.60, Stantec EUC updated, March 2005). Stormwater flows up to the 100 year event will be retained on-site and gradually discharged to the sewer network. This will involve the sizing of onsite sewers to a minimum of the 5 year rational pipe sizes, or of a minimum size modelled to convey the designed flow. On-site stormwater management measures may include maximizing surface ponding, rooftop ponding or providing underground storage.

4.3 Proposed Stormwater Management Plan

As previously noted, downstream infrastructure was designed to provide capacity and treatment of stormwater runoff from the subject lands. The proposed development will require extension of the existing storm sewers from Renaud Road and along Navan Road to the proposed intersection with the easterly most drive aisle on Navan Road. A review of the offsite servicing at Site Plan Application can involve a review of the potential to differ from the MSS configuration and extend the storm sewer along the Page Road ROW, and connect with Navan Road further south. This option will require a full review of road closure times, impacts to public, crossing conflicts, reinstatement implications and costs.

Internally, the storm sewer network will also be extended through the proposed development in order to provide drainage to all areas of the site. A schematic of the proposed sewers network is provided on **Figure 4.2** in **Appendix C.**

There are no major external lands contributing to the internal storm sewers of the proposed development. There will be minor drainage collection required of adjacent rear yard drainage from existing rural properties. The storm sewers on Navan Road will be designed for all of the residual area of drainage area 603b established in the MSS.

Due to existing topography, a portion of the subject lands will be designed with steep gradient drive aisles. As such, the storm sewer network will be constructed to limit sewage velocities within

the pipe network. This will require the use of flattened pipes relative to the road slope and several storm sewer manholes.

The gas bar lands will involve a dedicated oil and grit separator for the asphalt surface drainage areas.

4.4 Low Impact Development

As previously mentioned, the City of Ottawa has requested that Low Impact Development (LID) measures be implemented as best as possible on the development lands due to erosions concerns in Mud Creek, downstream of the Pond #3 SWMF. The following LID plan is an example of measures than can be established on-site to meet the criteria. Future design changes or site plan configurations may require a revisit to the strategy.

4.4.1 LID Design Criteria

The RVCt for Ottawa, based on the 90th percentile of rainfall, includes all events up to the 26mm event. The City has requested that attempts must be made to follow this criteria.

The geotechnical consultant, Paterson Group, has provided two percolation rates for the various material on-site.

In areas where the subgrade is considered silty sand (the upper +/- 1.5m crust), a percolation rate of 12 to 20 (min/cm) can be used. In areas where the subgrade is considered silty clay (areas below the 1.5m crust), a percolation rate of 35 to 50 (min/cm) can be used.

For the basis of this report, all underground infiltration galleries are anticipated to be 2.5m below proposed ground elevation.

A 24hr-26mm event duration has been used for the preliminary infiltration gallery calculations, which results in an intensity of 1.083mm.hr. During site plan application, a hydro-dynamic model will be required along with a comparison of the annual water budget impacts.

With reference to the macro grading plan in **Appendix D**, all infiltration galleries to the north of Building 5 and 6, will be considered to be in silty clay, and thus a percolation rate of 50min/cm is used. Grading for areas to the south of building 5 and 6 are generally in a fill condition, which finished grade will be approximately 2.0m above existing ground. This places the bottom of the infiltration galleries towards the top end of the sandy silt crust layer. Thus, a percolation rate of 16min/cm is used as a general average of the given rates provided by Paterson. The infiltration rate has been divided by 2.5 as a correction factor. At site plan application, further investigation should be performed at each infiltration gallery location in order to refine the calculations for each location.

4.4.2 Infiltration Measures for Rooftop Stormwater

It is anticipated that all rooftops will consist of flat roofs, which is typical for similar developments. The stormwater that falls on the flat roofs will be collected through rooftop drains, which will outlet through the building storm service.

The rooftop stormwater is considered clean stormwater, and does not require treatment prior to discharging into an infiltration gallery. Each rooftop may be provided with an infiltration gallery, either dedicated or shared with an adjacent building.

Below is a summary of the proposed infiltration measures, refer to the calculation sheets in **Appendix C.**

LOCATION	AREA	PERC. MIN/CM	26MM VOLUME	GALLERY STORAGE PROVIDED
BLD 1 & Gas Bar	1143	50	28.2	28.73
BLD 2 & 3	1006	50	24.8	25.65
BLD 4 & 5	744	50	18.4	19.95
BLD 6	3367	16	83.2	182.78*
BLD 7	3000	16	74.1	74.1

*BLD 6 gallery residual capacity of 99.6m3 to be used for Parking Area 2B.

4.4.3 Infiltration Measures for Parking Areas

The parking lot areas will employ 2 strategies for meeting the infiltration targets for the site. The first strategy will involve sheet draining the parking areas, through depressed curbs and into bioswales. The second strategy will involve conveying the stormwater flows from the parking areas into the storm sewer network, and treated with an oil and grit separator designed to provide normal level of protection (70% TSS removal) prior to discharging into an underground infiltration gallery.

4.4.3.1 Infiltration through sheet drainage and bioswales

In reference to **Figure 4.4** in **Appendix C**, parking lot Areas 2 and 4 will sheet drain along continuously graded parking lot and drive aisle surfaces, and spill into bioswales through flush depressed curbs. The bioswales will provide treatment to the surface water prior to infiltration. A perched catchbasin is proposed for each bioswale in order to allow for surface storage prior to discharging into the storm sewer network. Both areas will be located to the south of Building 5 and 6, and will utilize the crust layer of silty sand and general site fill for infiltration.

Below is a brief summary of the infiltration measures, refer to the calculation sheets in **Appendix C.**

LOCATION	AREA	PERC. MIN/CM	25MM VOLUME	GALLERY STORAGE
Parking Area 2A	3422	16	84.5	87.00
Parking Area 2B	5190	16	128.2	129.62*
Parking Area 4	1695	16	41.9	43.94

*Parking Area 2B gallery storage includes residual capacity of 99.6m3 from BLD 6

4.4.3.2 Infiltration through Sewer Network and Treatment structure

In reference to **Figure 4.4**, in **Appendix C**, stormwater from parking area 1 will be collected by standard parking lot and street catch basins (in drive aisles). The stormwater flows will be conveyed to a central location where an Oil and Grit Separator (OGS) will provide normal level of protection (70% TSS removal). A weir located downstream of the OGS, will divert the first 25mm stormwater flows into an infiltration gallery, designed to contain the 25mm volume and allow for infiltration. When the retention gallery is full, or infrequent storms generate higher flows, the weir will allow the more intense storms to pass into the downstream sewer network. Based on preliminary review, the infiltration gallery will likely need to be constructed to the north of building 5 and 6. In this area, the galley will likely be at a depth where the receiving soils are silty clay.

Depending on the final configuration of the buildings, and a more thorough review of the infiltration on-site, there may be an opportunity to combine Parking Area 1 (with an OGS), with the infiltration gallery for Building 6 and Parking Area 2B. This is an area that requires fill material to be placed on-site, and there may be an opportunity to take advantage of this operation and the type of material used for fill. The mainline sewers for the site run through this corridor, which may limit the space available for a larger infiltration gallery.

Below is a brief summary of the infiltration measures, refer to the calculation sheets in **Appendix C.**

LOCATION	AREA	PERC. MIN/CM	25MM VOLUME	GALLERY STORAGE
Parking Area 1	20669	50	510.5	519.84

4.4.3.3 Gas Bar Lands

Due to the industrious uses on the gas bar lands and high probability of hydro carbons within surface runoff, the surface areas in the gas bar have been excluded from the infiltration requirements.

4.4.3.4 Drive Aisle at Navan Road Site entrance

This drainage area is contained to a drive aisle which contains 3 major underground services. Unfortunately, due to the constraints of this particular location, there is no feasible method to treat this water prior to discharging into an infiltration gallery.

4.5 Stormwater Management Conclusions

The aforementioned section briefly discusses the stormwater management design criteria and possible solutions for the subject development lands. This report has demonstrated, that the site can be serviced by extension of existing municipal infrastructure already sized to accommodate flows from the subject lands. The conceptual low impact development strategy demonstrates that the targets can be met on-site by implanting the use of large infiltration galleries, bioswales and an Oil and Grit Separator (s).

5 ROADS AND GRADING

5.1 Site Grading

The existing grades within portions of the proposed development lands are approximately 1.0m below the existing right of way limits for Brian Coburn Boulevard. The existing topography suggests that the site naturally slopes towards the south, where the existing grade drops substantially as it reaches Navan Road. There is a grade drop of approximately 4.0m across the site.

As a result of the nature of commercial development lands, the building pads are preferred to have a flat floor slab, to maximize internal uses. This requires the use of creative grading strategies along the property line lines where building facades run parallel. The use of retaining walls along the property lines is expected in order to accommodate the flat floor slabs and the changing existing grades along rear property lines of existing residences.

The grade raise restriction of 2.5 m has been met for all location except the building pad of Building 6. Special Geotechnical considerations will be required for this building.

A macro grading plan has been prepared for the conceptual site plan of the development demonstrate the proposed grades at key locations, and any preliminary anticipate special grading considerations, see **Figure 5.1** in **Appendix D**.

5.2 Road Network

The subject lands are bound by 2 arterial roads, with private entrances off Brian Coburn and Navan Road. Internal drive aisles have been configured to promote easy vehicular connectivity, access for heavy truck traffic and for fire protection. Pedestrian connectivity has also been provided throughout the site.

5.3 Municipal Consent

Municipal consent application will be required for works along the ROW of Navan Road. Intersection improvements as per the Traffic Impact Study and extension of deep servicing infrastructure will require comment and review.

6 SOURCE CONTROLS

6.1 General

Since an end of pipe treatment facility is provided for the development lands, stormwater site management for the subject lands will focus on site level or source control management of runoff, and low impact development at the request of City staff. Such controls or mitigative measures are proposed for this development not only for final development but also during construction and build out. Some of these measures are:

- flat site grading where possible;
- vegetation planting; and
- groundwater recharge in landscaped areas and through the use of sporadic infiltration galleries.

6.2 Site Grading

Where possible, all of the proposed blocks within the development will make use gentle surface slopes on hard surfaces such as asphalt and concrete. In accordance with local municipal standards, all grading will be between 0.5 and 5.0 percent for hard surfaces and 2.0 and 6.0 percent for all landscaped areas. Significant grade changes will be accomplished through the use of terracing (3:1 max slope) or retaining walls. All street and parking lot catchbasins shall be equipped with 3.0m subdrains on opposite sides of a curbside catchbasin running parallel to the curb, and with 3.0m subdrains extending out from all 4 sides of parking lot catchbasins.

6.3 Vegetation

As with most site plans, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along drive aisles and within the landscaping areas provides opportunities to re-create lost vegetation.

7 CONVEYANCE CONTROLS

7.1 General

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- vegetated swales;
- catchbasin sumps; and
- low impact development measures that allow the first 25mm rainfall to infiltrate.

7.2 Catchbasins and Maintenance Hole Sumps

All catchbasins within the development, either rear yard or street, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Catchbasins will be to OPSD 705.02. All storm sewer maintenance holes serving local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

8 SEDIMENT AND EROSION CONTROL PLAN

8.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. Although construction is only a temporary situation, it is proposed to introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These will include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches;
- filter cloths will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use; and
- Silt fence on the site perimeter.

8.2 Trench Dewatering

Although little groundwater is expected during construction of municipal services, any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed including sediment removal and disposal and material replacement as needed.

8.3 Bulkhead Barriers

At the first new manhole constructed within the development that is immediately upstream of an existing sewer a temporary ½ diameter bulkhead will be constructed over the lower half of the outletting sewer. This bulkhead will trap any sediment carrying flows thus preventing any construction-related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed and removed prior to top course asphalt being laid.

8.4 Seepage Barriers

The presence of road side ditches along Brian Coburn Boulevard and Navan Road necessitate the installation of seepage barriers. These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

8.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures should be covered in some fashion to prevent sediment from entering the minor storm sewer system. Until landscape are sodded or until paved are asphalted and curbed, catchbasins and manholes will be constructed with geotextile filter bags located between the structure frame and cover respectively. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

8.6 Stockpile Management

During construction of any development similar to that proposed by the Owner, both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed.

During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed. Catchbasins are installed prior to the construction of the drive aisles and parking areas.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern provided the above noted seepage barriers are installed. These materials are quickly used and the mitigative measures stated previously, especially the ½ diameter sewer bulkheads and filter fabric in catchbasins and manholes help to manage these concerns.

The roadway granular materials are not stockpiled on site. They are immediately placed in the roadway and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

To assist in the control of transporting sediment off-site into municipal roads, mud matts will be employed at the construction entrances.

9 CONCLUSIONS

Water, wastewater and stormwater systems required to accommodate the orderly development of the 2893 Navan Road. The attached drawings and supporting analysis illustrate the lands can be developed in an orderly and effective manner and in accordance with the City of Ottawa's current level of service requirements.

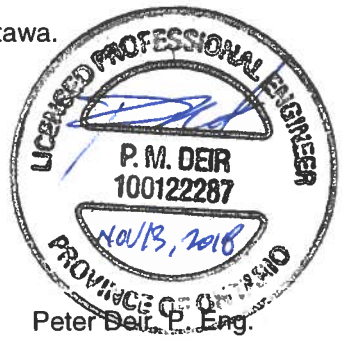
The use of lot level, low impact development, conveyance and end of pipe controls outlined in the report will result in effective treatment of surface stormwater runoff from the site. Adherence to the proposed sediment and erosion control plan during construction will minimize harmful impacts on surface water.

This report outlined conceptual servicing scheme to support the proposed development. The servicing schemes are subject to various governmental approvals prior to construction, including but not limited to the following:

- Environmental Compliance Approval (ECA) for private sewers: MOECP
- Environmental Compliance Approval (ECA) for private sewage works on the gas bar: MOECP
- Commence Work Order: City of Ottawa;
- Municipal Consent: City of Ottawa.

Report Prepared By:

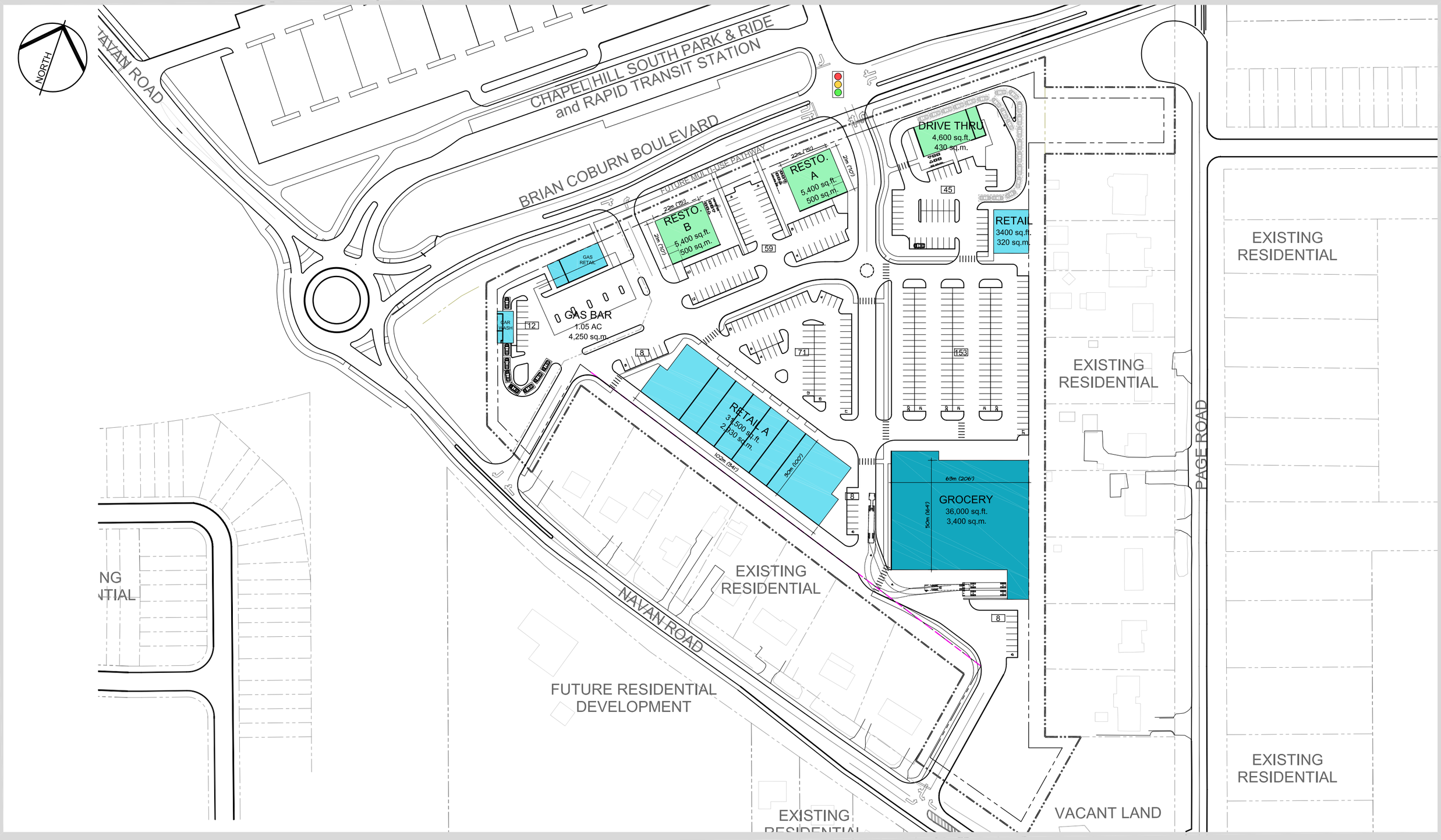
Ryan Magladry, C.E.T.



Peter Deir, P. Eng.

Terry Brule, P. Eng.

APPENDIX A



HOBIN

TAGGART REALTY

NAVAN - BRIAN COBURN

Concept

Scale 1:1500
November 2, 2018

J:\116393_BrianColburn\5.9 Drawings\59civil\current\AdequacyReport\Layout\116393-FIG 2.1 - WATERMAIN.dwg Layout Name: FIG 2.1
Plot Scale: 1:8.704 Plotted At: 11/12/2018 Last Saved By: EHenrie Last Saved At: Nov. 12, 18

IBI

Scale
1 : 2000

Project Title
2893 NAVAN ROAD
COMMERCIAL SITE

Drawing Title
CONCEPTUAL WATER
DISTRIBUTION SYSTEM

Sheet No.
FIGURE 2.1

BOUNDARY CONDITIONS

Boundary Conditions For: Brian Coburn and Navan Road Commercial Development

Date of Boundary Conditions: 2018-Jun-29

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	94.8	1.6
Maximum Daily Demand	142.2	2.4
Peak Hour	255.6	4.3
Fire Flow #1 Demand	11,000	183.3

Number Of Connections: 2

Location:

BOUNDARY CONDITIONS

Results:

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	64.0
Peak Hour	127.1	58.5
Max Day Plus Fire (11,000) L/min	124.7	55.1

[1]Elevation: **85.940 m**

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.9	70.1
Peak Hour	127.1	64.7
Max Day Plus Fire (11,000) L/min	125.3	62.2

[1]Elevation: **85.940 m**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

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.

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : NAVAN ROAD COMMERCIAL
LOCATION : CITY OF OTTAWA
DEVELOPER : TAGGART REALTY MANAGEMENT

FILE: 116393.5.7
DATE PRINTED: 9-Nov-18
DESIGN: LE
PAGE : 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND
	UNITS			POP'N	INDTRL	COMM.	RETAIL										
	SF	SD & TH	ST		(ha.)	(ha.)	(m^2)	Res.	Non-res.	Total	Res.	Non-res.	Total	Res.	Non-res.	Total	(l/min)
J10																	
BLD 5 & 6							6367	0.00	0.18	0.18	0.00	0.28	0.28	0.00	0.50	0.50	11,000
J30																	
BDL 3 & 4							2014	0.00	0.06	0.06	0.00	0.09	0.09	0.00	0.16	0.16	11,000
J50																	
BLD 1 & 2							928	0.00	0.03	0.03	0.00	0.04	0.04	0.00	0.07	0.07	11,000
TOTAL										0.27			0.41			0.73	

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) — 3.4 p / p / u
- Semi Detached (SD) & Townhouse (TH) — 2.7 p / p / u
- Stacked Townhouse (ST) — 2.3 p / p / u

AVG. DAILY DEMAND

- Residential — 350 l / cap / day
- Industrial (Business Park) — 35,000 l / ha / day
- Commercial (Employment Area) — 50,000 l / ha / day
- Retail (Shopping Centre) — 2,500 l / 1000m^2 / day

MAX. DAILY DEMAND

- Residential — 875 l / cap / day
- Industrial (Business Park) — 52,500 l / ha / day
- Commercial (Employment Area) — 75,000 l / ha / day
- Retail (Shopping Centre) — 3,750 l / 1000m^2 / day

MAX. HOURLY DEMAND

- Residential — 1,925 l / cap / day
- Industrial (Business Park) — 94,500 l / ha / day
- Commercial (Employment Area) — 135,000 l / ha / day
- Retail (Shopping Centre) — 6,750 l / 1000m^2 / day

FIRE FLOW

- SF, SD & TH — 10,000 l / min
- Retail — 13,000 l / min

Fire Flow Requirement from Fire Underwriters Survey - Brian Coburn Commercial

Building

Floor Area of Largest building	3,366	m^2
Total Floor Area	3,366	m^2

$F = 220C\sqrt{A}$

C	0.8		C =	1.5 wood frame
A	3,366	m^2		1.0 ordinary
				0.8 non-combustible
F	10,211	l/min		0.6 fire-resistive
use	10,500	l/min		

Occupancy Adjustment

		-25%	non-combustible
		-15%	limited combustible
Use	-15%	0%	combustible
		+15%	free burning
Adjustment	-1575 l/min	+25%	rapid burning
Fire flow	8,925 l/min		

Sprinkler Adjustment

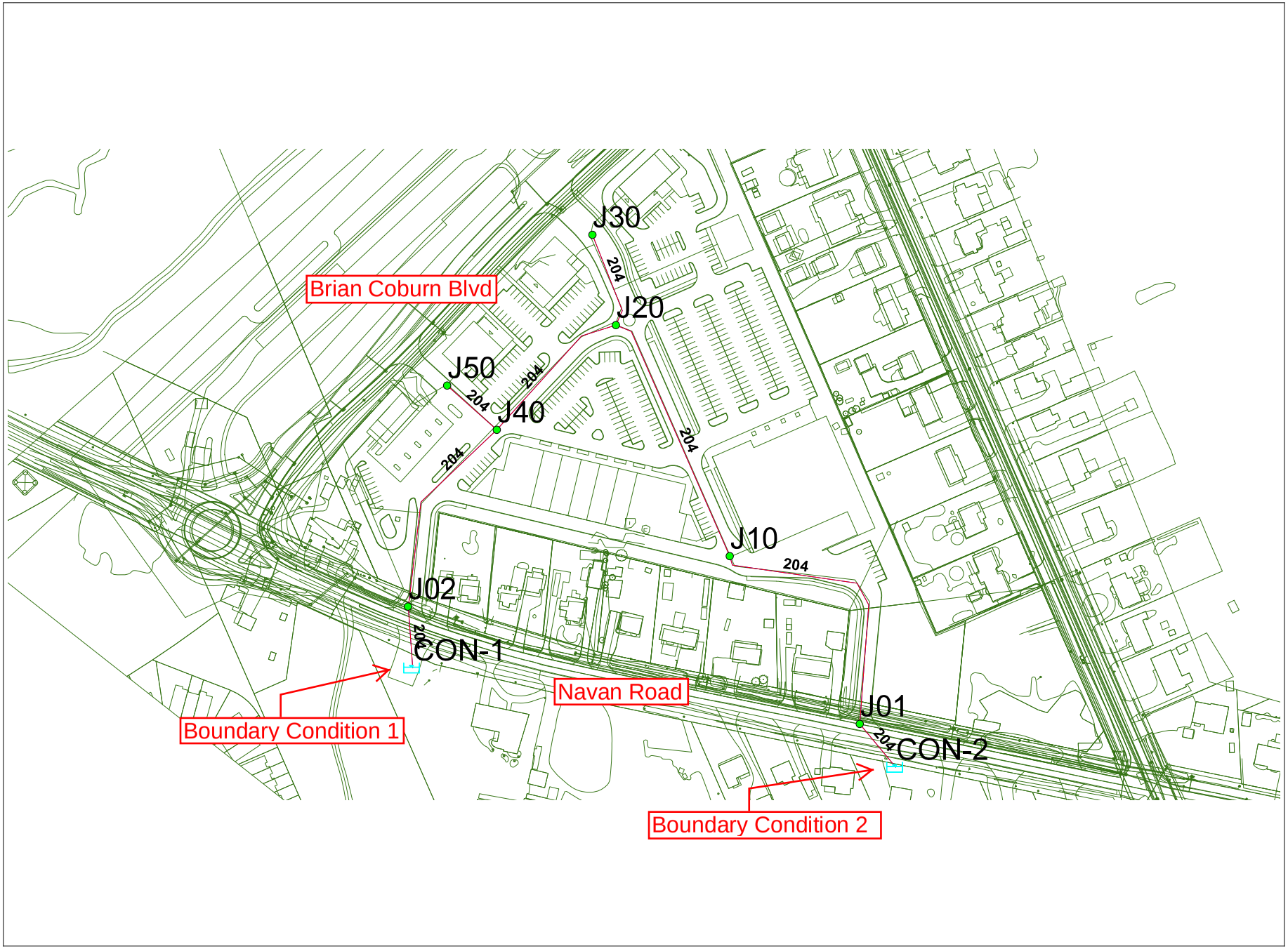
		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	-30%		
Adjustment	-2678 l/min		

Exposure Adjustment

Building Face	Separation	Charge
north	45	10%
east	5	20%
south	45	5%
west	20	15%
Total		50%
Adjustment		4,463 l/min
Fire flow		10,710 l/min
Use		**11,000 l/min**
		183 l/s

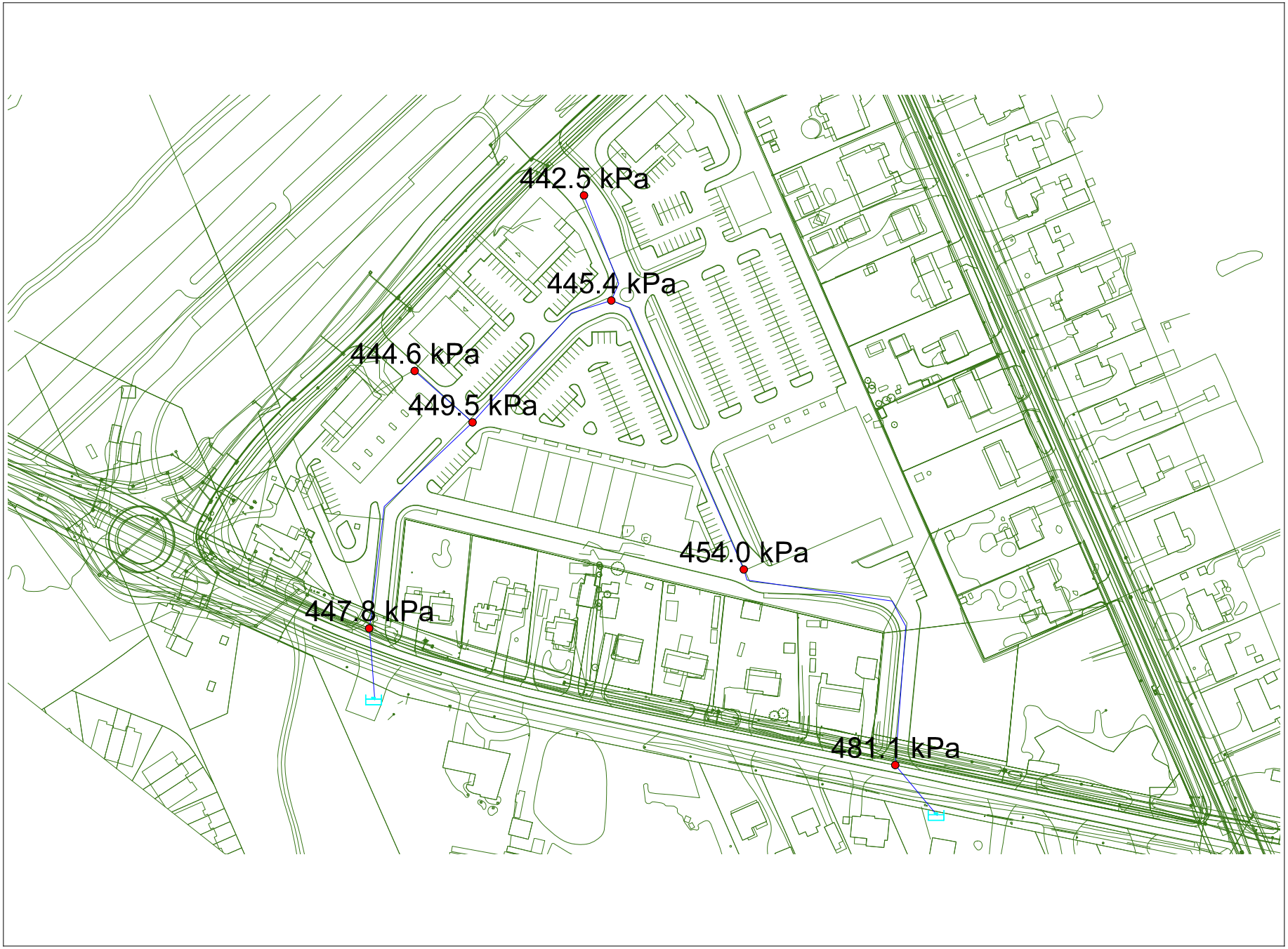
Separation	Charge
0 to 3m	+25%
3.1 to 10m	+20%
10.1 to 20m	+15%
20.1 to 30m	+10%
30.1 to 45m	+5%

Node ID's and Pipe Sizes



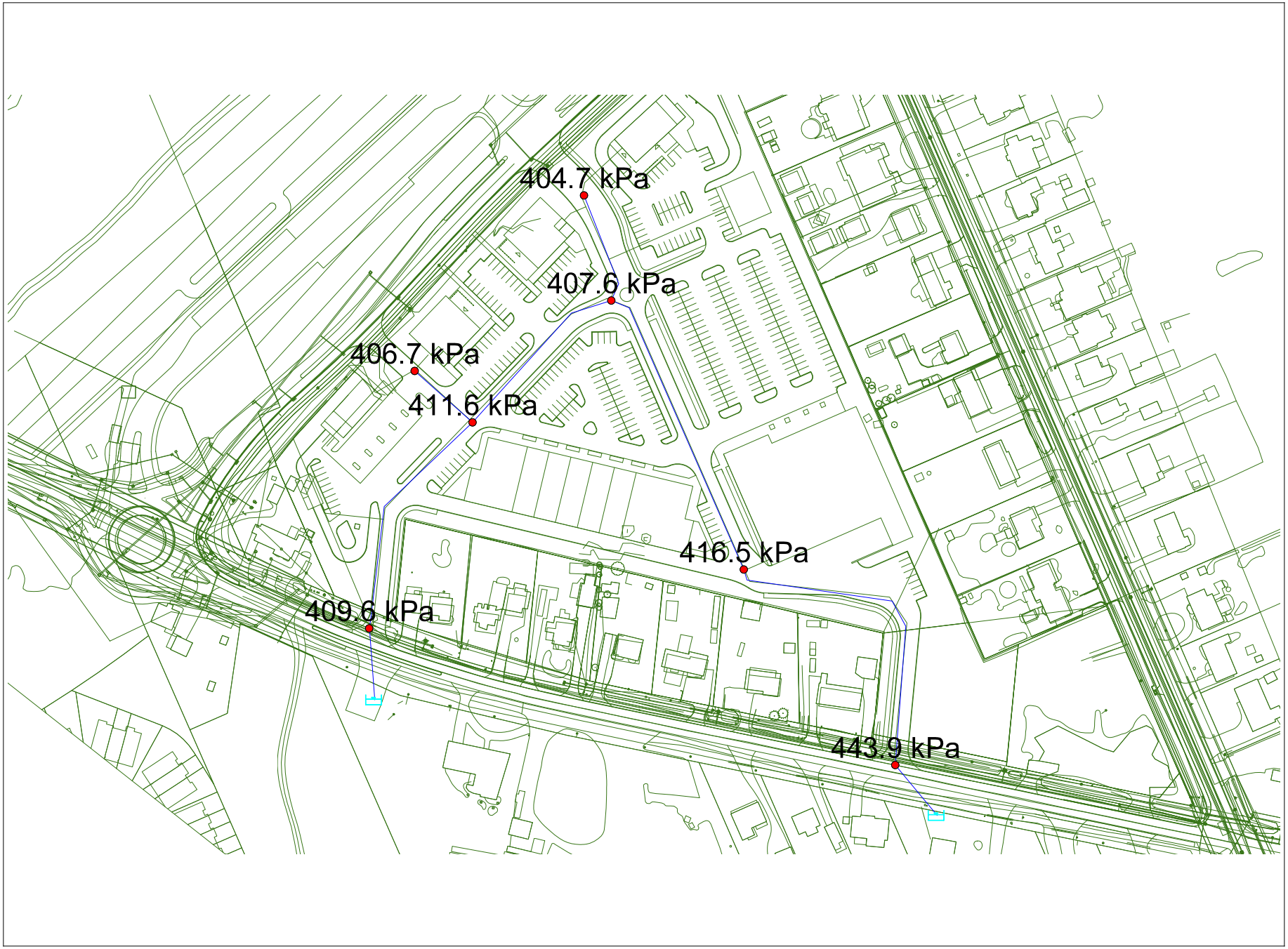
Date: Friday, November 09, 2018

Basic Day (Max HGL) Pressures



Date: Friday, November 09, 2018

Peak Hour Pressures

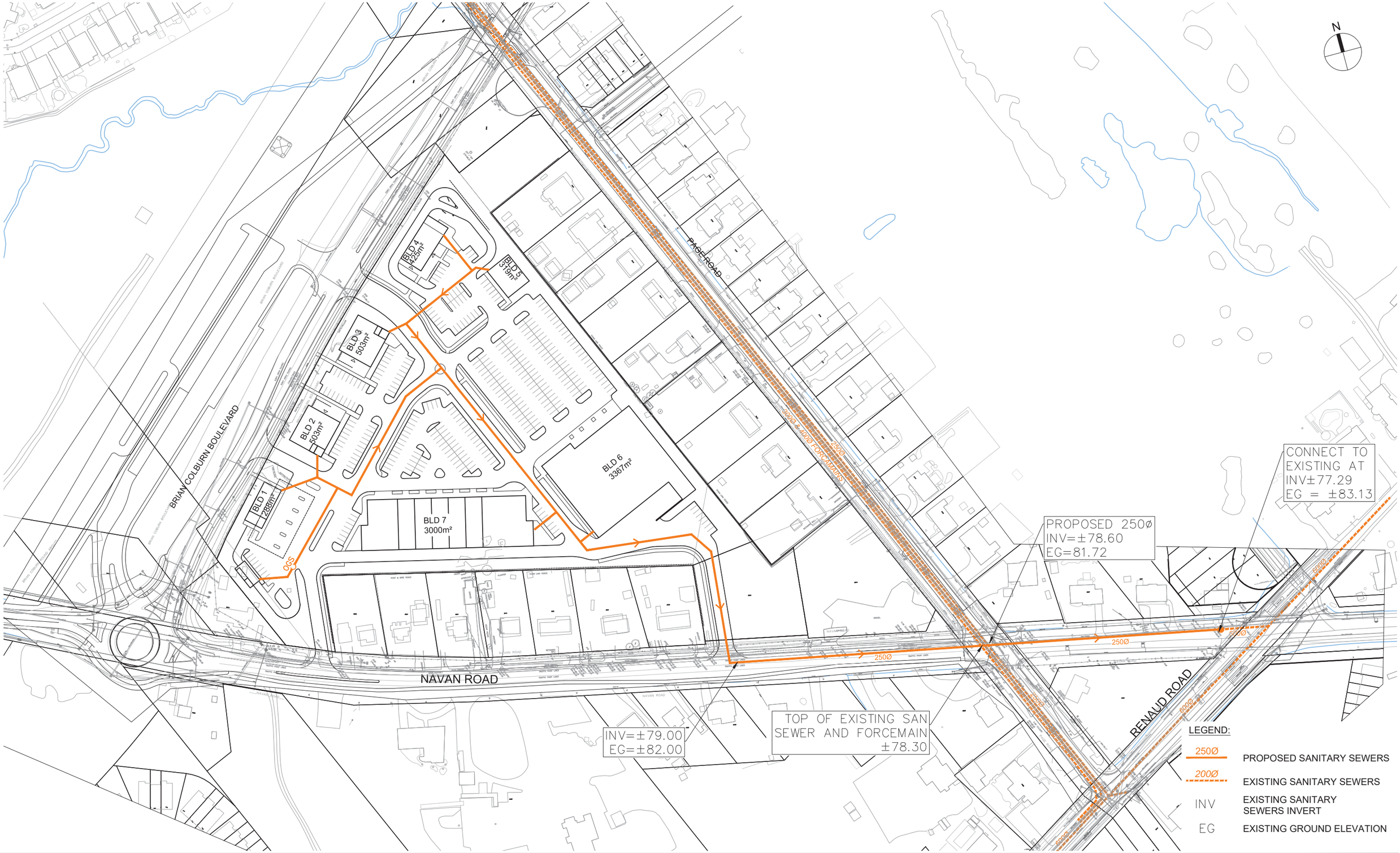


Date: Friday, November 09, 2018

Max Day + Fire - Design Fireflows

Date: Friday, November 09, 2018

APPENDIX B



J:\116393_BrianColburn\5.9 Drawings\59civil\current\AdequacyReport\Layout\116393-FIG 3.2 - SANITARY.dwg Layout Name: FIG 3.2
Plot Scale: 1:8.704 Plotted At: 11/12/2018 Last Saved By: EHenrie Last Saved At: Nov. 12, 18

Scale	Project Title	Drawing Title	Sheet No.
1 : 2000	2893 NAVAN ROAD COMMERCIAL SITE	CONCEPTUAL WASTEWATER DISPOSAL SYSTEM	FIGURE 3.2

SANITARY SEWER CALCULATION SHEET

LOCATION		RESIDENTIAL AREA AND POPULATION						COMM		INDUST			INST		C+I+I	PEAK FLOW				PIPE													
FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	DIAMETER NOM (mm)	DIAMETER ACT (mm)	SLOPE (%)	CAP. (FULL) (L/s)	Q/Qcap (%)	VEL. (FULL) (m/s)	Upstream OG (m)	Downstream OG (m)	Upstream Invert (m)	Upstream Obvert (m)	Downstream Invert (m)	Downstream Obvert (m)	Drop Structure (m)	US Frost Depth (m)	DS Frost Depth (m)
1	2	3.25	66	3.25	66	4.00	0.91		0.00		0.00			0.00	0.00	3.25	3.25	0.81	1.81	250	200	203.2	0.32	19.35	9.4%	0.60	88.25	88.00	84.83	85.03	84.03	84.23		3.22	3.77
2	3	5.20	181	8.45	247	4.00	3.84		0.00		0.00			0.00	0.00	5.20	8.45	2.37	6.21	320	200	203.2	0.32	19.35	32.1%	0.60	88.00	87.80	84.03	84.23	83.00	83.21		3.77	4.39
3	4	19.75	995	28.20	1232	3.74	18.66		0.00		0.00			0.00	0.00	19.75	28.20	7.90	26.56	320	250	254.0	0.24	30.39	87.4%	0.60	87.80	87.50	82.95	83.21	82.18	82.44		4.39	5.06
4A	4	19.80	979	19.80	979	3.81	15.10		0.00		0.00			0.00	0.00	19.80	19.80	5.54	20.64	365	250	254.0	0.24	30.39	67.9%	0.60	88.00	87.50	83.83	84.08	82.95	83.20		3.92	4.30
4	5	7.10	185	55.10	2396	3.62	34.19		0.00		0.00		3.10	3.10	2.69	10.20	58.20	16.30	53.18	310	375	381.0	0.14	58.43	77.7%	0.60	87.50	87.80	82.06	82.44	81.62	82.00		5.06	5.60
5A	5	7.90	362	7.90	362	4.00	5.87		0.00		0.00			0.00	0.00	7.90	7.90	2.21	8.08	320	200	203.2	0.65	27.56	29.3%	0.85	87.40	87.80	84.05	84.25	81.97	82.17		3.15	5.43
5	6	2.40	170	65.40	2928	3.45	40.94		0.00		0.00			0.00	0.00	2.40	68.50	19.18	62.81	295	375	381.0	0.14	58.43	91.8%	0.60	87.50	87.50	81.62	82.00	81.21	81.59		5.60	5.91
6	7	15.90	787	81.30	3715	3.36	50.60		0.00		0.00			3.10	2.69	15.90	84.40	23.63	76.92	115	450	457.2	0.11	98.64	78.0%	0.60	87.50	87.50	81.13	81.59	81.01	81.46		5.91	6.04
7	8	6.80	353	88.10	4068	3.33	54.83		0.00		0.00			3.10	2.69	6.80	91.20	25.54	83.09	235	450	457.2	0.11	98.64	84.2%	0.60	87.50	86.90	81.01	81.46	80.75	81.21		6.04	5.69
8A	8	11.85	826	11.85	826	3.85	12.89		0.00		0.00			0.00	0.00	11.85	11.85	3.32	18.21	150	200	203.2	0.50	24.19	67.0%	0.75	86.50	86.90	81.45	81.85	80.70	80.90		4.85	6.00
8	9	2.60	128	102.55	5022	3.24	65.98		0.00		0.00		2.20	5.30	4.60	4.80	107.85	30.20	100.78	170	525	533.4	0.10	141.87	71.0%	0.63	86.90	87.00	80.37	80.90	80.20	80.73		6.00	6.27
9A	9	6.45	300	6.45	300	4.00	6.86		0.00		0.00			0.00	0.00	6.45	6.45	1.53	8.38	85	200	203.2	0.32	19.35	33.0%	0.60	87.00	87.00	81.42	81.62	81.14	81.35		5.38	5.65
9	10	2.70	0	110.70	5322	3.22	69.42		0.00		0.00			5.30	4.60	2.70	116.00	32.48	104.58	275	525	533.4	0.10	141.87	73.1%	0.63	87.00	87.00	80.20	80.73	79.92	80.46		6.27	6.56
10A	10	14.80	731	14.80	731	3.68	11.50		0.00		0.00		0.60	0.60	0.52	15.40	15.40	4.31	16.34	270	200	203.2	0.32	19.35	84.4%	0.60	87.50	87.00	83.56	83.76	82.69	82.90		3.74	4.10
10	11	4.30	117	129.80	6170	3.16	78.96		0.00		0.00		2.40	8.30	7.20	6.70	138.10	38.67	124.84	405	525	533.4	0.10	141.87	88.0%	0.63	87.00	85.50	79.92	80.46	79.52	80.05		6.56	6.45
11A	11	8.00	393	8.00	393	4.00	6.36		0.00		0.00			0.00	0.00	8.00	8.00	2.24	8.69	95	200	203.2	0.32	19.35	44.4%	0.60	86.00	85.50	80.42	80.62	80.11	80.32		5.38	5.18
11B	11	5.90	352	5.90	352	4.00	6.70		0.00		0.00			0.00	0.00	5.90	5.90	1.65	7.36	90	200	203.2	0.32	19.35	38.0%	0.60	86.00	85.50	81.69	81.89	81.40	81.60		4.11	3.90
11	12	1.90	18	145.60	6931	3.11	87.34		0.00		0.00			8.30	7.20	1.90	153.90	43.09	137.83	230	600	609.6	0.100	202.65	68.0%	0.69	85.50	83.90	79.44	80.05	79.21	79.82		6.45	6.08
25D	25C	7.40	48	7.40	48	4.00	0.78		0.00		0.00			0.00	0.00	7.40	7.40	2.07	2.85	420	200	203.2	0.32	19.35	14.7%	0.60	86.30	86.00	83.02	83.22	81.67	81.88		3.08	4.12
LOCAL PS 2	25C	4.55	22	4.55	22	4.00	0.36		0.00		0.00			0.00	0.00	4.55	4.55	1.27	1.64	300		0.0		0.00	#DIV/0!	#DIV/0!	82.00	86.00		79.50		83.30		2.80	2.70
25G	25E	7.40	496	7.40	496	3.98	7.99		0.00		0.00			0.00	0.00	7.40	7.40	2.07	10.06	230	200	203.2	0.32	19.35	52.0%	0.60	81.50	81.00	78.80	79.00	78.06	78.26		2.90	2.74
25F	25E	4.60	272	4.60	272	4.00	4.41		0.00		0.00			0.00	0.00	4.60	4.60	1.29	5.70	120	200	203.2	2.50	54.10	10.5%	1.67	84.00	81.00	81.30	81.50	78.30	78.50		2.50	2.50
25E	LOCAL PS 1	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	70	200	203.2	0.32	19.35	79.6%	0.60	81.00	81.00	78.06	78.26	77.84	78.04		2.74	2.96
LOCAL PS 1	25C	0.00	0	12.00	768	3.87	12.04		0.00		0.00			0.00	0.00	0.00	12.00	3.36	15.40	340		0.0		0.00	#DIV/0!	#DIV/0!	81.00	86.00		78.50		83.50		2.50	2.50
25C	25B	7.00	51	30.95	890	3.83	13.81		0.00		0.00			0.00	0.00	7.00	30.95	8.67	22.48	460	300	304.8	0.19	43.97	51.1%	0.60	86.00	86.50	81.57	81.88	80.70	81.00		4.12	5.60
25B	25A	11.80	337	42.75	1226	3.74	18.59		0.00		0.00			0.00	0.00	11.80	42.75	11.97	30.56	295	375	381.0	0.14	58.43	44.7%	0.60	86.50	86.50	80.62	81.00	80.21	80.59		5.60	5.91
25A	25	17.00	845	59.75	2071	3.57	29.99		0.00		0.00			0.00	0.00	17.00	59.75	16.73	46.72	405	375	381.0	0.14	58.43	68.3%	0.60	86.50	86.50	80.21	80.59	79.84	80.02		5.91	6.48
20	21	8.75	505	8.75	505	3.97	8.13		0.00		0.00		2.55	2.55	2.21	11.30	11.30	3.16	13.51	320	200	203.2	0.32	19.35	69.8%	0.60	87.00	86.80	83.91	84.11	82.88	83.09		2.89	3.71
21	22	7.00	160	15.75	665	3.91	10.53		0.00	1.00	1.00	6.50	8.30	10.85	12.05	18.30	27.60	7.73	30.31	335	300	304.8	0.19	43.97	68.9%	0.60	86.80	87.00	82.78	83.09	82.14	82.45		3.71	4.55
22	23	7.30	440	23.05	1106	3.77	16.69		0.00		1.00	6.50		10.85	12.05	7.30	34.90	9.77	36.71	275	300	304.8	0.19	43.97	88.0%	0.60	87.00	86.50	82.14	82.45	81.62	81.93		4.55	4.57
23B	23A	15.70	565	15.70	565	3.95	9.03		0.00		0.00			0.00	0.00	15.70	15.70	4.40	13.43	325	250	254.0	0.45	41.38	32.4%	0.82	86.80	86.00	82.52	82.77	81.07	81.32		4.03	4.68
23A	23	9.40	584	25.10	1149	3.76	17.50		0.00		0.00			0.00	0.00	9.40	25.10	7.03	24.53	310	300	304.8	0.19	43.97	55.8%	0.60	86.00	86.50	81.02	81.32	80.43	80.73		4.68	5.77
23	24	2.60	120	50.75	2374	3.53	33.92		0.00		1.00	6.50	3.30	14.15	14.92	5.90	65.90	18.45	67.29	315	375	381.0	0.22	65.79	78.4%	0.75	86.50	86.50	80.35	80.73	79.68	80.04		5.77	6.48
24A	24	25.10	544	25.10	544	3.96	8.72		0.00		0.00			0.00	0.00	25.10	25.10	7.03	18.74	235	200	203.2	0.32	19.35	81.3%	0.60	86.00	86.50	83.00	83.20	82.24	82.45		2.80	4.05
24	25	0.80	0	76.65	2918	3.45	40.82		0.00		1.00	6.50		14.15	14.92	0.80	91.80	25.70	81.44	235	450	457.2	0.11	98.64	82.6%	0.60	86.50	86.50	79.58	80.04	79.33	79.78		6.46	6.72
LANDFILL PS	25	0.00	0	0.00	0	4.00	0.00		0.00	10.40	10.40	4.20		0.00	17.69	10.40	10.40	2.91		120		0.0		0.00	#VALUE!	#DIV/0!	80.00	86.50	77.50	77.80		84.00		2.50	2.50
25	26	8.30	99	144.70	5089	3.24	66.75		0.00		11.40	4.15		14.15	31.45	8.30	170.25	47.87	148.87	380	600	609.6	0.10	202.55	72.0%	0.89	86.50	86.50	79.17	79.78	78.79	79.40		6.72	7.10
26A	26	6.90	360	6.90	360	4.00	5.83		0.00		0.00		1.30	1.30	1.13	8.20	8.20	2.30	9.26	175	200	203.2	0.32	19.35	47.8%	0.60	86.00	86.50	81.00	81.20	80.44	80.64		4.80	5.86
26	12	2.80	6	154.40	5455	3.21	70.93		0.00		11.40	4.15		15.45	32.58	2.80	181.25	50.75	154.26	720	600	609.6	0.10	202.55	76.2%	0.89	86.50	83.90	78.79	79.40	78.07	78.68		7.10	5.22
12	13	0.60	32	300.60	12418	2.86	143.91	0.90	0.90		11.40	4.15		23.75	40.58	1.50	336.85	94.26	276.74	60	600	609.6	0.30	350.83	78.5%	1.20	83.90	82.50	78.07	78.68	77.89	78.50		5.22	4.00
13C	13	5.60	353	5.60	353	4.00	5.71		0.00		0.00			0.00	0.00	5.60	5.90	1.57	7.28	150	200	203.2	0.66	27.79	26.2%	0.86	83.50	82.50	80.80	81.00	79.61	80.01		2.50	2.49
13B	13A	10.50	314	10.50	314	4.00	5.09		0.00		0.00			0.00	0.00	10.50	10.50	2.94	8.93	160	200	203.2	0.32	19.35	41.5%	0.60	81.50	81.50	78.80	79.00	78.28	78.49		2.50	3.01
13A	13	6.60	90	17.10	404	4.00	6.54		0.00		0.00			0.00	0.00	6.60	17.10	4.79	11.33	100	200	203.2	0.32	19.35	58.5%	0.60	81.50	82.50	78.28	78.49	77.96	78.17		3.01	4.33
13	14	0.26	0	323.56	13175	2.83	151.30	0.54	1.44		11.40	4.15		23.75	41.03	0.60	360.15	100.84	293.17	100	600	609.6	0.40	405.10	72.4%	1.39	82.50	80.80	76.91	77.52	76.51	77.12	0.65	4.99	3.68
14	15	1.40	18	324.96	13191	2.83	151.46		1.44		11.40	4.15		23.75	41.03	1.40	361.55	101.23	293.72	150	600	609.6	0.40	405.10	72.5%	1.39	80.80	79.40	75.88	76.47	75.26	76.07	0.65	4.33	2.53
15	16	1.70	53	326.66	13244	2.83	151.97		1.44		11.40	4.15		23.75	41.03	1.70	363.25	101.71	294.71	150	600	609.6	0.60	496.14	59.4%	1.70	79.40	77.00	74.78	75.37	73.86	74.47	0.50	3.03	2.53
16	17	2.30	32	328.96	13276	2.83	152.28		1.44		11.40	4.15		23.75	41.03	2.30	365.55	102.35	295.67	250	600	609.6	0.60	496.14	59.6%	1.70	77.00	76.00	73.86	74.47	72.96	73.57		2.53	3.03
17	18	0.30	0	329.26	13276	2.83	152.28		1.44		11.40	4.15		23.75	41.03	0.30	365.85	102.44	295.75	100	600	609.6	0.80	572.90	51.6%	1.96	76.00	73.00	70.66	71.27	69.86	70.47	1.70	4.73	2.53
30	31	4.80	252	4.80	252	4.00	4.08		0.00		0.00			0.00	0.00	4.80	4.80	1.34	8.43	150	200	203.2	2.50	54.10	10.0%	1.67	83.50	79.00	80.26	80.46	78.51	78.71		3.04	2.29
31	32	1.40	34	6.20	286	4.00	4.83	1.30	1.30		0.00			0.00	1.13	2.70	7.50	2.10	7.86	205	200	203.2	3.90	67.57	11.6%	2.08	79.00	71.00	76.30	76.50	69.30	69.51	0.21	2.50	2.50
32A	32	5.50	336	5.50	336	4.00	5.44		0.00		0.00			0.00	0.00	5.50	5.50	1.54	6.88	80	300	304.8	0.19	43.97	15.9%	0.60	70.50	71.00	66.24	66.54	66.08	66.39		3.96	4.61
32	33	4.05	38	15.75	659	3.91	10.44		1.30		0.00			0.00	1.13	4.05	17.05	4.77	16.35	160	300	304.8	0.19	43.97	37.2%	0.60	71.00	70.80	66.08	66.39	65.78	66.08		4.81	4.72
33A	33	4.00	252	4.00	252	4.00	4.06		0.00		0.00			0.00	0.00	4.00	4.00	1.12	5.20	85	200	203.2	0.32	19.35	26.9%	0.60	70.50	70.60	66.07	66.27	65.79	66.00		4.23	4.80
33	34	0.90	42	20.65	953	3.81	14.73		1.30		0.00		2.80	2.80	3.56	3.70	24.75	6.93	25.22	185	300	304.8	0.19	43.97	57.3%	0.60	70.60	70.50	65.69	66.00	65.34	65.65		4.80	4.85
34A	34	3.70	176	3.70	176	4.00	2.86		0.00		0.00			0.00	0.00	3.70	3.70	1.04	3.89	80	200	203.2	2.00	48.38	8.0%	1.49	71.50	70.50	66.80	69.00	67.20	67.40		2.50	3.10
34	35	3.80	227	28.15	1357	3.71	20.39		1.30		0.00			2.80	3.56	3.80	32.25	9.03	32.98	160	300	304.8	0.19	43.97	75.0%	0.60	70.50	71.00	65.34	65.65	65.04	65.34		4.85	5.66
35C	35B	7.30	445	7.30	445	4.00	7.21		0.00		0.00			0.00	0.00	7.30	7.30	2.04	9.26	160	200	203.2	1.90	47.16	19.6%	1.45	75.00	72.00	72.30	72.50	69.26	69.46		2.50	2.54
35B	35A	0.96	50	8.26	495	3.98	7.98		0.00		0.00			0.00	0.00	0.96	8.26	2.31	10.30	65	200	203.2	0.32	19.35	53.2%	0.60	72.00	72.00	69.26	69.46	68.98	69.19		2.54	2.81
35A	35	2.70	134	10.96	630	3.92	10.01		0.00		0.00			0.00	0.00	2.70	10.96	3.07	13.07	70	200	203.2	2.50	54.10	24.2%	1.67	72.00	71.00	67.99	68.20	66.24	66.45	0.99	3.80	4.55
35	36	0.73	42	39.84	2029	3.58	29.43		1.30		0.00			2.80	3.56	0.73	43.94	12.30	45.29	110	375	381.0	0.14	58.43	68.2%	0.60	71.00	72.00	64.96	65.34	64.81	65.19		5.66	5.81
36	37	9.80	538	49.64	2568	3.50	36.38		1.30		0.00			2.80	3.56	9.80	53.74	15.05	54.98	165	375	381.0	0.14	58.43	80.3%	0.60	72.00	78.00	64.81	65.19	64.58	64.96		5.81	11.04
37	38	3.40	193	53.04	2759	3.47	38.82		1.30		0.00			2.80	3.56	3.40	57.14	16.00	58.38	95	375	381.0	0.14	58.43	85.3%	0.60	76.00	78.00	64.58	64.96	64.44	64.82		11.04	11.18

LOCATION		RESIDENTIAL AREA AND POPULATION						COMM		INDUST			INST		C+I+I	PEAK FLOW				PIPE														
FROM M.H.	TO M.H.	AREA (ha)	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FACTOR (per MOE)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	TOTAL FLOW (L/s)	LENGTH (m)	DIAMETER NOM (mm)	DIAMETER ACT (mm)	SLOPE (%)	CAP. (FULL) (L/s)	Q/Qcap (%)	VEL. (FULL) (m/s)	Upstream OG (m)	Downstream OG (m)	Upstream Invert (m)	Upstream Obvert (m)	Downstream Invert (m)	Downstream Obvert (m)	Drop Structure (m)	US Frost Depth (m)	DS Frost Depth (m)
38A	38	3.00	174	3.00	174	4.00	2.92		0.00		0.00			0.00	0.00	3.00	3.00	0.84	3.86	160	200	203.2	0.32	19.35	19.9%	0.60	72.00	76.00	68.60	68.79	67.99	68.19		3.30	7.61
38	39	3.40	182	59.44	3116	3.43	43.27		1.30		0.00			2.80	3.56	3.40	63.54	17.79	64.92	170	375	381.0	0.22	85.79	75.3%	0.75	76.00	72.00	64.44	64.82	64.07	64.45		11.16	7.55
39	18	6.20	341	65.64	3457	3.39	47.46		1.30		0.00			2.80	3.56	6.20	69.74	19.53	70.55	105	375	381.0	0.22	85.79	82.2%	0.75	72.00	73.00	64.07	64.45	63.84	64.22		7.56	8.78
50	51	8.20	555	8.20	555	3.95	8.88		0.00		0.00			0.00	0.00	8.20	8.20	2.30	11.17	60	200	203.2	0.50	24.19	46.2%	0.76	74.00	74.00	69.00	69.29	68.70	68.90		4.80	5.10
51	52	4.10	235	12.30	790	3.86	12.36		0.00		0.00			0.00	0.00	4.10	12.30	3.44	15.81	140	200	203.2	0.67	28.00	56.4%	0.86	74.00	72.80	68.65	68.75	67.81	67.81	0.15	5.25	4.99
52	18	4.70	174	17.00	964	3.81	14.68		0.00		0.00			0.00	0.00	4.70	17.00	4.78	19.64	70	250	254.0	0.32	35.09	56.0%	0.69	72.80	73.00	67.56	67.81	67.33	67.59		4.99	5.41
18	19	0.00	0	411.90	17696	2.71	193.96		2.74		11.40			26.55	25.43	0.00	432.69	126.73	346.13	110	600	609.6	0.50	452.92	76.4%	1.55	73.00	71.50	63.61	64.22	63.06	63.67		8.78	7.83
19	19A	0.00	0	411.90	17696	2.71	193.96		2.74		11.40	4.15		26.55	44.59	0.00	432.69	126.73	368.30	25	600	609.6	0.50	452.92	80.7%	1.55	71.50	71.00	63.06	63.67	62.93	63.54		7.83	7.46
19A	19B	0.40	0	412.30	17696	2.71	193.96		2.74		11.40	4.15		26.55	44.59	0.40	432.09	126.84	368.41	51	600	609.6	0.50	452.92	80.7%	1.55	71.00	71.00	62.87	63.48	62.62	63.23	0.06	7.62	7.77
50	19B	5.90	326	5.90	326	4.00	5.26		0.00		0.00			0.00	0.00	5.90	5.90	1.65	8.83	120	200	203.2	0.32	19.35	35.8%	0.60	71.00	71.00	68.30	68.50	67.91	68.12		2.50	2.88
19B	FVPS	0.00	0	418.20	18022	2.70	196.97		2.74		11.40	4.15		26.55	44.59	0.00	438.89	128.49	370.65	24	600	609.6	0.50	452.92	81.7%	1.55	71.00	71.50	62.66	63.17	62.44	63.05	0.06	7.83	8.45

DESIGN PARAMETERS

Residential Flow =	350 Lpcd	Industrial Peak Factor =	as per MOE Graph	Low Density (LD)/Existing =	3.2 ppu
Commerical/Institutional Flow =	50000 L/ha/d	Extraneous Flow =	0.28 L/s/ha	Low/Medium Density (LMD) =	3.2 ppu
Industrial Flow =	35000 L/ha/d	Minimum Velocity =	0.76 m/s	Medium Density (MD) =	2.4 ppu
Maximum Residential Peak Factor =	4.00	Mannings n =	0.013	High Density (HD) =	1.9 ppu
Minimum Residential Peak Factor =	2.00	Harmon Peak Factor =	1+14/(4+(P/1000)^1/2)*K, where K= 1	MUC =	1.9 ppu
Commerical/Institutional Peak Factor =	1.50			GUA =	3.1 ppu

(Telephone Conversation with Selma Hassan Sept. 10/2004 - Based on development applications - 361 Singles @ 3.2pers/unit and 184 Singles @ 3 pers/unit)

Designed: B.D	PROJECT:	Gloucester EUC Infrastructure Servicing Study Update	
Checked: F.W	LOCATION:	City of Ottawa	
Dwg. Reference: SAN	File Ref.: 1634-00493	Date: Mar-05	Sheet No.

N

SANITARY SEWER AND MANHOLE

SANITARY TRUNK SEWER AND MANHOLE

SANITARY FORCEMAIN

SANITARY CATCHMENT AREA

ORIGINAL GROUND / OBVERT

AREA (ha) / POPULATION / MANHOLE No.

AREA (ha) / POPULATION / MANHOLE No. / INST (INSTUTIONAL) ha / IND (INDUSTRIAL) ha / COM (COMMERCIAL) ha

* EQUIVALENT AREA (17.7 l/s ALLOWABLE PEAK FLOW UNDER C of O SEWER USE AGREEMENT)

HYDRO CORRIDOR

PROPOSED TRANSITWAY

PROPOSED BLACKBURN BY-PASS EXTENSION

MER BLEUE ROAD

SANITARY TRUNK No.1

SANITARY TRUNK No.2

SANITARY TRUNK No.3

SANITARY TRUNK No.4

FOURTH LINE ROAD

PAGE ROAD

NAVAN ROAD

WALL ROAD

SAPHIR AVE.

GRAND PRE

WSI LANDFILL

ABANDONED C.P.R. RIGHT OF WAY

SCHOOL

PARK

INSTIT.

INSTITUTIONAL

COMMERCIAL

ESCARPMENT

FIRE HALL

"FOREST VALLEY PUMPING STATION"

LOCAL PUMP STA. No.1

LOCAL PUMP STA. No.2

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE SERVICING STUDY UPDATE

SANITARY SEWER SYSTEM

Scale 0 40 120 200m

Dwg. No. SAN

Own By E.C. Date 04.10.29 Revision 2

NO.	REVISIONS	BY	DATE
1	ISSUED FOR UTILITY CIRCULATION	GTP	05/03/15

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

Ainley CONSULTING ENGINEERS PLANNERS

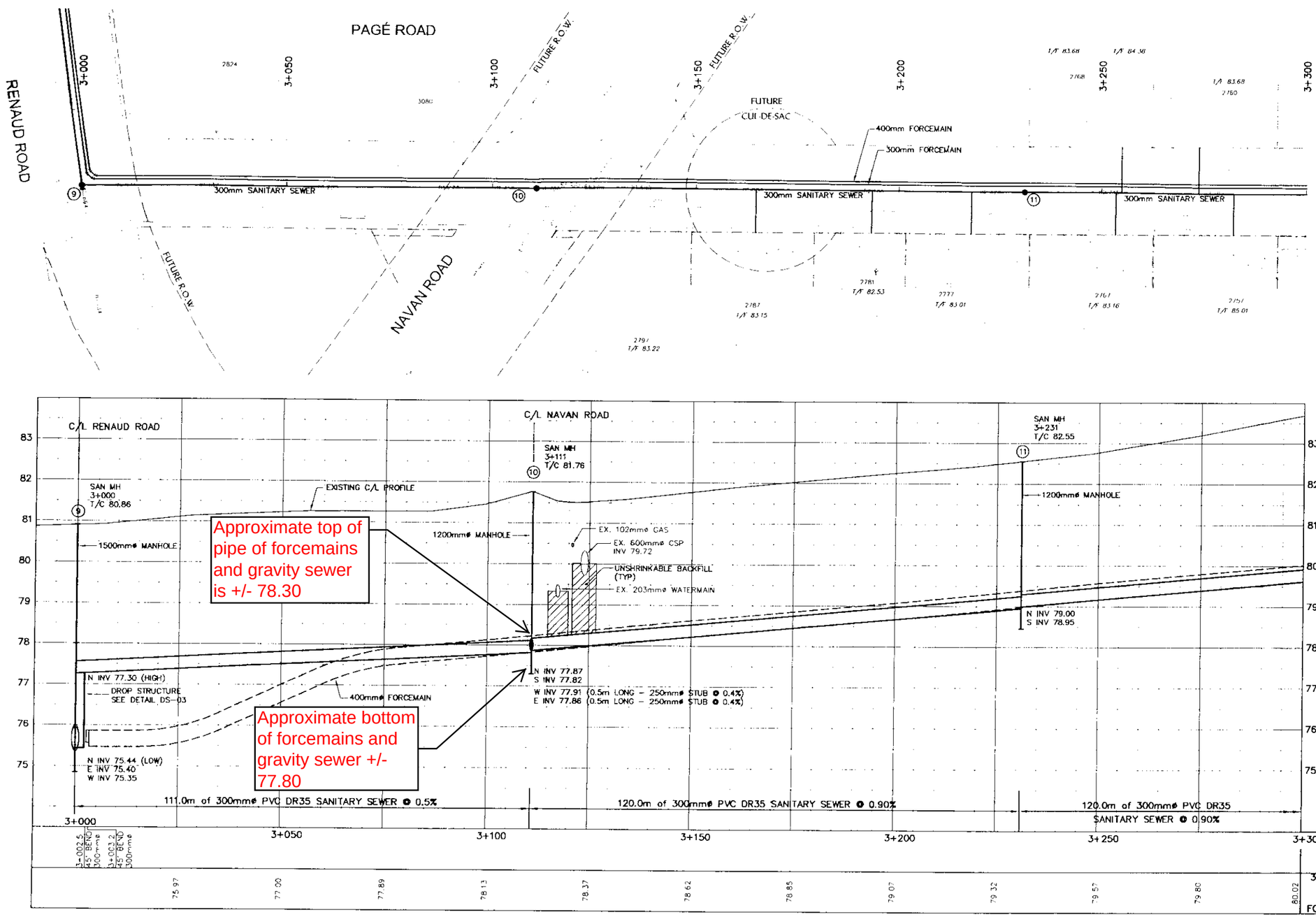
FOREST VALLEY SANITARY SERVICING

DUAL FORCEMAIN & 300mmø SANITARY SEWER
STA 3+000 – STA 3+300
PAGÉ ROAD

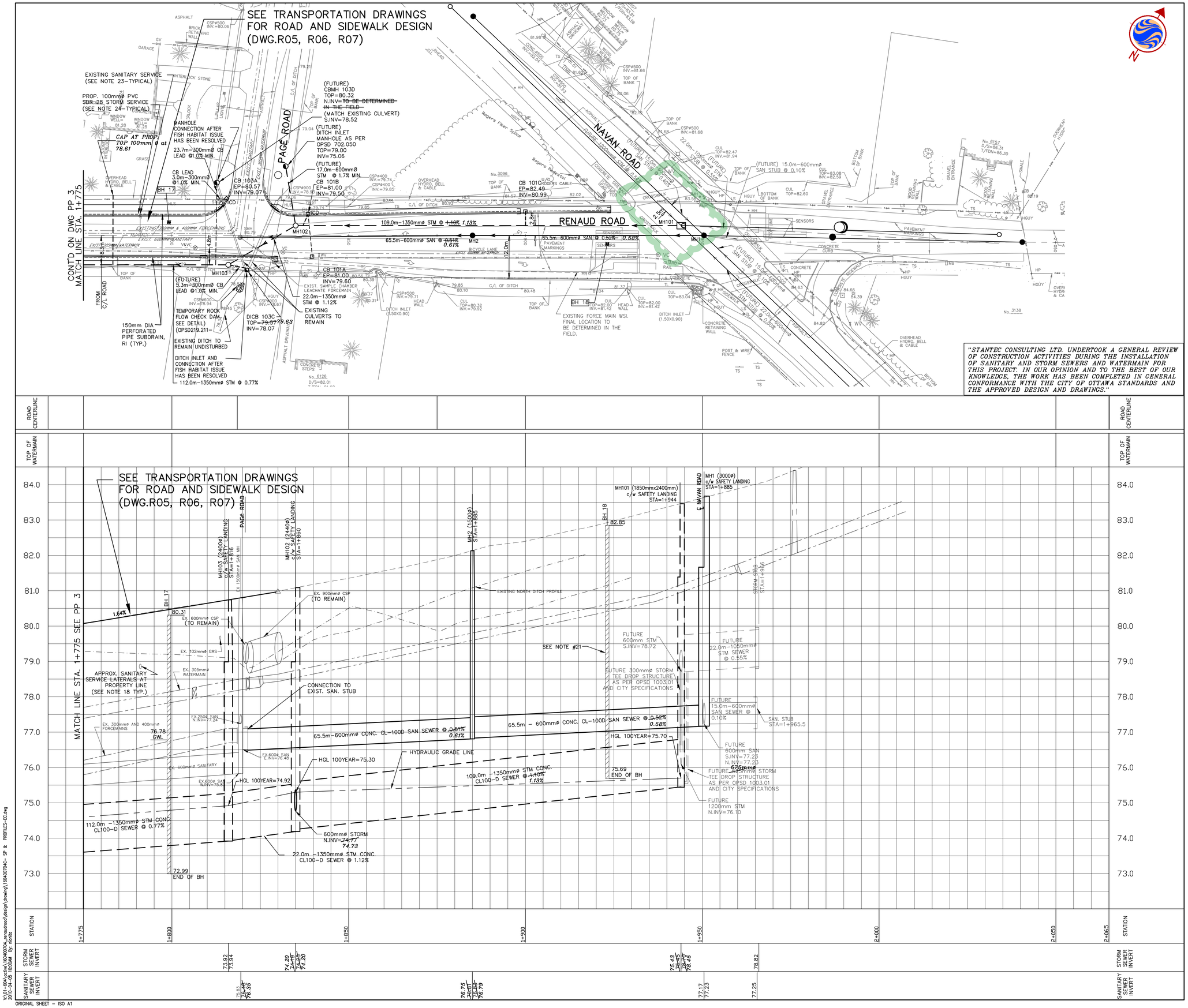
R. HEWITT, P.ENG. — Director Infrastructure Services
W. CLOUTHIER, P.ENG. — Manager Construction Services-Development

Dwn: AVH | Chkd: GTP | Dsn: – | Chkd: –

Ottawa
CONTRACT NO. ISB02 - XXXX
DWG. NO. C6
SHEET – OF –
DATE –
SCALE Hor 0m 5 10m, Vert 0m 1m



Mar 14, 2005 I:\DRAWINGS\20085\Design Drawings\Page Road.dwg



ORIGINAL SHEET – ISO A1

V:\01-ACA\active\160400704_renaudroad\design\drawing\160400704C- SP & PROFILES-CC.dwg
2010-04-05 10:00AM by: rsmith

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Stantec

Notes

1. ALL MATERIALS AND CONSTRUCTION METHODS TO BE IN ACCORDANCE WITH OPS AND CITY OF OTTAWA STANDARD SPECIFICATIONS AND DRAWINGS AND OPSD SUPPLEMENT. ONTARIO PROVINCIAL STANDARDS WILL APPLY WHERE NO CITY STANDARDS ARE AVAILABLE.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED AND BEAR COST OF SAME INCLUDING WATER PERMIT AND ASSOCIATED COSTS.
3. SERVICE AND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO VERIFY LOCATION AND ELEVATION OF EXISTING SERVICES AND UTILITIES PRIOR TO ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING LOCATES FROM ALL UTILITY COMPANIES TO LOCATE EXISTING UTILITIES PRIOR TO EXCAVATION. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTION AND REINSTATEMENT.
4. ALL DISTURBED AREAS SHALL BE REINSTATED TO EQUAL OR BETTER CONDITION TO THE SATISFACTION OF THE ENGINEER & THE CITY. PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH OPSD 509.010 AND OPSS 310.
5. STORM SEWERS 375mm DIA. OR SMALLER SHALL BE PVC SDR 35. STORM SEWERS LARGER THAN 375mm DIA. SHALL BE CONCRETE CSA A 257 CLASS 100 D.
6. STORM MANHOLES SIZE SHALL BE AS INDICATED ON THE PROFILES IN ACCORDANCE WITH OPSD c/w FRAME AND COVER AS PER CITY OF OTTAWA S24.1 AND S25.
7. STREET CBs SHALL BE CURB INLET TYPE AS PER CITY STANDARD S3. FRAME AND COVER AS PER CITY STANDARD S22 AND S23, AND PROVIDED WITH 150mmø SPACERS. ALL CBs SHALL HAVE 600mmø SUMPS. CB LEADS SHALL BE 200mmø (MIN.) PVC SDR35 AT 1.0% MIN. ALL STREET CBs WILL BE INTERCONNECTED WITH ICDs. SEE SCHEDULE ON DWG. OSD-1.
8. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES TO PROVIDE PROTECTION FOR RECEIVING STORM SEWERS OR DRAINAGE DURING CONSTRUCTION ACTIVITIES. (ie: FILTER CLOTH ON CATCH BASINS, STRAW BALE CHECK DAMS AND SEDIMENT CONTROLS AROUND ALL DISTURBED AREAS). DEWATERING SHALL BE PUMPED INTO SEDIMENT TRAPS. (SEE EROSION CONTROL PLAN).
9. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300 mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA
10. SEWER TRENCH SHALL CONSIST OF A CLASS "B" BEDDING AS PER CITY OF OTTAWA STANDARDS S6 AND S7. COMPACTION SHALL BE A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
11. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
12. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEWED BY THE CITY OF OTTAWA PRIOR TO TREE CUTTING.
13. CONTRACTOR SHALL PERFORM VIDEO INSPECTION OF ALL STORM SEWERS. A COPY OF THE VIDEO AND INSPECTION REPORT SHALL BE SUBMITTED TO THE CONSULTANT FOR REVIEW.
14. ASPHALT WEAR COURSE SHALL NOT BE PLACED UNTIL THE VIDEO INSPECTION OF SEWERS & NECESSARY REPAIRS HAVE BEEN CARRIED OUT TO THE SATISFACTION OF THE CONSULTANT.
15. SUB-EXCAVATE SOFT AREAS & FILL WITH GRANULAR 'B' COMPACTED IN 0.15m LAYERS.
16. CONCRETE CURBS SHALL BE CONSTRUCTED AS PER CITY STANDARD SC1.1
17. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
18. RECONNECT EXISTING SANITARY SERVICE LATERALS FROM EXISTING RESIDENTAL UNITS AS REQUIRED AS PER CITY STANDARD S11.
19. STORM SERVICE LATERALS TO BE INSTALL FOR THE EXISTING RESIDENTS ALONG RENAUD ROAD TO PROPERTY LINE AS REQUIRED AS PER CITY STANDARD S11. CONNECTION LOCATION AND INV. TO BE DETERMINED IN FIELD. (INVERT AT PROPERTY LINE SHALL BE A MINIMUM OF 3.0m BELOW TOP OF FOUNDATION WALL.)
20. 150mmø SUBDRAIN TO BE INSTALLED 300mm BELOW SUBGRADE LEVEL CONTINUOUS ALONG BOTH SIDES OF PAVEMENT, CONNECTED TO CATCHBASINS.
21. REFER TO GEOTECHNICAL REPORT BY PATERSONGROUP DATED NOVEMBER 17, 2008 FOR TEST PIT INFORMATION AND GEOTECHNICAL RECOMMENDATIONS.

7	*AS RECORDED*	*GBU*	*GT*	*11.12.12*
6	*AS RECORDED*	*CTL*	*PM*	*11.03.25*
5	ISSUED FOR CONSTRUCTION	NI	TJW	10.04.01
4	ISSUED FOR TENDER	NI	TJW	09.04.17
3	ADD FRONT YARD GRADING	NI	TJW	09.02.25
2	REVISED AS PER CITY COMMENTS/ ADD BOREHOLES INFORMATION	NI	TJW	08.12.01
1	REVISED STORM SEWER ALIGNMENT AS PER CITY COMMENTS	NI	TJW	08.10.17
0	1ST SUBMISSION	NI	TJW	08.08.12
Revision		By	Appd.	YY.MM.DD
File Name: 160400704C-SP&PP		NI	PM	TJW	08.07.10
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Seal

RECORD DRAWING
DATE DEC. 12/11

Client/Project

CLARIDGE HOMES (CARSON) INC.

RENAUD ROAD IMPROVEMENTS

Ottawa ON Canada

Title

RENAUD ROAD
STA. 1+775 TO STA. 1+966

Project No. 160400704

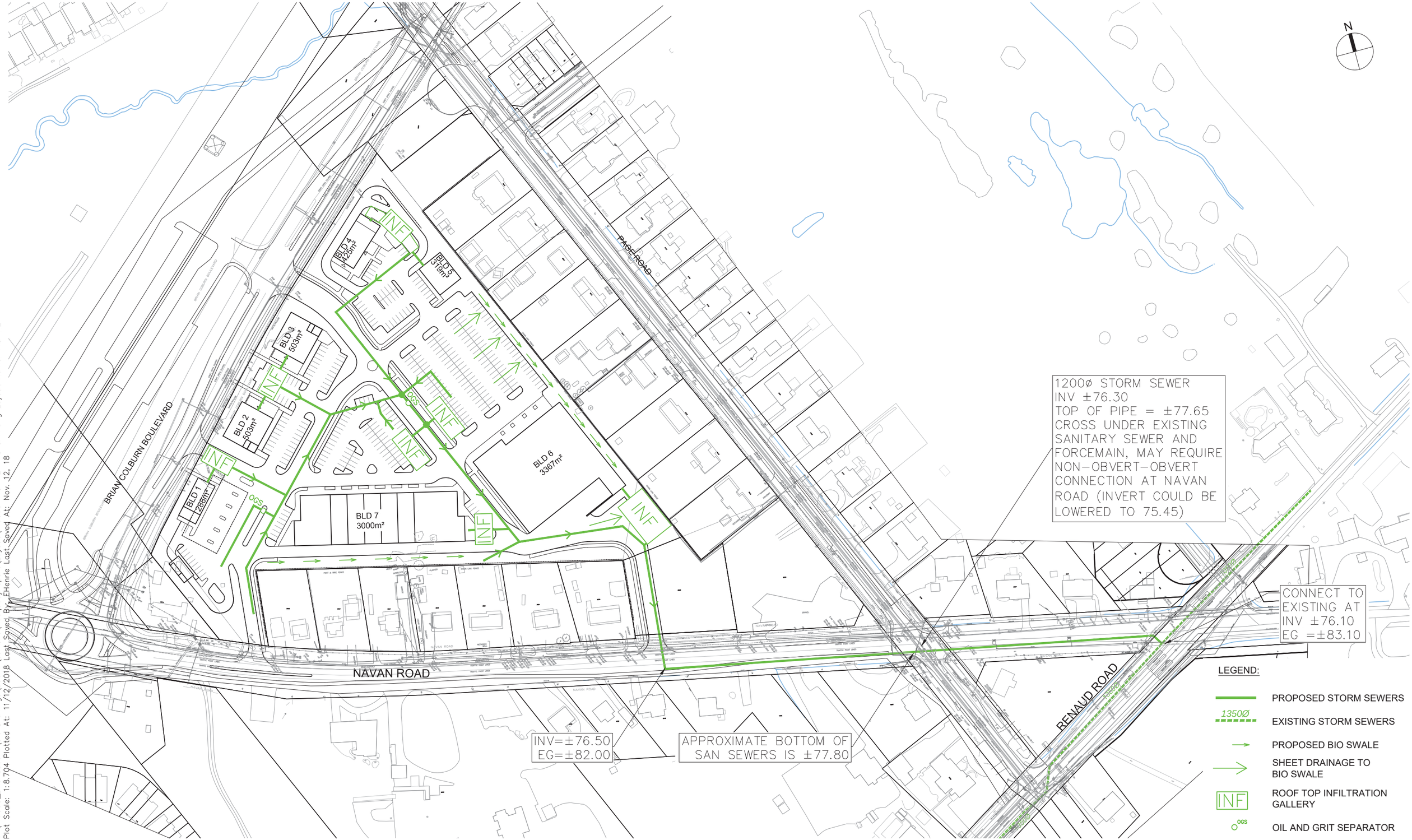
Scale 1:500H 0 5 15 25m
1:50V 0 0.5 1.5 2.5m

Drawing No. PP-4

Sheet 6 of 12

Revision 7

APPENDIX C



J:\116393_BrianColburn\5.9 Drawings\59civil\current\AdequacyReport\Layout\116393-FIG 4.2 - STORM.dwg Layout Name: FIG 4.2
Plot Scale: 1:8.704 Plotted At: 11/12/2018 Last Saved By: EHenrie Last Saved At: Nov. 12, 18

IBI

Scale
1 : 2000

Project Title
2893 NAVAN ROAD
COMMERCIAL SITE

Drawing Title
CONCEPTUAL STORMWATER
MANAGEMENT PLAN

Sheet No.
FIGURE 4.2

J:\116393_BrianCoburn\5.9 Drawings\59civil\current\AdequacyReport\Layout\116393-FIG 4.3 - STORM.dwg Layout Name: FIG 4.3
Plot Scale: 1:8.704 Plotted At: 11/12/2018 Last Saved By: EHenrie Last Saved At: Nov. 12, 18

IBI	Scale: 1 : 1250	Project Title: 2893 NAVAN ROAD COMMERCIAL SITE	Drawing Title: CONCEPTUAL INFILTRATION STRATEGY
			Sheet No.: FIGURE 4.3

J:\116393_BrianColburn\5.9 Drawings\59civil\current\AdequacyReport\Layout\116393-FIG 4.4 - STORM.dwg
Plot Scale: 1:8.704 Plotted At: 11/12/2018 Last Saved By: EHenrie Last Saved At: Nov. 12, 18

Scale	Project Title	Drawing Title	Sheet No.
1 : 1250	2893 NAVAN ROAD COMMERCIAL SITE	LID TRIBUTARY AREAS	FIGURE 4.4

PRELIMINARY INFILTRATION GALLERY SIZING CALCULATION

Taggart Realty Management
Navan Road @ Brian Coburn Commercial
Date: 2018-11-12
Prepared by: RM
Checked by : PD

BLD 1 incl gas bar 1143 m^2
Effective Runoff 95%
Percolation 0.14 (m/day, avg silty Clay)
INFILTRATION GALLERY SIZING
Width 9 m
Length 14 m
depth 0.6 m
Number Cells 1
void ratio 0.38 (19mm clear stone with non-woven geotextile)
28.728 TOTAL DRYCELL VOL

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	28.2	28.2	28.2	0.0	17.1	2.1	9.1

BLD 2 & 3 1006 m^2
Effective Runoff 95%
Percolation 0.14 (m/day, avg silty Clay)
INFILTRATION GALLERY SIZING
Width 7.5 m
Length 15 m
depth 0.6 m
Number Cells 1
void ratio 0.38 (19mm clear stone with non-woven geotextile)
25.65 TOTAL DRYCELL VOL

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	24.8	24.8	24.8	0.0	15.2	2.0	7.6

BLD 4 & BLD 5 744 m^2
Effective Runoff 95%
Percolation 0.14 (m/day, avg silty Clay)
INFILTRATION GALLERY SIZING
Width 7 m
Length 10 m
depth 0.75 m
Number Cells 1
void ratio 0.38 (19mm clear stone with non-woven geotextile)
19.95 TOTAL DRYCELL VOL

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	18.4	18.4	18.4	0.0	9.5	1.5	7.4

BLD 6 3367 m^2
Effective Runoff 95%
Percolation 0.36 (m/day, avg silty Sand)
INFILTRATION GALLERY SIZING
Width 18.5 m
Length 26 m
depth 1 m
Number Cells 1
void ratio 0.38 (19mm clear stone with non-woven geotextile)
182.78 TOTAL DRYCELL VOL Residual = 99.62 for use in Parking Area 2B

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	83.2	83.2	83.2	0.0	83.2	0.0	0.0

BLD 7 3000 m^2
Effective Runoff 95%
Percolation 0.36 (m/day, avg silty Sand)
INFILTRATION GALLERY SIZING
Width 12.5 m
Length 26 m
depth 0.6 m
Number Cells 1
void ratio 0.38 (19mm clear stone with non-woven geotextile)
74.1 TOTAL DRYCELL VOL

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	74.1	74.1	74.1	0.0	74.1	0.0	0.0

Parking 1 20669 m^6
Effective Runoff 95%
Percolation 0.14 (m/day, avg silty Sand)
INFILTRATION GALLERY SIZING
Width 18 m
Length 38 m
depth 1 m
Number Cells 2
void ratio 0.38 (19mm clear stone with non-woven geotextile)
519.84 TOTAL DRYCELL VOL

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	510.5	510.5	510.5	0.0	185.4	5.1	320.1

Parking 2A 3423 m^2
Effective Runoff 95%
Percolation 0.36 (m/day, avg silty Clay)
INFILTRATION GALLERY SIZING

Underground			Surface		
Width	3	m	Width	1.5	m
Length	25	m	Length	130	m
depth	1	m	depth	0.3	m
Number Cells	1		Number Cells	1	
void ratio	0.38	(19mm clear stone with non-woven	void ratio	1	Bioswale
	28.5	geotextile using 150mm perched TCB, no pipe)		58.5	
	87	TOTAL DRYCELL VOL			

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	84.5	84.5	84.5	0.0	27.0	6.7	50.8

Parking 2B 5190 m^7
Effective Runoff 95%
Percolation 0.36 (m/day, avg silty Clay)
INFILTRATION GALLERY SIZING

Underground			Surface		
			Width	10	m
Refer to Residual from BLD 6			Length	15	m
			depth	0.2	m (avg h, d=.3)
			Number Cells	1	
			void ratio	1	Bioswale
	99.6	geotextile using 150mm perched TCB, no pipe)		30	
	129.62	TOTAL DRYCELL VOL			

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	128.2	128.2	128.2	0.0	128.2	0.0	0.0

Parking 4 1695 m^8
Effective Runoff 95%
Percolation 0.36 (m/day, avg silty Sand)
INFILTRATION GALLERY SIZING

Underground			Surface		
Width	3	m	Width	1	m
Length	35	m	Length	100	m
depth	0.6	m	depth	0.2	m (avg h, d=.3)
Number Cells	1		Number Cells	1	
void ratio	0.38	(19mm clear stone with non-woven	void ratio	1	Bioswale
	23.94	geotextile using 150mm perched TCB, no pipe)		20	
	43.94	TOTAL DRYCELL VOL			

DATE	RAINFALL	RAINFALL INTENSITY (AVG)	RAINWATER AVAILABLE	VOLUME INFLOW TO DRYCELL	VOLUME IN DRY CELL	VOLUME PASSING DRY CELL	INFILTRATION FROM BOTTOM	INFILTRATION FROM SIDES (BOTTOM 1/3)	BALANCE IN DRYCELL
	[MM]	[MM/HR]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]	[M^3]
Previous Day	0	0.000	0	0	0	0	0	0	0
26mm/day Event	26	1.083	41.9	41.9	41.9	0.0	37.8	9.1	0.0

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) - POND 3

Manning's 0.013 **Return Frequency** = 5 years

		AREA (Ha)							FLOW					SEWER DATA																	
From Node	To Node	R= 0.3	R= 0.5	R= 0.55	R= 0.6	R= 0.75	R= 0.79	R= 0.82	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	DIA. (m) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (m/m)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full	Upstream OG	Downstream OG	Upstream Invert	Upstream Obvert	Downstream Invert	Downstream Obvert	Drop Structure	US Frost Depth	DS Frost Depth
601A	601	0.00	4.45	0.00	0.00	0.00	1.50	0.00	9.48	9.48	21.00	68.13	645.86	0.76	750	CONC	0.0035	90	687.1	1.5	1.00	0.94	86.00	85.50	81.27	82.03	80.95	81.71		3.97	3.79
601	602	0.00	4.91	0.00	0.00	0.00	1.80	0.00	10.78	20.26	22.00	66.15	1340.16	0.91	900	CONC	0.0055	220	1400.6	2.1	1.72	0.96	85.50	83.90	80.80	81.71	79.59	80.50		3.79	3.40
602	603	0.00	0.66	3.50	0.00	0.97	1.43	1.75	15.42	35.68	23.71	63.03	2248.78	0.99	975	CONC	0.01	70	2338.0	3.0	0.38	0.96	83.90	82.50	79.51	80.50	78.81	79.80	2.26	3.40	2.70
603B	603A	0.00	4.42	3.47	0.00	0.00	1.24	1.80	18.28	18.28	22.00	66.15	1208.89	0.99	975	CONC	0.003	150	1280.5	1.7	1.50	0.94	81.50	81.50	77.50	78.49	77.05	78.04		3.01	3.46
603A	603	0.00	5.58	0.00	0.00	0.00	1.08	0.38	10.99	29.27	23.50	63.39	1855.51	1.07	1050	CONC	0.0045	110	1911.0	2.1	0.86	0.97	81.50	82.50	76.97	78.04	76.48	77.54		3.46	4.96
603	604	0.00	0.66	0.00	0.00	0.00	0.28	0.00	1.53	66.48	25.96	59.41	3949.46	1.37	1350	CONC	0.006	100	4313.1	2.9	0.57	0.92	82.50	80.80	76.17	77.54	75.57	76.94	0.52	4.96	3.86
604	605	0.00	1.03	0.00	0.00	0.00	0.52	0.00	2.57	69.06	26.53	58.56	4043.75	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.94	80.80	78.40	75.05	76.42	74.15	75.52	0.40	4.38	2.88
605	606	0.00	0.89	0.41	0.00	0.00	0.39	0.00	2.72	71.78	27.39	57.33	4115.22	1.37	1350	CONC	0.006	150	4313.1	2.9	0.86	0.95	78.40	77.00	73.75	75.12	72.85	74.22	0.40	3.28	2.78
606	607	0.00	1.66	0.00	0.00	0.00	0.74	0.00	3.93	75.71	28.24	56.17	4252.25	1.37	1350	CONC	0.006	250	4313.1	2.9	1.43	0.99	77.00	76.00	72.45	73.82	70.95	72.32	1.60	3.18	3.68
607	608	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.55	76.26	29.67	54.33	4143.26	1.37	1350	CONC	0.006	90	4313.1	2.9	0.51	0.96	76.00	73.00	69.35	70.72	68.81	70.18	1.10	5.28	2.82
608E	608D	0.41	3.79	0.00	0.00	0.00	1.58	0.00	9.08	9.08	20.00	70.25	637.88	0.91	900	CONC	0.0013	170	680.9	1.0	2.73	0.94	71.00	71.00	68.59	69.50	68.36	69.28		1.50	1.72
608D	608	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.86	9.94	22.73	64.77	643.62	0.91	900	CONC	0.0013	150	680.9	1.0	2.41	0.95	71.00	73.00	68.36	69.28	68.17	69.08		1.72	3.92
608C	608B	0.00	2.57	3.82	0.00	0.00	1.80	0.00	13.37	13.37	19.00	72.53	969.39	0.84	825	CONC	0.005	60	1058.9	1.9	0.52	0.92	74.00	74.00	69.50	70.33	69.20	70.03		3.67	3.97
608B	608A	0.00	3.12	0.00	0.00	0.00	0.96	0.00	6.45	19.81	19.52	71.32	1412.95	0.99	975	CONC	0.005	120	1653.2	2.1	0.93	0.85	74.00	72.80	69.04	70.03	68.44	69.43		3.97	3.37
608A	608	1.26	2.29	0.00	0.00	0.00	1.25	0.00	6.98	26.79	20.45	69.27	1855.82	1.07	1050	CONC	0.005	70	2014.4	2.3	0.52	0.92	72.80	73.00	68.37	69.43	68.02	69.08		3.37	3.92
608	609	0.00	2.60	0.00	0.00	0.00	1.11	0.00	6.05	119.04	30.18	53.70	6392.78	1.98	1950	CONC	0.002	290	6638.9	2.2	2.24	0.96	73.00	76.00	67.10	69.08	66.52	68.50	0.46	3.92	7.50
700	701	16.26	2.78	0.00	0.00	1.39	4.09	0.00	29.31	29.31	25.00	60.90	1784.60	0.91	900	CONC	0.0095	170	1840.8	2.8	1.01	0.97	86.00	86.50	81.53	82.45	79.92	80.83	1.33	3.56	5.67
701A	701	0.00	6.89	0.00	0.00	0.00	0.00	1.29	12.52	12.52	15.00	83.56	1045.95	0.84	825	CONC	0.005	330	1058.9	1.9	2.87	0.99	86.50	86.50	82.96	83.80	81.31	82.15	2.65	2.70	4.35
701	702	0.00	1.56	0.00	0.00	0.00	0.46	1.30	6.14	47.97	26.01	59.33	2845.74	0.99	975	CONC	0.023	210	3545.7	4.6	0.76	0.80	86.50	79.00	78.51	79.50	73.68	74.67		7.00	4.33
702A	702	0.00	0.00	0.00	0.00	3.11	1.67	0.00	10.15	10.15	20.00	70.25	713.19	0.61	600	CONC	0.02	150	905.9	3.1	0.81	0.79	83.50	79.00	78.89	79.50	75.89	76.50	1.83	4.00	2.50
702	703	0.00	0.00	0.36	0.00	0.00	0.54	0.00	1.74	59.85	26.77	58.21	3483.92	1.07	1050	CONC	0.024	210	4413.3	4.9	0.71	0.79	79.00	71.00	73.60	74.67	68.56	69.63		4.33	1.37
703	704	5.02	0.00	0.41	0.00	0.00	0.41	0.00	5.71	65.57	27.48	57.20	3750.72	1.83	1800	CONC	0.0012	160	4154.1	1.6	1.69	0.90	71.00	70.80	67.80	69.63	67.61	69.44		1.37	1.36
704	705	0.99	0.00	0.55	0.00	3.19	0.45	0.00	9.31	74.87	29.17	54.96	4115.38	1.83	1800	CONC	0.0013	180	4323.7	1.6	1.82	0.95	70.80	70.50	67.61	69.44	67.38	69.20		1.36	1.30
705A	705	0.00	0.00	2.06	0.00	0.00	1.74	0.00	6.97	6.97	23.00	64.29	448.15	0.69	675	CONC	0.003	80	480.3	1.3	1.03	0.93	71.50	70.50	68.76	69.44	68.52	69.20		2.06	1.30
705	706	0.00	0.00	0.92	0.00	0.00	0.44	0.00	2.37	84.22	30.99	52.75	4442.71	1.98	1950	CONC	0.001	160	4694.4	1.5	1.75	0.95	70.50	71.00	67.22	69.20	67.06	69.04		1.30	1.96
706C	706B	0.00	0.00	5.20	0.00	0.00	2.00	0.00	12.34	12.34	21.00	68.13	840.94	0.69	675	CONC	0.012	155	960.6	2.6	0.99	0.88	75.00	72.00	71.13	71.81	69.27	69.95		3.19	2.05
706B	706A	0.00	0.00	0.64	0.00	0.00	0.22	0.00	1.46	13.80	21.99	66.16	913.32	0.76	750	CONC	0.007	80	971.7	2.1	0.63	0.94	72.00	72.00	69.19	69.95	68.63	69.39		2.05	2.61
706A	706	0.00	0.00	1.74	0.00	0.00	1.16	0.00	5.21	19.01	22.62	64.98	1235.49	0.91	900	CONC	0.005	70	1335.4	2.0	0.57	0.93	72.00	71.00	68.48	69.39	68.13	69.04		2.61	1.96
706	707	0.00	0.00	0.50	0.00	0.00	0.21	0.00	1.23	104.46	32.74	50.81	5307.00	1.98	1950	CONC	0.0015	100	5749.5	1.9	0.89	0.92	71.00	72.00	67.06	69.04	66.91	68.89		1.96	3.11
707	708	0.00	0.00	2.66	0.00	0.00	1.20	0.00	6.70	111.16	33.63	49.87	5543.80	1.98	1950	CONC	0.0015	175	5749.5	1.9	1.56	0.96	72.00	76.00	66.91	68.89	66.65	68.63		3.11	7.37
708	609	0.00	0.00	1.38	0.00	0.00	0.67	0.00	3.58	114.74	35.20	48.33	5545.19	1.98	1950	CONC	0.0015	85	5749.5	1.9	0.76	0.96	76.00	76.00	66.65	68.63	66.52	68.50	0.46	7.37	7.50
609	610	0.00	3.00	0.00	0.00	0.00	1.21	0.00	6.83	240.60	35.96	47.62	11456.50	1.52	1500 x 4200	CONC	0.002	160	14595.0	2.3	1.15	0.78	76.00	72.00	66.52	68.04	66.20	67.72		7.96	4.28
610	Outlet	0.00	3.98	0.00	0.00	0.00	0.96	0.00	7.64	248.25	37.11	46.58	11563.06	1.52	1500 x 4200	CONC	0.002	100	14595.0	2.3	0.72	0.79	72.00	70.00	66.20	67.72	66.00	67.52		4.28	2.48
800	801	0.00	0.00	2.51	0.00	0.00	0.73	0.00	5.44	5.44	18.00	74.97	407.91	0.84	825	CONC	0.001	140	473.6	0.9	2.72	0.86	70.00	70.00	67.60	68.44	67.46	68.30		1.56	1.70
801	802	0.00	0.00	1.02	0.00	0.00	0.34	0.00	2.31	7.75	20.72	68.71	532.33	0.91	900	CONC	0.001	80	597.2	0.9	1.47	0.89	70.00	70.00	67.38	68.30	67.30	68.22		1.70	1.78
802	803	0.00	0.00	2.06	0.00	0.00	0.77	0.00	4.84	12.59	22.19	65.79	828.22	1.07	1050	CONC	0.001	195	900.9	1.0	3.22	0.92	70.00	70.00	67.15	68.22	66.96	68.02		1.78	1.98
803	804	0.00	0.00	1.60	0.00	0.00	0.75	0.00	4.09	16.68	25.41	60.25	1005.07	1.07	1050	CONC	0.0013	80	1027.1	1.1	1.16	0.98	70.00	70.00	66.96	68.02	66.85	67.92		1.98	2.08
804	805	0.00	0.00	2.76	0.00	0.00	0.83	0.00	6.04	22.72	26.57	58.50	1329.38	1.22	1200	CONC	0.0012	285	1409.0	1.2	3.94	0.94	70.00	70.00	66.70	67.92	66.36	67.58		2.08	2.42
805	806	0.00	0.00	1.51	0.00	0.00	0.70	0.00	3.85	26.57	30.51	53.32	1416.74	1.22	1200	CONC	0.0013	80	1466.5	1.3	1.06	0.97	70.00	70.00	66.36	67.58	66.26	67.47		2.42	2.53
806	807	0.86	0.00	1.24	0.00	0.00	0.41	0.00	3.51	30.08	31.57	52.09	1567.14	1.22	1200	CONC	0.0017	70	1677.0	1.4	0.81	0.93	70.00	70.00	66.26	67.47	66.14	67.36		2.53	2.64
807	Outlet	0.00	0.00	0.86	0.00	0.00	0.34	0.00	2.06	32.15	32.38	51.19	1645.68	1.22	1200	CONC	0.0017	80	1677.0	1.4	0.93	0.98	70.00	70.00	66.14	67.36	66.00	67.22		2.64	2.78

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

Notes:
1) Ottawa IDF Curve
2) Min Velocity = 0.80 m/sec

Designed: B.D

Checked: F.W

Dwg. : STM / STM P1

PROJECT: Gloucester EUC Infrastructure Servicing Study Update

LOCATION: Stormwater Management Pond 3

File Ref. 1634-00493

Date: March-05

Sheet No. 1 of 1

N

- STORM SEWER AND MANHOLE
- STORM TRUNK SEWER AND MANHOLE
- STORM CATCHMENT AREA (POND #1)
- STORM CATCHMENT AREA (POND #2)
- STORM CATCHMENT AREA (POND #3)
- 30m CREEK BUFFER
- ORIGINAL GROUND / OBVERT
- AREA (ha) / RUNOFF COEFFICIENT / MANHOLE No.
- AREAS OF INSUFFICIENT COVER (LESS THAN 2.0m)

1. "PONDS 1 AND 3 EAST URBAN COMMUNITY DESIGN BRIEF" (STANTEC CONSULTING, APRIL 2001)
2. "CITY OF GLOUCESTER EAST URBAN COMMUNITY MASTER DRAINAGE PLAN" (GORE & STORRIE, 1992)
3. WATER LEVEL TO BE CONFIRMED AS PART OF THE REDESIGN OF POND 3.

Approximate Location of Subject Lands

HYDRO CORRIDOR
PROPOSED TRANSITWAY
PROPOSED BLACKBURN BY-PASS EXTENSION
MER BLEUE ROAD
FOURTH LINE ROAD
PAGE ROAD
WALL ROAD
NAVAN ROAD
SAPHIR AVE.
GRAND PRE
ABANDONED C.P.R. RIGHT OF WAY
WSI LANDFILL

STORM TRUNK SEWER No.1
STORM TRUNK SEWER No.2
STORM TRUNK SEWER No.3
STORM TRUNK SEWER No.4
STORM TRUNK SEWER No.5
STORM TRUNK SEWER No.6

POND 1
100 YR. WL=87.00m
NWL=80.10m

POND 2
100 YR. WL=80.00m
(2)

POND 3
100 YR. WL=68.50m
NWL=67.00m
(3)

PARK
SCHOOL
INSTIT.
INSTITUTIONAL
COMMERCIAL
FIRE HALL
ESCARPMENT

REVISION No.2 MARCH, 2005

CITY OF OTTAWA
GLOUCESTER EUC INFRASTRUCTURE SERVICING STUDY UPDATE

STORM SEWER SYSTEM

Scale: 0 40 120 200m
Dwg. No.: STM
Own By: E.C.
Date: 04.10.29
Revision: 2

APPENDIX D

LEGEND:

- 81.89 / 83.30 — PROPOSED ELEVATION / EXISTING ELEVATION
- MAJOR OVERLAND FLOW ROUTE
- FF=85.70 — PROPOSED FINISHED FLOOR ELEVETION
- LANDSCAPING RETAINING WALL
- ENGINEERED RETAINING WALL
- AREA EXCEEDING GRADE RAISE RESTRICTION (SPECIAL REVIEW REQUIRED BY GEOTECHNICAL CONSULTANT)
- BUILDING UPSTANDS (GRADE ABOVE FINISHED FLOOR)

N

BRIAN COLBURN BOULEVARD

PAGE ROAD

NAVAN ROAD

BLD 1 288m² FF=85.85

BLD 2 503m² FF=85.70

BLD 3 503m² FF=85.75

BLD 4 425m² FF=85.85

BLD 5 379m² FF=85.80

BLD 6 3367m² FF=85.50

BLD 7 3000m² FF=85.50

85.85 85.09

85.60 84.82

86.00 85.26

85.77 84.64

85.30 85.57

85.50 84.86

85.25 84.53

85.10 84.30

85.10 84.73

85.25 84.74

84.30 82.56

82.85 82.01

85.00 84.91

85.00 84.25

84.60 82.72

81.75 81.64

100YEAR CAPTURE

81.80 81.50

85.30 85.36

A

B

300–600mm LANDSCAPE RETAINING WALL

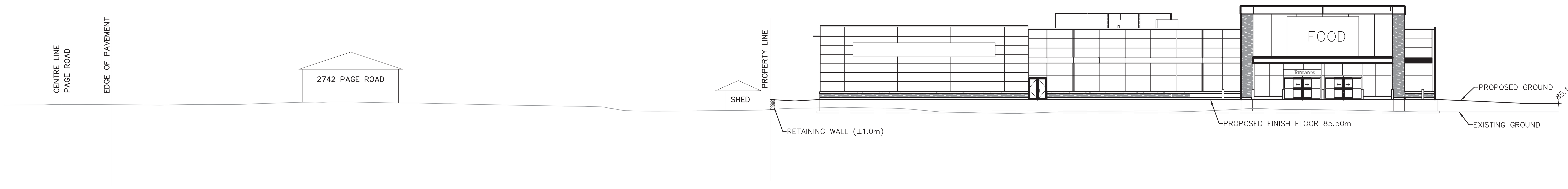
Plotted At: 11/12/2018 3:31 PM Last Saved By: Etherie Last
---- Plot Scale: 1:2.5849 Plot Style: MacroGrading.ctb Layout Name: MacroGrading.dwg Layout
\\116393_BrianColburn\5.9 Drawings\5.9Civil\current\Adequacy\Report\Layout\\116393 - FIG 5.1 - MacroGrading.dwg
Plotted At: Nov 12, 18

Scale: 1 : 750

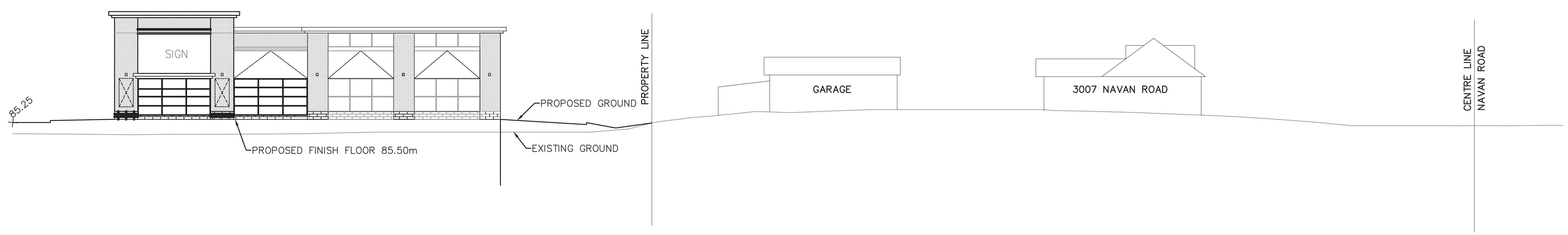
Project Title: NAVAN ROAD COMMERCIAL

Drawing Title: MACRO GRADING

Sheet No.: FIGURE 5.1



CROSS SECTION A–A



CROSS SECTION B–B

Scale	Project Title	Drawing Title	Sheet No.
1:200	NAVAN ROAD COMMERCIAL	CROSS SECTIONS	FIGURE 5.2