Servicing Brief
115201-5.2.2.1

380 ROLLING MEADOW CR
SPRING VALLEY ZENS

CITY OF OTTAWA

Prepared for CLARIDGE HOMES
by IBI Group
October 11, 2018

Table of Contents

1 INTRODUCTION 1

2 WATER DISTRIBUTION 2

2.1 Existing Conditions 2

2.2 Design Criteria 2

2.2.1 Water Demands 2

2.2.2 System Pressure 2

3 WASTEWATER SYSTEM 4

3.1 Existing Conditions 4

3.2 Design Criteria 4

3.3 Recommended Wastewater Plan 4

4 STORMWATER MANAGEMENT 5

4.1 Background 5

4.2 Objective 5

4.3 Design Criteria 5

4.4 Proposed Minor System 6

4.5 Stormwater Management 6

4.6 Inlet Controls 6

4.7 On-Site Detention 7

4.8 Low Impact Development 8

5 SOURCE CONTROLS 9

5.1 General 9

5.2 Lot Grading 9

5.3 Roof Leaders 9

5.4 Vegetation 9

6 CONVEYANCE CONTROLS 10

6.1 General 10

6.2 Flat Vegetated Swales 10

6.3 Catchbasins 10

Table of Contents (continued)

6.4 Pervious Rear Yard Drainage 10

7 SEDIMENT AND EROSION CONTROL PLAN 11

7.1 General 11
7.2 Trench Dewatering 11
7.3 Temporary Flow Controls in Existing Manholes 11
7.4 Bulkhead Barriers 11
7.5 Seepage Barriers 11
7.6 Surface Structure Filters 12
7.7 Stockpile Management 12

8 ROADS .... Error! Bookmark not defined.

9 SOILS 13

10 RECOMMENDATIONS 14

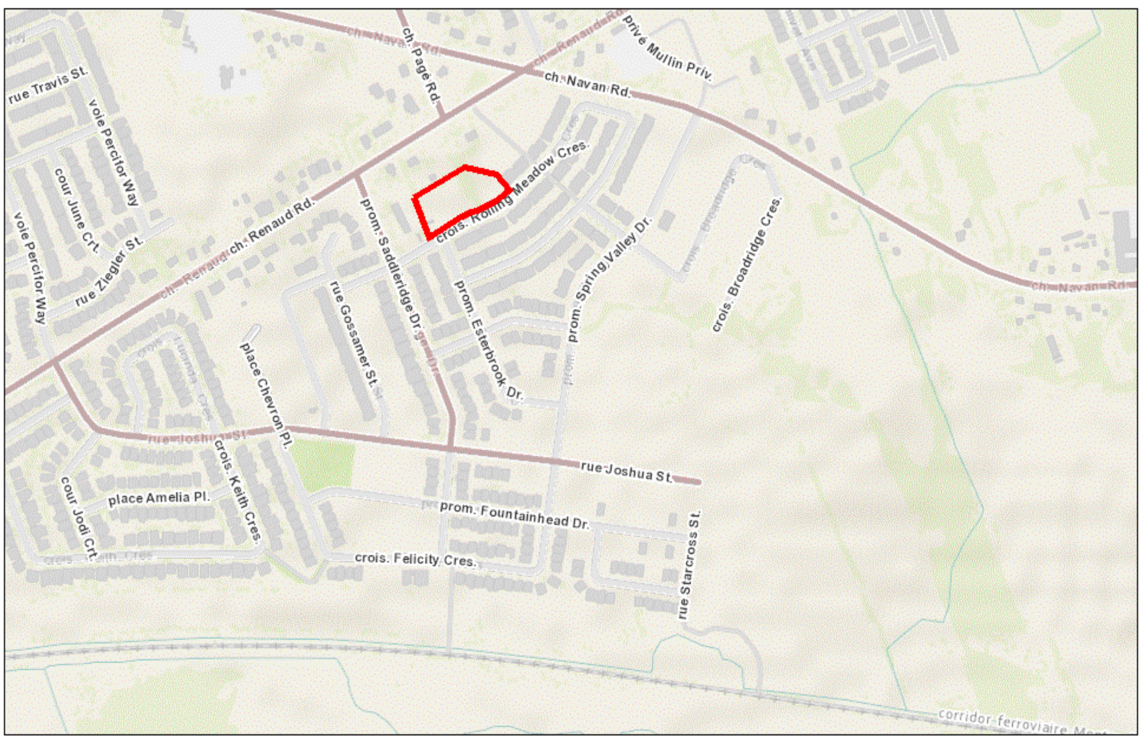
1 INTRODUCTION

IBI Group has been retained by Claridge Homes to prepare a Servicing Brief and detailed servicing design for Block 165 in Phase 2 of the Spring Valley Trails Subdivision in the City of Ottawa, formerly the Town of Gloucester.

Spring Valley Trails is a 35.65 ha parcel owned and developed by Claridge Homes. Of the 35.65ha parcel, Phase 1 is comprised of 11.68ha, Phase 2 is comprised of 9.49 ha, and Phase 4 is comprised of 1.20Ha. The municipal services for each of these phases has been constructed. Phase 3 consists of 13.28 ha and is currently under construction with a pending in-service memo. The development is part of the East Urban Community (EUC) and is subject to the EUC Design plan update which identified this area for low and medium density residential usages.

Block 165 is bounded by existing residential lands to the North, Rolling Meadow Crescent to the south, and existing residential (previous phases of Spring Valley Trails) to the east and vacant residential lands to the west. Refer to key plan on **Figure 1.1** for block location.

Figure 1.1 Site Location



The proposed development consists of Claridge's walk-up townhouse "ZEN" product. Claridge has previously constructed these units in multiple locations in Ottawa. A total of 4 walk-up buildings, each building consists of 12 units, are proposed over 0.68 Ha to be constructed. The site plan was prepared by RLA Architecture is included in **Appendix A**.

The proposed servicing design conforms to current City of Ottawa and MOE design criteria, and no pre-consultation meetings were requested from the Rideau Valley Conservation Authority (RVCA) or the Ministry of Environment of Ontario (MOE). A pre-consultation meeting occurred for this development with the City of Ottawa on February, 2018.

2 WATER DISTRIBUTION

2.1 Existing Conditions

As previously noted, the 0.68 hectare proposed development is located in Phase 2 of the development on the north side of Rolling Meadow Crescent. An existing 200mm diameter watermain is located within the Rolling Meadow Crescent right of way. The existing watermain is part of within the City of Ottawa's pressure district **Zone 2E** which will provide the water supply to the site. A water model was previously completed for the area, under the Phase 2 Servicing Brief. A copy of the boundary conditions, and water model from the Phase 2 Servicing Brief have been included in **Appendix A.**

2.2 Design Criteria

2.2.1 Water Demands

Water demands have been calculated for the full development. Per unit population density and consumption rates are taken from Tables 4.1 and 4.2 at the Ottawa Design Guidelines – Water Distribution and are summarized as follows:

- Single Family 3.4 person per unit
- Townhouse and Semi-Detached 2.7 person per unit
- Average Apartment 1.8 person per unit
- Residential Average Day Demand 350 l/cap/day
- Residential Peak Daily Demand 875 l/cap/day
- Residential Peak Hour Demand 1,925 l/cap/day

A watermain demand calculation sheet is included in **Appendix A** and the total water demands for area SV1-35 are summarized as follows for 48 stacked townhouse units:

- Average Day 0.45 l/s
- Maximum Day 1.12 l/s
- Peak Hour 2.46 l/s
- Fire Demand 125 l/s

2.2.2 System Pressure

The Ottawa Design Guidelines – Water Distribution (WDG001), July 2010, City of Ottawa, Clause 4.2.2 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 480 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in Clause 4.2.2 of 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

In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls will be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

The system pressure at node SV1-35 (node representing the subject development) is 559.87 kPa, dropping to 453.36kPa during the max day demand, to 445.84kPa during peak hour demand, and 354.65kPa during fire flow. A design flow rate of 334.86l/s is provided during fire flow conditions. The aforementioned system pressures meet the minimum requirements, and during basic day the pressures exceed the minimum allowable system pressure, therefore pressure reducing valves are required for each building. Pressure reducing valves are shown on the grading plan.

3 WASTEWATER SYSTEM

3.1 Existing Conditions

Phase 1, 2 and 4 of Spring Valley Trails has been constructed and is operational. The 200mmØ sanitary sewer on Rolling Meadow Crescent was constructed as part of Phase 2, and was designed to accommodate the subject development. The Phase 2 sanitary drainage area plan and design sheet are included in **Appendix B** illustrating that the design flows for the 48 stacked townhouse was part of the approved design. To this end no negative impact is anticipated on the existing downstream system.

3.2 Design Criteria

The sanitary flows for the development were determined based on the outdated City of Ottawa design criteria which includes, but it not limited to the following:

Population (Residential)	3.4 persons per single family unit
	2.7 persons per semi or townhouse unit
	1.8 persons per apartment unit
Domestic Flow:	350l/cap/day
Peak Factor (Residential only)	Harmon Formula
Institutional/Industrial/Commercial:	50,000l/d/Ha
Peak Factor (IIC only)	1.5
Extraneous Flow (Infiltration)	0.28l/s/Ha
Minimum Pipe Size:	200mm diameter

3.3 Recommended Wastewater Plan

As noted previously, the existing sanitary sewer system was designed and approved with 48 stacked townhouses being built on this block. To this end we anticipate no negative impact on the downstream system. The on-site sanitary system will consist of a network of 200mm PVC sewers installed at normal depth and slope and will provide four service connections to each building pad as required by the new building code. The sewers have been designed using the criteria noted above in section 3.2 and outlet via two connections to the existing sanitary sewer within the Rolling Meadow right of way on the south side of the subject site. The sanitary drainage area plan 115201-C-400 and the sanitary sewer design have been included in **Appendix B.**

4 STORMWATER MANAGEMENT

4.1 Background

As identified within Section 1, the development is part of the East Urban Community (EUC) and is subject to the EUC Design plan update which identified this area for low and medium density residential usages. In accordance with the EUC servicing study, stormwater from the neighbourhood will be conveyed to an end of pipe SWM treatment facility, identified in the EUC Infrastructure Servicing Study as Pond 3. Pond 3 has been constructed and is operational. For details on the SWM facility, see Stantec Report EUC SWM Facility #3 Design Brief, dated August 22, 2005, henceforth referred to as the 2005 Pond 3 Design Brief. Also, the EUC infrastructure servicing study report of March 2005 identified the development lands were to restrict stormwater flow into the piped system to an average of 85 l/s/Ha.

Additionally, subsequent to the pre-consultation meeting with City of Ottawa staff, City Staff advised that low impact development (LID) strategies must be implemented on this site. The NCC, the Conservation Authority and the City of Ottawa have undertaken a review and in the absence of the Cumulative Impact Statement (CIS) and its recommendations, the City has determined that all new development must attempt to infiltrate the first 25mm daily event in order to limit low flow erosion in the downstream receiving watercourse of Mudd Creek. .

4.2 Objective

The purpose of this evaluation is to prepare the dual drainage design for the Spring Valley Trails Walk-up development. The design includes the infiltration galleries, the sizing of inlet control devices including storm water retention strategies, sewer sizing.

4.3 Design Criteria

The stormwater system was designed following the principles of dual drainage, making accommodations for both major and minor flow.

Some of the key criteria include the following:

• Design Storm	1:5 year return (Ottawa)
• Rational Method Sewer Sizing	
• Initial Time of Concentration	10 minutes
• Runoff Coefficients	
- Landscaped Areas	C = 0.25
- Landscaped Areas with Walkway	C = 0.30 – 0.60
- Parking with landscaping	C = 0.75
- Roof	C = 0.90
• Pipe Velocities	0.80 m/s to 6.0 m/s
• Minimum Pipe Size	250 mm diameter (200 mm CB Leads)

4.4 Proposed Minor System

Using the criteria identified in Section 4.3, the proposed on-site storm sewers were sized accordingly. A detailed storm sewer design sheet and the associated storm sewer drainage area plan is included in **Appendix C**. The general plan of services, depicting all on-site storm sewers can be found in **Appendix A**.

It has been requested by the City of Ottawa that the site owner provide confirmation that the site owners will be responsible for regular maintenance of the on-site catch basins and inlet control devices (ICDs). Maintenance includes but is not limited to the cost of regular cleaning the structures and ICDs as necessary. The site owner will also be responsible for replacement of damaged or missing catch basin structures, grates or ICDs as needed. Confirmation from the owners will be forwarded directly to the City upon receipt.

4.5 Stormwater Management

The subject site will be limited to a release rate established using the criteria described in section 4.1. This will be achieved through a combination of inlet control devices (ICD's) at inlet locations, surface storage where possible and underground storage where required. The site has also been designed to capture and infiltrate the first 25mm of rain with the installation of underground infiltration galleries, refer to Site Storm Drainage and Infiltration Plan 115201-C-504 in **Appendix C** for further details.

Flows generated that are in excess of the site`s allowable release rate will be stored on site in strategic surface storage areas or underground chambers and gradually released into the minor system so as not to exceed the site's allowable release rate.

The maximum surface retention depth located within the developed areas will be limited to 300mm during a 1:100 year event as show on the ponding and grading plans located in **Appendix C.** Overland flow routes will be provided in the grading to permit emergency overland flow, in excess of the site storage, from the site.

At certain locations within the site, the opportunity to store runoff is limited due to grading constraints and building geometry. These locations are generally located at the perimeter of the site where it is necessary to tie into public boulevards and adjacent properties or in areas where ponding stormwater is undesirable. These "uncontrolled" areas – 0.023 hectares in total, have an average C value of 0.81. Based on 1:100 year storm uncontrolled flows, the uncontrolled areas generate 9.23 l/s runoff (refer to Section 4.6 for calculation).

Due to the steep slope of the site surface ponding storage is limited. Therefore all surface inlets are proposed to be directed to a central location where the stormwater is treated by an Oil and Grit Separator provided normal treatment (70% removal of TSS). The treated water discharges into a combination infiltration and major storm underground storage gallery. Below the invert of the outletting pipe, a clear stone filled basin is proposed to allow low flow storms to infiltrate into the subsoils. Above the clear stone filled basin is a series of interconnected hollow bottom High Density Polyethylene (HDPE) arches used for major storm water retention. A Soleno Hydrostor HS180 system is proposed with 5 rows of 5 chambers each (or an approved equal). Refer to **Appendix C** for details. Flows generated by the 100 year storm event will be restricted and retained onsite to meet the 85l/s/ha requirement of the MSS.

4.6 Inlet Controls

The allowable release rate for the 0.68 Ha site can be calculated as follows:

$\mathbf{Q_{allowable}}$ = 85 L/s/Ha as per EUC infrastructure servicing study report, March 2005

Area = 0.68 Ha

= **57.80 L/s**

As noted in Section 4.5, a portion of the site will be left to discharge to the Rolling Meadow Crescent at an uncontrolled rate in addition to the sunken patios which will drain internally and discharge through the building service.

Based on a 1:100 year event, the flow from the 0.07 Ha uncontrolled area can be determined as:

$\mathbf{Q_{uncontrolled}}$ = $\mathbf{2.78} \times \mathbf{C} \times \mathbf{i_{100yr}} \times \mathbf{A}$ where:

C = Average runoff coefficient of uncontrolled area = 0.81

$\mathbf{i_{100yr}}$ = Intensity of 100-year storm event (mm/hr)

= $1735.688 \times (T_c + 6.014)^{0.820}$ =178.56 mm/hr; where T_c = 10 minutes

A = Uncontrolled Area = 0.023 Ha

Therefore, the uncontrolled release rate can be determined as:

$\mathbf{Q_{uncontrolled}}$ = $\mathbf{2.78} \times \mathbf{C} \times \mathbf{i_{100yr}} \times \mathbf{A}$

= 2.78 x 0.81 x 178.56 x 0.023

= **9.23 L/s**

The maximum allowable release rate from the remainder of the site can then be determined as:

$\mathbf{Q_{max\ allowable}}$ = $\mathbf{Q_{restricted}} - \mathbf{Q_{uncontrolled}}$

= 57.80 L/s – 9.23 L/s

= **48.57 L/s**

Based on the aforementioned flow allowance inlet control devices are proposed for the flat roofs, and a single orifice is proposed for all of the surface drainage. Refer to stormwater management calculations in **Appendix C**.

The proposed stormwater management scheme consists of rooftop ICD's and 1 common orifice for the surface areas. The sum of all restricted flow rates (**48.26 l/s**) is less than the maximum allowable flowrate of 48.57 l/s. Refer to **Appendix C** for detailed calculations and orifice sizing.

LOCATION	AREA (HA)	RELEASE RATE	HEAD (M)	ICD
BLDG A	0.012	0.63 l/s	0.15	Watts Roof Drain with Flow Control
BLDG B	0.013	0.63 l/s	0.15	Watts Roof Drain with Flow Control
BLDG C	0.012	0.63 l/s	0.15	Watts Roof Drain with Flow Control
BLDG D	0.013	0.63 l/s	0.15	Watts Roof Drain with Flow Control
Area 1	0.605	45.74 l/s	1.006	Custom Orifice Plate 131mmx131mm
TOTAL	**0.655**	**48.26 l/s**		

4.7 On-Site Detention

Detention can be provided in parking and landscape areas and building rooftops, where feasible. As previously noted, the volume of storage is dependent on the characteristics of each individual drainage area and the ICD's were chosen accordingly. It should be noted that 0.30m of vertical separation has been provided from all maximum ponding elevations to lowest building openings. For depressed patios, the building opening is being considered as the top of the stairs leading down to the patio. These patios are also provided with an unrestricted drain which outlets through the building plumbing to the storm sewer.

The rooftops have an assumed storage volume equal to a maximum depth of 150mm, and a useable area of roof of 75%.

The surface areas had very limited surface ponding available. A full underground storage strategy was implemented for this site. Selono HydroStor HS180 Detention System is selected for underground storage. The proposed storage includes 5 rows of chambers, each row containing of 5 chambers, all header pipes and the clear stone surround. The storage calculations for the system have been provided by the manufacturer. In this instance, the storage provided, including void ratios in the surrounding clear stone is 147.3m^3. The upstream volume in upstream sewers has not been accounted for, therefore additional capacity is provided above and beyond that required to meet the stormwater target. Refer to **Appendix C** for underground storage calculations.

4.8 Low Impact Development

As previously mentioned, low impact development strategies are required for the subject lands. A single infiltration gallery is proposed downstream of an oil and grit separator used for pre-treatment of stormwater prior to infiltration. The infiltration gallery is proposed beneath the underground storage chambers mentioned in section 4.7. The gallery consists of a 23m wide x 13m long x 1m deep basin filled with 19mm clear stone. Refer to infiltration gallery sizing calculations in **Appendix C.**

A percolation rate of 1.03m/day (43mm/hr) was used based on Golder's percolation test performed on site. Refer to Golder memo in **Appendix D**.

5 SOURCE CONTROLS

5.1 General

As noted, an existing stormwater management facility provides end of pipe quantity and quality treatment for captured stormwater. In addition to the stormwater management facility, on site level or source control management of runoff will be provided. Such controls or mitigative measures are proposed for the development not only for final development but also during construction and build out. Some of these measures are:

- flat lot grading;
- split lot drainage;
- Roof-leaders to vegetated areas;
- vegetation planting; and
- groundwater recharge through Low impact development (LID).

5.2 Lot Grading

The subject development will consist of stacked townhouse units with partially flat roofs. The flat roof drains through internal plumbing to the storm sewers. It is proposed that leaders for the sloped roof sections from these units be constructed such that the runoff is directed to the grass areas adjacent to the units. This will promote water quality treatment through settling, absorption, filtration and infiltration and a slow release rate to the conveyance network.

5.3 Roof Leaders

Phase 3 of the development will consist of single family lots and townhomes. It is proposed that roof leaders from these units be constructed such that runoff is directed to grass areas adjacent to the units. This will promote water quality treatment through settling, absorption, filtration and infiltration and a slow release rate to the conveyance network.

5.4 Vegetation

As with most site plan agreements, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along roadsides and within public parks provides opportunities to re-create lost natural habitat.

5.5 Low Impact Development

See section 4.8 for details.

6 CONVEYANCE CONTROLS

6.1 General

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

- flat vegetated swales;
- catchbasin and maintenance hole sumps; and
- pervious rearyard drainage.

6.2 Flat Vegetated Swales

The development will make use of relatively flat vegetated swales where possible to encourage infiltration and runoff treatment.

6.3 Catchbasins

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. Both rear yard and street catchbasins will be fabricated to OPSD 705.010 or 705.020. All storm sewer maintenance holes servicing local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

6.4 Pervious Landscaping Drainage

Some of the landscape swales make use of a filter wrapped perforated drainage pipe constructed below the rear yard swale. This perforated system is designed to provide some ground water recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system. Typically, a 250 mm diameter perforated pipe wrapped in filter sock is constructed in a crushed clear stone surround at an invert elevation of approximately 0.8 m below grade. These pipes are in turn directly connected to the storm sewer at regular intervals as per City Standards.

7 SEDIMENT AND EROSION CONTROL PLAN

7.1 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. An erosion and sediment control plan has been prepared and is included in **Appendix** D. 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; and
- Filter cloths will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use.

7.2 Trench Dewatering

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.

7.3 Temporary Flow Controls in Existing Manholes

Temporary flow controls in existing manholes are not proposed for this site as the existing system has live services upstream. As noted below, bulkhead barriers will be constructed in the first new manhole on-site which will help reduce flows from the site.

7.4 Bulkhead Barriers

At the first manhole constructed immediately upstream of an existing sewer, a ½ diameter bulkhead will be constructed over the lower half of the outlet 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.

7.5 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 and will be installed in accordance with the sediment and erosion control drawing 900 included in **Appendix D**. 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.

7.6 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 will be covered to prevent sediment from entering the minor storm sewer system. Until rearyards are sodded or until streets are asphalted and curbed, all catchbasins and manholes will be equipped with geotextile filter socks. These will stay in place and be maintained during construction and build until it is appropriate to remove them.

7.7 Stockpile Management

During construction of any development similar to that being proposed 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. Street catchbasins are installed at the time of roadway construction and rearyard catchbasins are usually installed after base course asphalt is placed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern since these materials are quickly used and the mitigative measures stated previously, especially the use of 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.

8 SOILS

Golder Associates geotechnical report dated August, 2018 provides details on the existing soils within the development. A copy of the report is included in **Appendix D**. The report contains recommendations which include but are not limited to the following:

- Grade raise constraints are identified within the report 07-1121-0232. The maximum permissible grade raise is 0.5m
- In areas where finished grade exceeds grade raise limits, preloading and surcharging can be employed to induce required settlement, light weight fill may also be used, or a combination or surcharging and light weight fill, as per the Geotechnical recommendations
- Fill placed below the foundations to meet OPSS Granular 'A' or Granular 'B' Type II placed in 300 mm lifts compacted to 98% SPMDD.
- Fill for roads to be suitable native material in 300mm lifts compared to 95% SPMDD
- Pavement Structure: **Local Road**

  40mm HL3 superpave 12.5mm

  50mm superpave 19mm

  150mm Granular 'A'

  375mm Granular 'B' Type II

- Pipe bedding and cover; bedding to be minimum 150 mm OPSS Granular 'A' up to spring line of pipe. Cover to be 300 mm OPSS A (PUC and concrete pipes) or sand for concrete pipes. Both bedding and cover to be placed in maximum 225 mm lifts compacted to 95% SPMDD.

In general the grading plan for Block 165 of Phase 2 adheres to the grade raise constraints noted above. A copy of the grading plans is included in **Appendix D**. For areas that exceed the grade raise limit a light weight fill program will be in place.

9 RECOMMENDATIONS

Water, wastewater and stormwater systems required to develop Block 165 of Spring Valley Trails Phase 2 are designed in accordance with MOE and City of Ottawa's current level of service requirements.

The use of lot level controls, conveyance controls 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.

Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

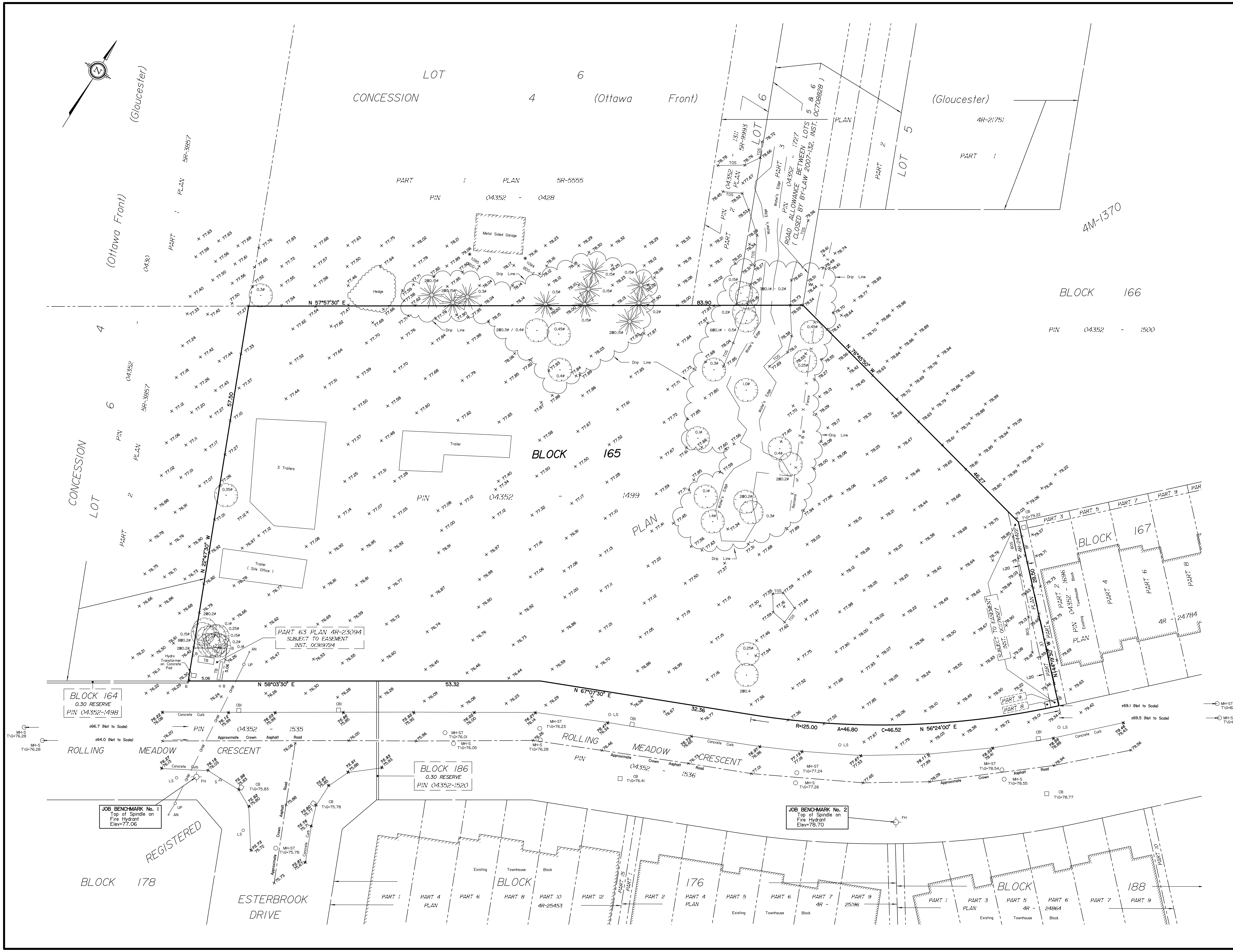
- Commence Work Order: City of Ottawa
- ECA (sewers): MOECP
- Watermain Approval: City of Ottawa
- Commence Work Order (utilities): City of Ottawa

Report prepared by:

LICENSED PROFESSIONAL ENGINEER
D.G. Yannoulopoulos
PROVINCE OF ONTARIO

Demetrius Yannoulopoulos, P.Eng. Director	Ryan Magladry, C.E.T. Project Designer

APPENDIX A



TOPOGRAPHICAL PLAN OF

BLOCK 165
REGISTERED PLAN 4M-1370
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed December 12, 2017

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

Metric

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

Notes & Legend

(tree)	Denotes	Deciduous Tree
(tree)	-	Coniferous Tree
FH	-	Fire Hydrant
MH-ST	-	Maintenance Hole (Storm Sewer)
MH-S	-	Maintenance Hole (Sanitary)
CB	-	Catch Basin
CBI	-	Catch Basin Inlet
TB	-	Unidentified Terminal Box on Concrete Pad
B	-	Bollard
S	-	Sign
UP	-	Utility Pole
AN	-	Anchor
LS	-	Light Standard
Ø	-	Diameter
+ 65.00	-	Location of Elevations
+ 65.00	-	Top of Concrete Curb Elevation
P&W	-	Post and Wire
TOS	-	Top of Slope
BOS	-	Bottom of Slope
OHW	-	Overhead Wires
	-	Property Line

Bearings are grid, derived from GPS observations and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

SITE AREA = 6767.0 sqm

BOUNDARY INFORMATION COMPILED FROM REGISTERED PLAN 4M-1370.

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

Job No. 18588-17 Claridge Blk 165 4M-1370 T DI | N

WATERMAIN SCHEDULE					
	Station	Description	Finished Grade	Top of Watermain	As Built Watermain
A	0+000.00	45° BEND	76.436m	74.036m	
	0+008.49	45° BEND	76.451m	74.051m	
	0+010.17	SERVICE TEE	76.498m	74.098m	
	0+014.25	INVERT W/M	76.644m	74.140m	
	0+034.48	SERVICE TEE	77.031m	74.631m	
	0+036.19	V BEND	77.056m	74.656m	
	0+036.44	V BEND	77.059m	74.550m	
	0+038.69	V BEND	77.098m	74.550m	
	0+038.94	V BEND	77.091m	74.691m	
	0+045.06	45° BEND	77.130m	74.730m	
	0+047.24	45° BEND	77.186m	74.786m	
	0+055.77	INVERT W/M	77.286m	74.886m	
	0+062.19	200Ø VB	77.173m	74.773m	
	0+085.69	45° BEND	77.447m	75.047m	
	0+087.87	45° BEND	77.461m	75.061m	
	0+094.31	V BEND	77.398m	74.998m	
	0+094.56	V BEND	77.408m	74.700m	
	0+128.48	SERVICE TEE	77.534m	74.700m	
	0+129.93	SERVICE TEE	77.560m	74.700m	
	0+131.11	45° BEND	77.581m	74.700m	
	0+134.16	45° BEND	77.398m	74.700m	
	0+135.87	V BEND	77.348m	74.700m	
	0+136.12	V BEND	77.348m	74.948m	
	0+137.83	45° BEND	77.348m	74.948m	
B	0+138.45	45° BEND	77.301m	74.901m	

STM STRUCTURE TABLE

NAME	RIM ELEV.	INVERT IN	INVERT OUT	DESCRIPTION
CBMH1	76.95	S74.835	NE74.800	1200ø OPSD 701.010
CBMH2	77.00	SW74.679	SE74.620	1200ø OPSD 701.010
EXMH150B	76.33	NW74.180 NE74.260	SW74.122	1200ø OPSD 701.010
EXMH151	77.22	N75.030 NE74.399	SW74.299	1200ø OPSD 701.010
MH1	76.42	NW74.230	SE74.205	1200ø OPSD 701.010
MH2	77.11	NE74.430	SW74.423	1200ø OPSD 701.010
MH3	154.66	NE74.380 NW74.430	SE74.305	1200ø OPSD 701.010
MH4	77.05	SW75.443	SE74.496	1200ø OPSD 701.010
MH5	77.99	SE75.560	N75.460	1200ø OPSD 701.010
MH10	77.71	W75.201 NE75.350	S75.100	1200ø OPSD 701.010
OGS	154.33	NW74.608	SE74.590	STC 300 OR APPROVED EQUAL

SAN STRUCTURE TABLE

NAME	RIM ELEV.	INVERT IN	INVERT OUT	DESCRIPTION
EXMH150A	76.35	NE73.430	SW72.650	1200ø OPSD 705.010
EXMH151A	77.18		SW73.822	1200ø OPSD 705.010
EXMH300A	76.08	NE72.590		1200ø OPSD 705.010
MH1A	76.52	NW73.088 SW74.444	SE73.068	1200ø OPSD 705.010
MH2A	77.01	NW73.764 SW73.356	SE73.296	1200ø OPSD 705.010
MH3A	76.86	S73.798 NW74.563	NE73.768	1200ø OPSD 705.010
MH4A	76.95	SE73.899 NE74.515	N73.869	1200ø OPSD 705.010
MH5A	76.61	NE74.114	NW74.054	1200ø OPSD 705.010
MH6A	77.12	NE74.825	SE74.775	1200ø OPSD 705.010
MH10A	77.76	NE75.329 NW74.776	S73.966	1200ø OPSD 705.010
MH11A	78.15	NE75.215	SE75.191	1200ø OPSD 705.010
MH12A	78.22	SE75.603	SW75.543	1200ø OPSD 705.010
MH13A	78.60	SW75.843	NW75.783	1200ø OPSD 705.010

CB STRUCTURE TABLE

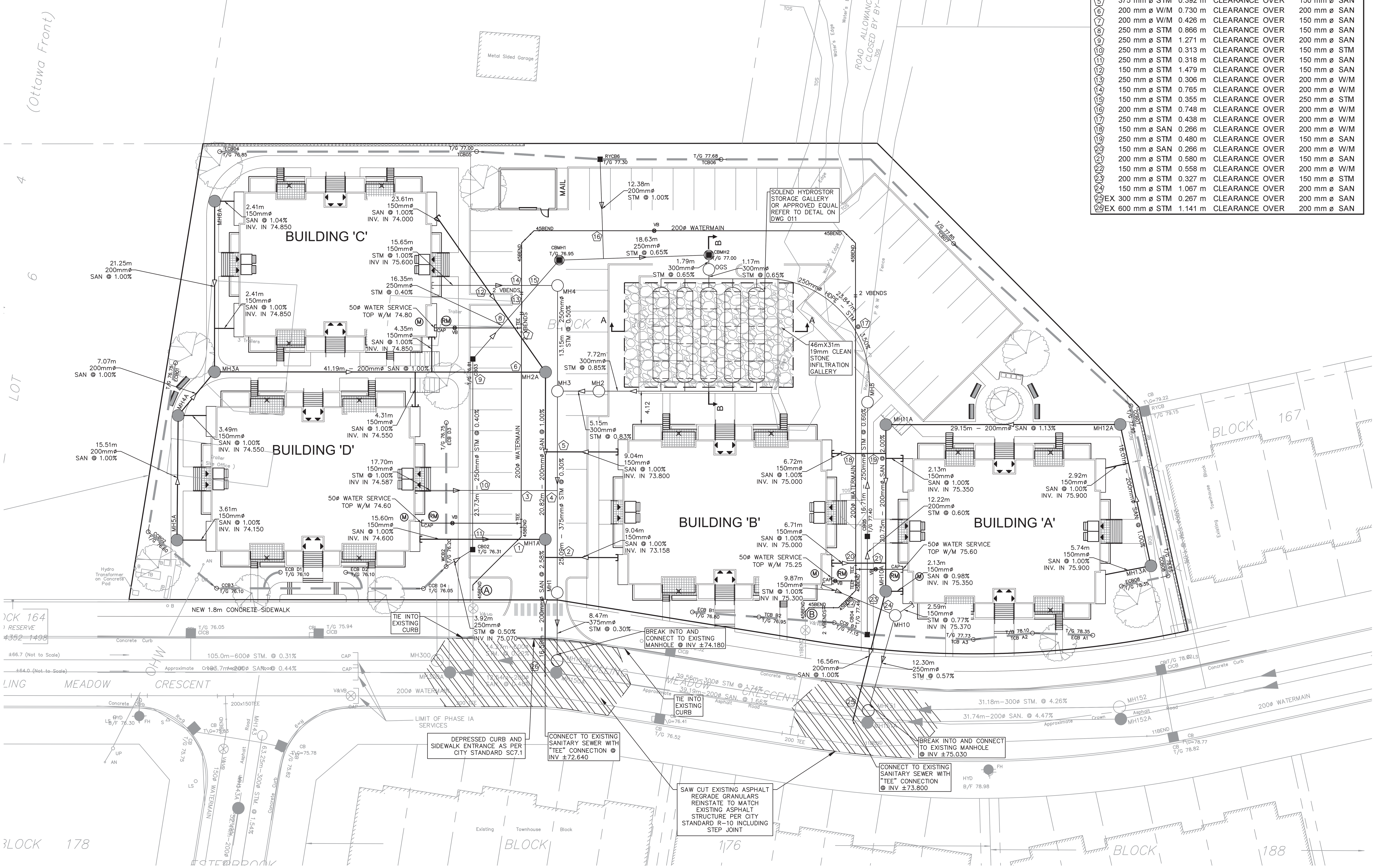
NAME	RIM ELEV.	INVERT IN	INVERT OUT	DESCRIPTION
CB02	76.31	75.080	75.020	OPSD 705.010
CB03	76.81	74.925	74.900	OPSD 705.010
CB04	77.49	W75.838 NE76.300	75.750	OPSD 705.010
CB05	77.40	75.677	75.660	OPSD 705.010
CCB B3	77.15	75.860	75.860	CITY STD S29
CCB D4	76.05	75.120	75.120	CITY STD S29
CCB02	76.60	75.750	75.750	CITY STD S29
CCB3	76.10	75.250	75.250	CITY STD S29
CCB07	77.95	77.100	77.100	CITY STD S29
CCB08	78.65	77.470	77.470	CITY STD S29
ECB A1	78.35		77.500	CITY STD S29
ECB B1	76.80		75.950	CITY STD S29
ECB D1	76.10		75.250	CITY STD S29

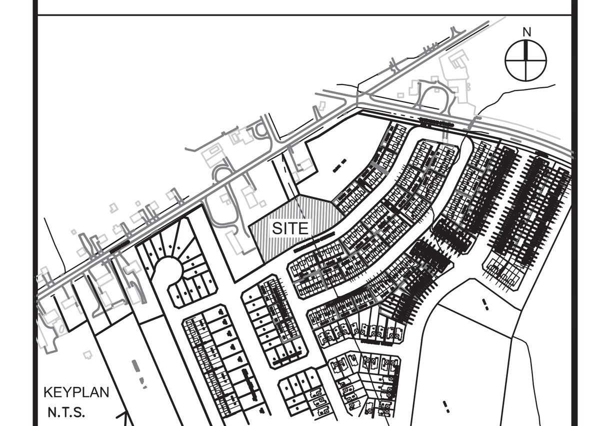
CB STRUCTURE TABLE

NAME	RIM ELEV.	INVERT IN	INVERT OUT	DESCRIPTION
ECB D2	76.10		75.250	CITY STD S29
ECB D3	76.75		75.900	CITY STD S29
ECB01	76.75		75.900	CITY STD S29
ECB04	76.85		76.000	CITY STD S29
ECB08	78.35		77.500	CITY STD S29
RYCB6	77.30	NE76.450 SW75.765	75.700	OPSD 705.010
TCB A2	78.10	77.250	77.250	CITY STD S29
TCB A3	77.73	76.880	76.880	CITY STD S29
TCB B2	76.95	75.910	75.910	CITY STD S29
TCB05	77.00	75.840	75.840	CITY STD S29
TCB06	77.68	76.770	76.770	CITY STD S29
TCB07	77.85	76.950	76.950	CITY STD S29
WCB2	76.20	NW75.100 S75.100	75.100	OPSD 705.010

CROSSING SCHEDULE

1	150 mm ø SAN	0.416 m	CLEARANCE OVER	200 mm ø W/M
2	375 mm ø STM	0.994 m	CLEARANCE OVER	150 mm ø SAN
3	150 mm ø STM	0.310 m	CLEARANCE OVER	200 mm ø W/M
4	150 mm ø STM	1.066 m	CLEARANCE OVER	200 mm ø SAN
5	375 mm ø STM	0.392 m	CLEARANCE OVER	150 mm ø SAN
6	200 mm ø W/M	0.730 m	CLEARANCE OVER	200 mm ø SAN
7	200 mm ø W/M	0.426 m	CLEARANCE OVER	150 mm ø SAN
8	250 mm ø STM	0.866 m	CLEARANCE OVER	150 mm ø SAN
9	250 mm ø STM	1.271 m	CLEARANCE OVER	200 mm ø SAN
10	250 mm ø STM	0.313 m	CLEARANCE OVER	150 mm ø STM
11	250 mm ø STM	0.318 m	CLEARANCE OVER	150 mm ø SAN
12	150 mm ø STM	1.479 m	CLEARANCE OVER	150 mm ø SAN
13	250 mm ø STM	0.306 m	CLEARANCE OVER	200 mm ø W/M
14	150 mm ø STM	0.765 m	CLEARANCE OVER	200 mm ø W/M
15	150 mm ø STM	0.355 m	CLEARANCE OVER	250 mm ø STM
16	200 mm ø STM	0.748 m	CLEARANCE OVER	200 mm ø W/M
17	250 mm ø STM	0.438 m	CLEARANCE OVER	200 mm ø W/M
18	150 mm ø SAN	0.266 m	CLEARANCE OVER	200 mm ø W/M
19	250 mm ø STM	0.480 m	CLEARANCE OVER	150 mm ø SAN
20	150 mm ø SAN	0.266 m	CLEARANCE OVER	200 mm ø W/M
21	200 mm ø STM	0.580 m	CLEARANCE OVER	150 mm ø SAN
22	150 mm ø STM	0.558 m	CLEARANCE OVER	200 mm ø W/M
23	200 mm ø STM	0.327 m	CLEARANCE OVER	150 mm ø STM
24	150 mm ø STM	1.067 m	CLEARANCE OVER	200 mm ø SAN
25EX	300 mm ø STM	0.267 m	CLEARANCE OVER	200 mm ø SAN
26EX	600 mm ø STM	1.141 m	CLEARANCE OVER	200 mm ø SAN





No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS

WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2018/10/11 PROVINCE OF ONTARIO

Drawing Title

GENERAL PLAN OF SERVICING

Scale	1:250
Design: R.M./A.Z.	Date: OCTOBER 2018
Drawn: E.H.	Checked: D.G.Y.
Project No.: 115201	Drawing No.: 001

CITY PLAN No. ####

CITY FILE No. ####

Evan Hawkins

From: Leroux, Benoit [Benoit.Leroux@ottawa.ca]
Sent: Tuesday, June 08, 2010 8:50 AM
To: Lance Erion
Cc: Demetrius Yannoulopoulos; Evan Hawkins
Subject: RE: Spring Valley Development - Boundary Condition Confirmation

Hi Lance,

Here are the boundary conditions using Evan's numbers listed below:

Apparently there was a glitch in the model and the results of the original analysis (sent May 27th) should be disregarded. We have rerun the boundary conditions using the original demands and have the following response: (It is also our understanding from earlier correspondence that the a school is part of the development, so the fireflow analysis was also done for 250 L/s).

Ben

The following are boundary conditions, HGL, for hydraulic analysis at Navan Rd approximately 145 m east of Renaud Rd (see attached PDF for location).

Max Day + FF = 122.8 m assuming a fire flow of 125 L/s

Max Day + FF = Considering a ground elevation of 86.5 m, minimum pressures cannot be achieved for a fire flow of 250 L/s

Minimum Pressure during Peak Hour = 122.3 m

Max Pressure Check = 133.6 m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

From: Evan Hawkins [mailto:evan.hawkins@IBIGroup.com]
Sent: May 20, 2010 11:22 AM
To: Leroux, Benoit
Subject: RE: Spring Valley Development - Boundary Condition Confirmation

Hi Ben,

The demands are as follows:

Average Daily Demand = 10.92 l/s

Maximum Daily Demand = 27.29 l/s

Maximum Hourly Demand = 60.04 l/s

Thanks,

Evan Hawkins

IBI Group
400-333 Preston Street
Ottawa ON K1S 5N4 Canada

tel 613 225 1311
fax 613 225 9868
email evan.hawkins@IBIGroup.com
web www.ibigroup.com

SADDLERIDGE DR
203
ROLLING MEADOW CRES
152
203
PAGE RD
KNOTRIDGE ST
SPRING VALLEY DR
BROADRIDGE
208

IBI GROUP
IBI GROUP 333 PRESTON STREET OTTAWA, ONTARIO K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : SPRING VALLEY SUBDIVISION
CLARIDGE HOMES

FILE: 10261-5.7
DATE: June 8, 2010
DESIGN: E.A.H

NODE	RESIDENTIAL					NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/s)
	SINGLE FAMILY UNITS	SEMI & TOWNHOUSE UNITS	STACKED TOWNHOUSE UNITS	GROSS RESIDENTIAL (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
SPRING VALLEY PHASE 2																		
SV2-2		12			32				0.13		0.13	0.33		0.33	0.72		0.72	125
SV2-3		15			41				0.16		0.16	0.41		0.41	0.90		0.90	125
SV2-4		14			38				0.15		0.15	0.38		0.38	0.84		0.84	125
SV2-5		8			22				0.09		0.09	0.22		0.22	0.48		0.48	125
SV2-6		12			32				0.13		0.13	0.33		0.33	0.72		0.72	125
SV2-7	8				27				0.11		0.11	0.28		0.28	0.61		0.61	100
SV2-8	9				31			2.63	0.12	0.46	0.58	0.31	0.68	0.99	0.68	1.23	1.91	250
SV2-9	10				34				0.14		0.14	0.34		0.34	0.76		0.76	100
SV2-10	8				27				0.11		0.11	0.28		0.28	0.61		0.61	100
SV2-11	16				54				0.22		0.22	0.55		0.55	1.21		1.21	100
SV2-12	11				37				0.15		0.15	0.38		0.38	0.83		0.83	100
SV2-13	11				37				0.15		0.15	0.38		0.38	0.83		0.83	100
SV2-14	11				37				0.15		0.15	0.38		0.38	0.83		0.83	100
SV2-16	12				41				0.17		0.17	0.41		0.41	0.91		0.91	100
TOTAL					491						2.45			5.66			12.17	
SPRING VALLEY PHASE 1																		
SV1-6	9				31				0.12		0.12	0.31		0.31	0.68		0.68	100
SV1-7	9				31				0.12		0.12	0.31		0.31	0.68		0.68	100
SV1-8	10				34				0.14		0.14	0.34		0.34	0.76		0.76	100
SV1-9		18			49				0.20		0.20	0.49		0.49	1.08		1.08	125
SV1-10	8				27				0.11		0.11	0.28		0.28	0.61		0.61	100
SV1-11	5	11			47				0.19		0.19	0.47		0.47	1.04		1.04	125
SV1-12		16			43				0.18		0.18	0.44		0.44	0.96		0.96	125
SV1-13		13			35				0.14		0.14	0.36		0.36	0.78		0.78	125
SV1-14		18			49				0.20		0.20	0.49		0.49	1.08		1.08	125
SV1-15		16			43				0.18		0.18	0.44		0.44	0.96		0.96	125
SV1-16		13			35				0.14		0.14	0.36		0.36	0.78		0.78	125

POPULATION DENSITY

Single Family	3.4	persons/unit
Townhouse	2.7	persons/unit
Gross Residential	100	persons/hectare
Sta cked Townhouse	2.3	

WATER DEMAND RATES

Residential	350	l/cap/day
Industrial	20000	l/ha/day
Commercial	60000	l/ha/day
Institutional	15000	l/ha/day

PEAKING FACTORS

Maximum Daily	
Residential	2.5 x avg. day
ICI	1.5 x avg. day
Maximum Hourly	
Residential	2.2 x max. day
ICI	1.8 x max. day

FIRE DEMANDS

Single Family	100 l/s
Townhouse	125 l/s
Apartment	170 l/s
ICI	200 l/s

IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : SPRING VALLEY
CLARIDGE HOMES

FILE: 10261-5.7
DATE: June 8, 2010
DESIGN: E.A.H

NODE	RESIDENTIAL					NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/s)
	SINGLE FAMILY UNITS	SEMI & TOWNHOUSE UNITS	STACKED TOWNHOUSE UNITS	GROSS RESIDENTIAL (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
SPRING VALLEY PHASE 1																		
SV1-17	7				24				0.10		0.10	0.24		0.24	0.53		0.53	100
SV1-18	13				44				0.18		0.18	0.45		0.45	0.98		0.98	100
SV1-19	13				44				0.18		0.18	0.45		0.45	0.98		0.98	100
SV1-20	12				41				0.17		0.17	0.41		0.41	0.91		0.91	100
SV1-21	6				20				0.08		0.08	0.21		0.21	0.45		0.45	100
SV1-22	10				34				0.14		0.14	0.34		0.34	0.76		0.76	100
SV1-23	13				44				0.18		0.18	0.45		0.45	0.98		0.98	100
SV1-24	11				37				0.15		0.15	0.38		0.38	0.83		0.83	100
SV1-25	11				37				0.15		0.15	0.38		0.38	0.83		0.83	100
SV1-26	8				27				0.11		0.11	0.28		0.28	0.61		0.61	100
SV1-27	12	2			46				0.19		0.19	0.47		0.47	1.03		1.03	125
SV1-28	6	10			47				0.19		0.19	0.48		0.48	1.06		1.06	125
SV1-29	7	10			51				0.21		0.21	0.51		0.51	1.13		1.13	125
SV1-33		5			14				0.05		0.05	0.14		0.14	0.30		0.30	125
SV1-34		6	24		71				0.29		0.29	0.72		0.72	1.59		1.59	125
SV1-35			48		110				0.45		0.45	1.12		1.12	2.46		2.46	125
SV1-36		6	24		71				0.29		0.29	0.72		0.72	1.59		1.59	125
SV1-37		19			51				0.21		0.21	0.52		0.52	1.14		1.14	125
SV1-38		15			41				0.16		0.16	0.41		0.41	0.90		0.90	125
SV1-39		14			38				0.15		0.15	0.38		0.38	0.84		0.84	125
SV1-41		18			49				0.20		0.20	0.49		0.49	1.08		1.08	125
SV1-42		14			38				0.15		0.15	0.38		0.38	0.84		0.84	125
SV1-43		15			41				0.16		0.16	0.41		0.41	0.90		0.90	125
SV1-44		19			51				0.21		0.21	0.52		0.52	1.14		1.14	125
SV1-45		19			51				0.21		0.21	0.52		0.52	1.14		1.14	125
SV1-46		14			38				0.15		0.15	0.38		0.38	0.84		0.84	125
SV1-47	6				20				0.08		0.08	0.21		0.21	0.45		0.45	100
TOTAL					1,605						6.50			16.25			35.76	
TOTAL ALL					2,096						8.95			21.91			47.93	

POPULATION DENSITY

Single Family	3.4	persons/unit
Townhouse	2.7	persons/unit
Gross Residential	100	persons/hectare
Stacked Townhouse	2.3	

WATER DEMAND RATES

Residential	350	l/cap/day
Industrial	20000	l/ha/day
Commercial	60000	l/ha/day
Institutional	15000	l/ha/day

PEAKING FACTORS

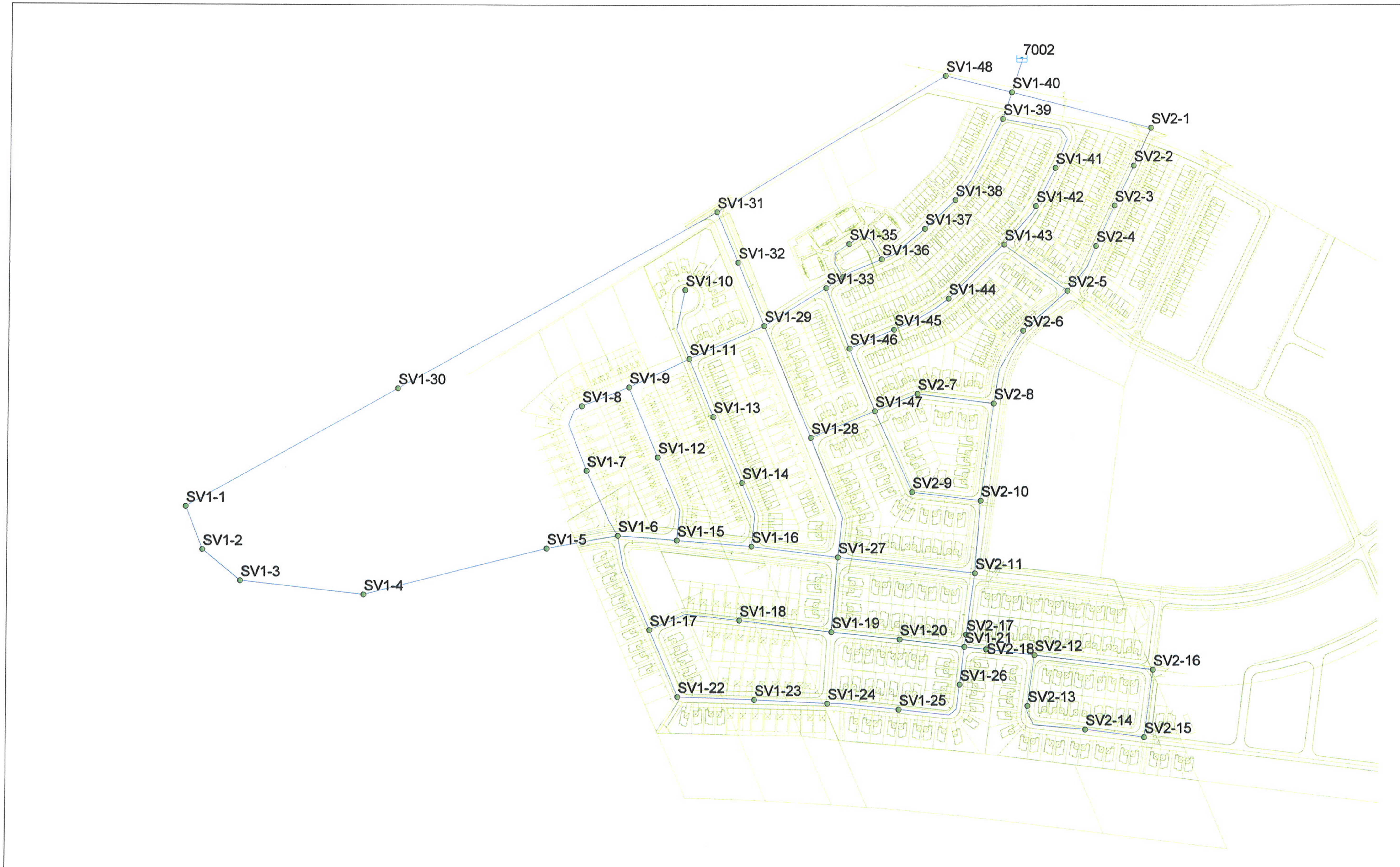
Maximum Daily
- Residential 2.5 x avg. day
- ICI 1.5 x avg. day

Maximum Hourly
- Residential 2.2 x max. day
- ICI 1.8 x max. day

FIRE DEMANDS

Single Family	100 l/s
Townhouse	125 l/s
Apartment	170 l/s
ICI	200 l/s

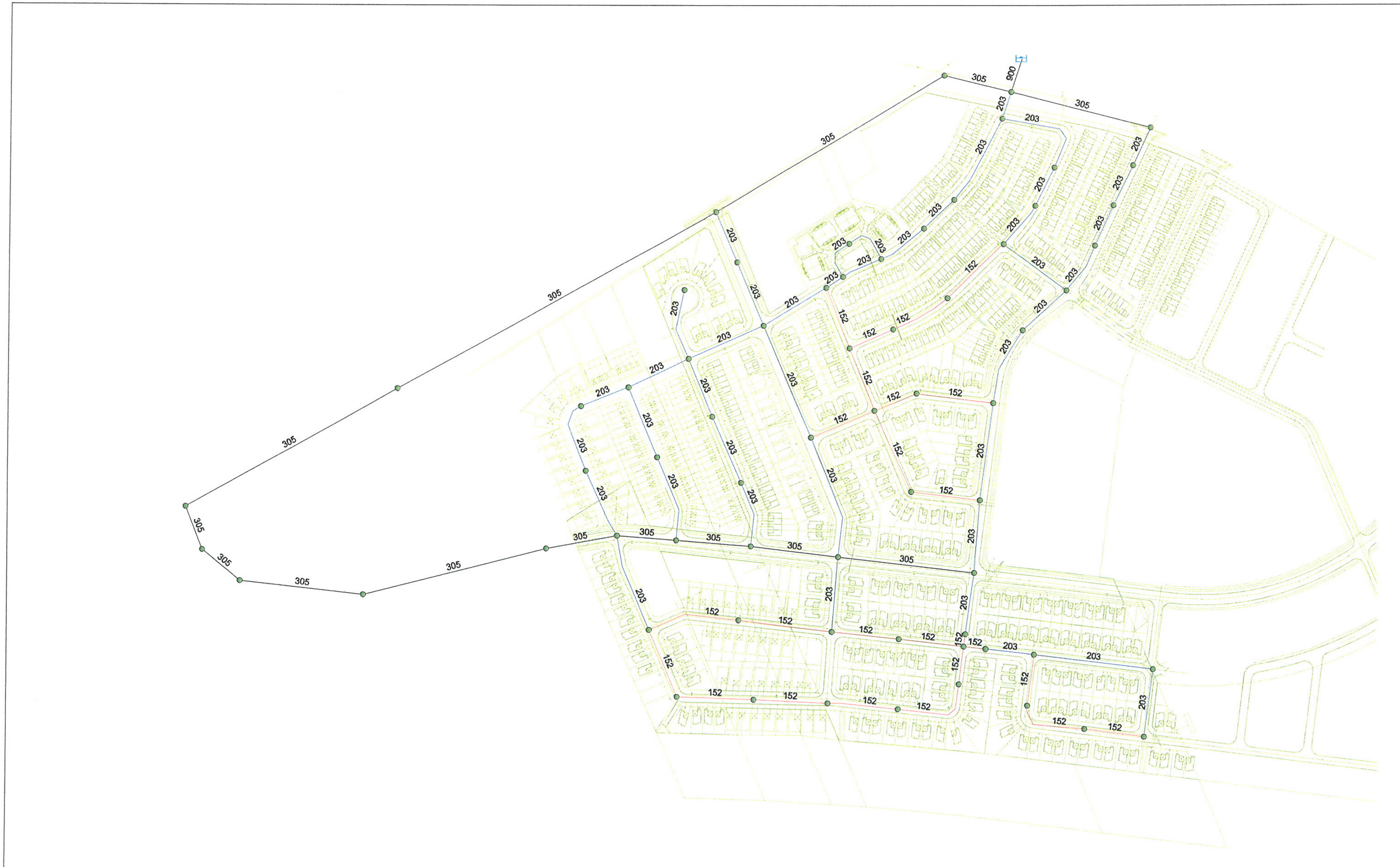
SPRING VALLEY - NODE ID's



Prepared By: IBI Group

Date: Wednesday, June 09, 2010

SPRING VALLEY - PIPE SIZES

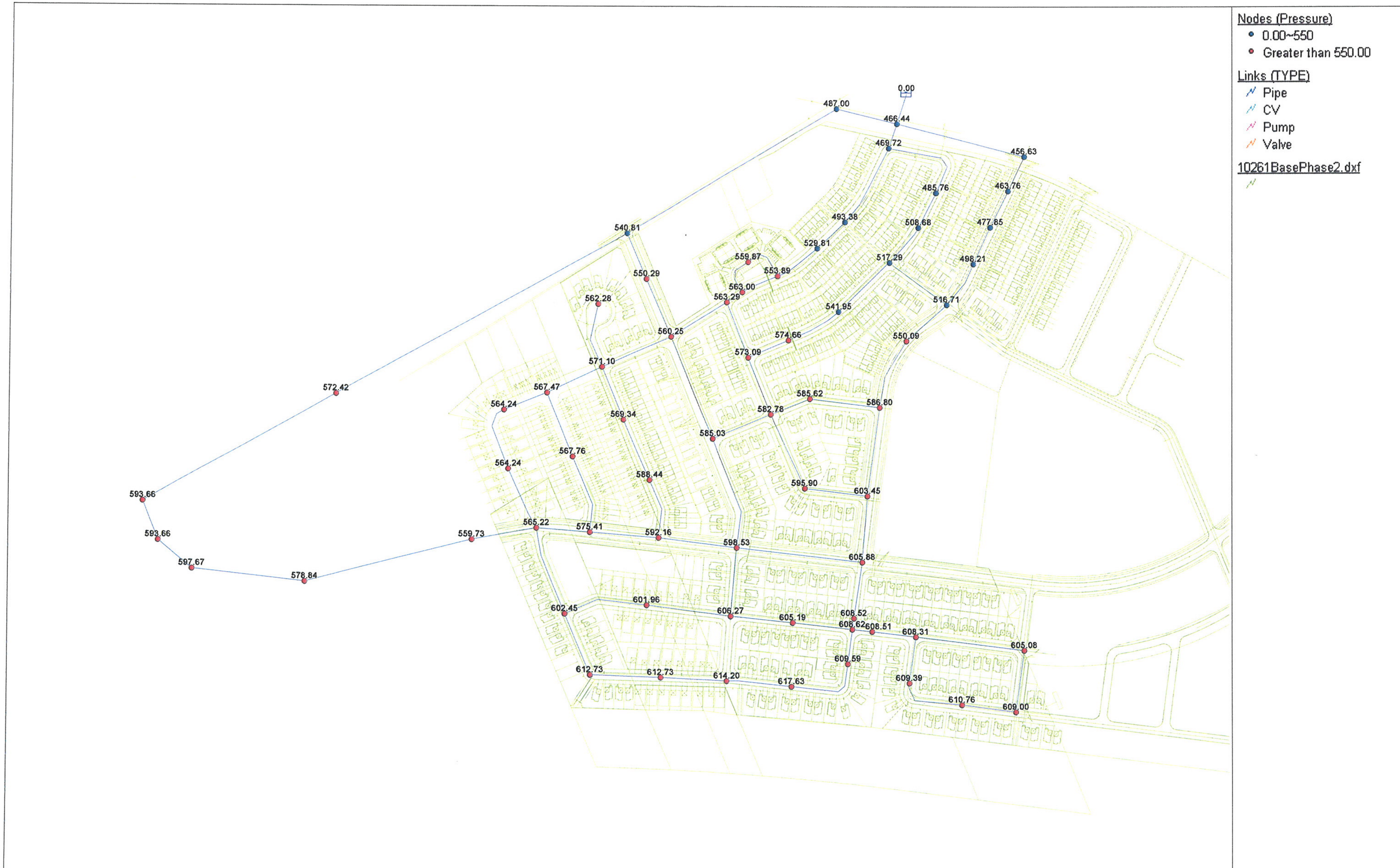


SPRING VALLEY - PIPE ID's

Prepared By: IBI Group

Date: Wednesday, June 09, 2010

SPRING VALLEY - BASIC DAY PRESSURE



Spring Valley - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		SV1-1	0.00	73.00	133.58	593.66
2		SV1-10	0.11	76.20	133.58	562.28
3		SV1-11	0.19	75.30	133.58	571.10
4		SV1-12	0.18	75.64	133.58	567.76
5		SV1-13	0.14	75.48	133.58	569.34
6		SV1-14	0.20	73.53	133.58	588.44
7		SV1-15	0.18	74.86	133.58	575.41
8		SV1-16	0.14	73.15	133.58	592.16
9		SV1-17	0.10	72.10	133.58	602.45
10		SV1-18	0.18	72.15	133.58	601.96
11		SV1-19	0.18	71.71	133.58	606.27
12		SV1-2	0.00	73.00	133.58	593.66
13		SV1-20	0.17	71.82	133.58	605.19
14		SV1-21	0.08	71.47	133.58	608.62
15		SV1-22	0.14	71.05	133.58	612.73
16		SV1-23	0.18	71.05	133.58	612.73
17		SV1-24	0.15	70.90	133.58	614.20
18		SV1-25	0.15	70.55	133.58	617.63
19		SV1-26	0.11	71.37	133.58	609.59
20		SV1-27	0.19	72.50	133.58	598.53
21		SV1-28	0.19	73.88	133.58	585.03
22		SV1-29	0.21	76.41	133.58	560.25
23		SV1-3	0.00	72.59	133.58	597.67
24		SV1-30	0.00	75.17	133.58	572.42
25		SV1-31	0.00	78.40	133.59	540.81
26		SV1-32	0.00	77.43	133.59	550.29
27		SV1-33	0.05	76.10	133.58	563.29
28		SV1-34	0.29	76.13	133.58	563.00
29		SV1-35	0.45	76.45	133.58	559.87
30		SV1-36	0.29	77.06	133.58	553.89
31		SV1-37	0.21	79.52	133.59	529.81
32		SV1-38	0.16	83.24	133.59	493.38
33		SV1-39	0.15	85.66	133.59	469.72
34		SV1-4	2.54	74.51	133.58	578.84
35		SV1-40	0.00	86.00	133.60	466.44
36		SV1-41	0.20	84.02	133.59	485.76
37		SV1-42	0.15	81.68	133.59	508.68
38		SV1-43	0.16	80.80	133.59	517.29
39		SV1-44	0.21	78.28	133.59	541.95
40		SV1-45	0.21	74.94	133.58	574.66
41		SV1-46	0.15	75.10	133.58	573.09
42		SV1-47	0.08	74.11	133.58	582.78
43		SV1-48	0.00	83.90	133.60	487.00
44		SV1-5	0.00	76.46	133.58	559.73
45		SV1-6	0.12	75.90	133.58	565.22
46		SV1-7	0.12	76.00	133.58	564.24
47		SV1-8	0.14	76.00	133.58	564.24

Spring Valley - Basic Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
48		SV1-9	0.20	75.67	133.58	567.47
49		SV2-1	0.00	87.00	133.60	456.63
50		SV2-10	0.11	72.00	133.58	603.45
51		SV2-11	0.22	71.75	133.58	605.88
52		SV2-12	0.15	71.50	133.58	608.31
53		SV2-13	0.15	71.39	133.58	609.39
54		SV2-14	0.15	71.25	133.58	610.76
55		SV2-15	0.00	71.43	133.58	609.00
56		SV2-16	0.17	71.83	133.58	605.08
57		SV2-17	0.00	71.48	133.58	608.52
58		SV2-18	0.00	71.48	133.58	608.51
59		SV2-2	0.13	86.27	133.60	463.76
60		SV2-3	0.16	84.83	133.59	477.85
61		SV2-4	0.15	82.75	133.59	498.21
62		SV2-5	0.09	80.86	133.59	516.71
63		SV2-6	0.13	77.45	133.59	550.09
64		SV2-7	0.11	73.82	133.58	585.62
65		SV2-8	0.58	73.70	133.58	586.80
66		SV2-9	0.14	72.77	133.58	595.90

Spring Valley - Max Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		SV1-1	0.00	73.00	122.71	487.10
2		SV1-10	0.28	76.20	122.70	455.63
3		SV1-11	0.47	75.30	122.70	464.45
4		SV1-12	0.44	75.64	122.69	461.09
5		SV1-13	0.36	75.48	122.70	462.68
6		SV1-14	0.49	73.53	122.69	481.77
7		SV1-15	0.44	74.86	122.69	468.74
8		SV1-16	0.36	73.15	122.69	485.50
9		SV1-17	0.24	72.10	122.69	495.76
10		SV1-18	0.45	72.15	122.69	495.27
11		SV1-19	0.45	71.71	122.69	499.59
12		SV1-2	0.00	73.00	122.71	487.07
13		SV1-20	0.41	71.82	122.69	498.48
14		SV1-21	0.21	71.47	122.69	501.90
15		SV1-22	0.34	71.05	122.69	506.00
16		SV1-23	0.45	71.05	122.68	505.98
17		SV1-24	0.38	70.90	122.68	507.45
18		SV1-25	0.38	70.55	122.68	510.88
19		SV1-26	0.28	71.37	122.69	502.86
20		SV1-27	0.47	72.50	122.69	491.87
21		SV1-28	0.48	73.88	122.70	478.43
22		SV1-29	0.51	76.41	122.71	453.71
23		SV1-3	0.00	72.59	122.70	491.06
24		SV1-30	0.00	75.17	122.72	465.93
25		SV1-31	0.00	78.40	122.74	434.51
26		SV1-32	0.00	77.43	122.73	443.88
27		SV1-33	0.14	76.10	122.71	456.77
28		SV1-34	0.72	76.13	122.71	456.49
29		SV1-35	1.12	76.45	122.71	453.36
30		SV1-36	0.72	77.06	122.72	447.40
31		SV1-37	0.52	79.52	122.73	423.42
32		SV1-38	0.41	83.24	122.74	387.09
33		SV1-39	0.38	85.66	122.77	363.68
34		SV1-4	6.34	74.51	122.69	472.17
35		SV1-40	0.00	86.00	122.80	360.61
36		SV1-41	0.49	84.02	122.76	379.58
37		SV1-42	0.38	81.68	122.75	402.46
38		SV1-43	0.41	80.80	122.74	411.03
39		SV1-44	0.52	78.28	122.73	435.53
40		SV1-45	0.52	74.94	122.72	468.17
41		SV1-46	0.38	75.10	122.71	466.56
42		SV1-47	0.21	74.11	122.71	476.21
43		SV1-48	0.00	83.90	122.79	381.07
44		SV1-5	0.00	76.46	122.69	453.06
45		SV1-6	0.31	75.90	122.69	458.54
46		SV1-7	0.31	76.00	122.69	457.56
47		SV1-8	0.34	76.00	122.69	457.57

Spring Valley - Max Day - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
48		SV1-9	0.49	75.67	122.69	460.80
49		SV2-1	0.00	87.00	122.79	350.75
50		SV2-10	0.11	72.00	122.70	496.84
51		SV2-11	0.55	71.75	122.69	499.22
52		SV2-12	0.38	71.50	122.68	501.56
53		SV2-13	0.38	71.39	122.68	502.63
54		SV2-14	0.38	71.25	122.68	504.00
55		SV2-15	0.00	71.43	122.68	502.24
56		SV2-16	0.41	71.83	122.68	498.32
57		SV2-17	0.00	71.48	122.69	501.83
58		SV2-18	0.00	71.48	122.69	501.77
59		SV2-2	0.33	86.27	122.78	357.77
60		SV2-3	0.41	84.83	122.77	371.76
61		SV2-4	0.38	82.75	122.76	392.03
62		SV2-5	0.22	80.86	122.74	410.44
63		SV2-6	0.33	77.45	122.73	443.70
64		SV2-7	0.28	73.82	122.71	479.06
65		SV2-8	0.99	73.70	122.71	480.27
66		SV2-9	0.34	72.77	122.70	489.31

Spring Valley - Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1		SV1-1	0.00	73.00	121.92	479.43
2		SV1-10	0.61	76.20	121.88	447.59
3		SV1-11	1.04	75.30	121.88	456.41
4		SV1-12	0.96	75.64	121.86	452.97
5		SV1-13	0.78	75.48	121.87	454.59
6		SV1-14	1.08	73.53	121.87	473.66
7		SV1-15	0.96	74.86	121.86	460.61
8		SV1-16	0.78	73.15	121.87	477.37
9		SV1-17	0.53	72.10	121.85	487.55
10		SV1-18	0.98	72.15	121.85	487.06
11		SV1-19	0.98	71.71	121.86	491.39
12		SV1-2	0.00	73.00	121.91	479.30
13		SV1-20	0.91	71.82	121.84	490.18
14		SV1-21	0.45	71.47	121.84	493.58
15		SV1-22	0.76	71.05	121.84	497.65
16		SV1-23	0.98	71.05	121.83	497.56
17		SV1-24	0.83	70.90	121.82	499.02
18		SV1-25	0.83	70.55	121.82	502.45
19		SV1-26	0.61	71.37	121.83	494.49
20		SV1-27	1.03	72.50	121.87	483.75
21		SV1-28	1.06	73.88	121.90	470.58
22		SV1-29	1.13	76.41	121.93	446.07
23		SV1-3	0.00	72.59	121.90	483.18
24		SV1-30	0.00	75.17	121.96	458.55
25		SV1-31	0.00	78.40	122.06	427.82
26		SV1-32	0.00	77.43	122.00	436.78
27		SV1-33	0.30	76.10	121.94	449.21
28		SV1-34	1.59	76.13	121.95	448.96
29		SV1-35	2.46	76.45	121.95	445.84
30		SV1-36	1.59	77.06	121.96	439.94
31		SV1-37	1.14	79.52	122.01	416.36
32		SV1-38	0.90	83.24	122.06	380.40
33		SV1-39	0.84	85.66	122.19	357.96
34		SV1-4	12.63	74.51	121.87	464.05
35		SV1-40	0.00	86.00	122.30	355.71
36		SV1-41	1.08	84.02	122.12	373.32
37		SV1-42	0.84	81.68	122.09	396.02
38		SV1-43	0.90	80.80	122.07	404.43
39		SV1-44	1.14	78.28	121.99	428.33
40		SV1-45	1.14	74.94	121.95	460.67
41		SV1-46	0.84	75.10	121.94	458.96
42		SV1-47	0.45	74.11	121.91	468.44
43		SV1-48	0.00	83.90	122.25	375.80
44		SV1-5	0.00	76.46	121.87	444.94
45		SV1-6	0.68	75.90	121.86	450.42
46		SV1-7	0.68	76.00	121.86	449.44
47		SV1-8	0.76	76.00	121.87	449.44

Spring Valley - Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
48		SV1-9	1.08	75.67	121.87	452.69
49		SV2-1	0.00	87.00	122.27	345.65
50		SV2-10	0.61	72.00	121.90	488.95
51		SV2-11	1.21	71.75	121.87	491.10
52		SV2-12	0.83	71.50	121.82	493.10
53		SV2-13	0.83	71.39	121.82	494.13
54		SV2-14	0.83	71.25	121.82	495.50
55		SV2-15	0.00	71.43	121.82	493.75
56		SV2-16	0.91	71.83	121.82	489.83
57		SV2-17	0.00	71.48	121.85	493.61
58		SV2-18	0.00	71.48	121.83	493.35
59		SV2-2	0.72	86.27	122.22	352.26
60		SV2-3	0.90	84.83	122.16	365.84
61		SV2-4	0.84	82.75	122.12	385.77
62		SV2-5	0.48	80.86	122.07	403.82
63		SV2-6	0.72	77.45	122.01	436.63
64		SV2-7	0.61	73.82	121.92	471.33
65		SV2-8	1.91	73.70	121.93	472.66
66		SV2-9	0.76	72.77	121.90	481.44

Spring Valley - Max Day + Fire - Fireflow Report

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
1		SV1-10	100.28	SV2-2	355.47	112.48	1,463.77	222.48	SV1-10	139.96	90.48	222.48	222.48
2		SV1-11	125.47	SV2-2	354.54	111.48	1,463.96	394.17	SV1-10	131.14	88.68	388.16	388.16
3		SV1-12	125.44	SV2-2	354.52	111.82	1,457.09	326.51	SV1-12	139.96	89.92	326.51	326.51
4		SV1-13	125.36	SV2-2	354.51	111.66	1,454.86	326.86	SV1-13	139.96	89.76	326.86	326.86
5		SV1-14	125.49	SV2-2	354.47	109.70	1,444.59	341.69	SV1-14	139.96	87.81	341.70	341.70
6		SV1-15	125.44	SV2-2	354.50	111.04	1,452.11	448.28	SV1-15	139.96	89.14	448.28	448.28
7		SV1-16	125.36	SV2-2	354.42	109.32	1,428.92	462.53	SV1-16	139.96	87.43	462.53	462.53
8		SV1-17	100.24	SV2-2	355.41	108.37	1,436.04	288.49	SV1-17	139.96	86.38	288.49	288.49
9		SV1-18	100.45	SV2-2	355.37	108.42	1,421.05	187.29	SV1-18	139.96	86.43	187.29	187.29
10		SV1-19	100.45	SV2-2	355.33	107.97	1,400.89	322.50	SV1-19	139.96	85.99	322.50	322.50
11		SV1-2	100.00	SV2-2	355.79	109.31	1,629.25	418.90	SV1-2	139.96	87.28	418.90	418.90
12		SV1-20	100.41	SV2-2	355.31	108.08	1,394.63	210.90	SV1-20	139.96	86.10	210.90	210.90
13		SV1-21	100.21	SV2-2	355.28	107.73	1,378.11	280.88	SV2-16	136.38	85.39	279.34	279.34
14		SV1-22	100.34	SV1-22	349.99	106.77	160.73	160.74	SV1-22	139.96	85.33	160.74	160.73
15		SV1-23	100.45	SV1-23	299.85	101.65	137.80	137.81	SV1-23	139.96	85.33	137.81	137.80
16		SV1-24	100.38	SV1-24	290.99	100.60	134.36	134.36	SV1-24	139.96	85.18	134.36	134.36
17		SV1-25	100.38	SV1-25	316.05	102.80	143.16	143.17	SV1-25	139.96	84.83	143.17	143.16
18		SV1-26	100.28	SV2-2	355.31	107.63	1,391.53	185.67	SV1-26	139.96	85.65	185.67	185.67
19		SV1-27	125.47	SV2-2	354.30	108.66	1,393.92	467.96	SV1-27	139.96	86.78	467.97	467.97
20		SV1-28	125.48	SV2-2	354.28	110.03	1,388.31	382.77	SV1-28	139.96	88.16	382.77	382.77
21		SV1-29	125.51	SV2-2	354.65	112.60	1,503.47	478.61	SV1-29	139.96	90.69	478.61	478.61
22		SV1-3	100.00	SV2-2	355.75	108.89	1,610.16	422.08	SV1-3	139.96	86.87	422.08	422.08
23		SV1-33	125.14	SV2-2	354.55	112.28	1,466.22	409.53	SV1-33	139.96	90.38	409.53	409.53
24		SV1-34	125.72	SV2-2	354.63	112.32	1,489.80	384.24	SV1-34	139.96	90.41	384.24	384.24
25		SV1-35	126.12	SV2-2	354.65	112.64	1,495.64	334.86	SV1-35	139.96	90.73	334.86	334.86
26		SV1-36	125.72	SV2-2	354.69	113.26	1,503.63	364.98	SV1-36	139.96	91.34	364.98	364.98
27		SV1-37	125.52	SV1-38	350.51	115.29	365.00	335.64	SV1-37	139.96	93.80	335.64	335.64
28		SV1-38	125.41	SV1-38	341.96	118.14	323.06	323.06	SV1-38	139.96	97.52	323.06	323.06
29		SV1-39	125.38	SV1-39	348.92	121.27	576.52	576.51	SV1-39	139.97	99.94	576.52	576.52
30		SV1-4	106.34	SV2-2	355.66	110.80	1,565.80	422.72	SV1-4	139.96	88.79	422.73	422.73
31		SV1-41	125.49	SV1-41	335.56	118.26	320.65	320.65	SV1-41	139.96	98.30	320.65	320.65
32		SV1-42	125.38	SV1-41	344.74	116.86	366.56	331.49	SV1-42	139.96	95.96	331.49	331.49
33		SV1-43	125.41	SV2-2	350.97	116.62	890.63	361.26	SV1-43	139.96	95.08	361.27	361.27
34		SV1-44	125.52	SV1-44	284.84	107.35	181.53	181.53	SV1-44	139.96	92.56	181.53	181.53
35		SV1-45	125.52	SV1-45	326.13	108.22	198.72	198.72	SV1-45	139.96	89.22	198.72	198.72
36		SV1-46	125.38	SV2-2	353.26	111.15	1,176.29	277.06	SV1-46	139.96	89.38	277.06	277.06
37		SV1-47	100.21	SV2-2	354.77	110.31	1,210.09	322.54	SV1-47	139.96	88.39	322.54	322.54
38		SV1-5	100.00	SV2-2	355.56	112.74	1,509.40	418.18	SV1-5	139.96	90.74	418.19	418.19
39		SV1-6	100.31	SV2-2	355.48	112.18	1,472.40	438.99	SV1-6	139.96	90.18	438.99	438.99
40		SV1-7	100.31	SV2-2	355.47	112.27	1,463.13	319.15	SV1-7	139.96	90.28	319.15	319.15
41		SV1-8	100.34	SV2-2	355.46	112.27	1,459.07	317.39	SV1-8	139.96	90.28	317.39	317.39
42		SV1-9	125.49	SV2-2	354.52	111.85	1,459.10	364.81	SV1-9	139.96	89.95	364.81	364.81
43		SV2-10	100.11	SV2-2	354.67	108.19	1,172.49	388.58	SV2-10	139.96	86.28	388.58	388.58
44		SV2-11	100.55	SV2-2	355.17	108.00	1,339.18	439.58	SV2-11	139.96	86.03	439.58	439.58
45		SV2-12	100.38	SV2-16	338.98	106.09	157.34	158.13	SV2-16	136.72	85.45	157.35	157.34
46		SV2-13	100.38	SV2-13	270.63	99.01	128.41	128.41	SV2-13	139.96	85.67	128.41	128.41

Spring Valley - Max Day + Fire - Fireflow Report

		ID	Total Demand (L/s)	Critical Node 1 ID	Critical Node 1 Pressure (kPa)	Critical Node 1 Head (m)	Adjusted Fire-Flow (L/s)	Available Flow @Hydrant (L/s)	Critical Node 2 ID	Critical Node 2 Pressure (kPa)	Critcal Node 2 Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
47		SV2-14	100.38	SV2-14	250.32	96.79	122.46	122.46	SV2-14	139.96	85.53	122.46	122.46
48		SV2-15	100.00	SV2-15	281.45	100.15	131.52	131.53	SV2-15	139.96	85.71	131.53	131.52
49		SV2-16	100.41	SV2-16	293.55	101.79	136.77	136.77	SV2-16	139.96	86.11	136.77	136.77
50		SV2-2	125.33	SV2-2	329.16	119.86	381.90	381.92	SV2-2	139.96	100.55	381.92	381.90
51		SV2-3	125.41	SV2-3	334.87	119.00	344.88	344.90	SV2-3	139.96	99.11	344.90	344.88
52		SV2-4	125.38	SV2-2	341.76	117.63	529.91	352.42	SV2-4	139.96	97.03	352.42	352.42
53		SV2-5	125.22	SV2-2	347.53	116.33	690.42	403.26	SV2-5	139.96	95.14	403.27	403.27
54		SV2-6	125.33	SV2-2	349.85	113.15	807.07	353.94	SV2-6	139.96	91.73	353.94	353.94
55		SV2-7	100.28	SV2-2	354.49	110.00	1,129.43	227.57	SV2-7	139.96	88.10	227.57	227.57
56		SV2-8	250.99	SV2-8	314.81	105.83	374.15	374.17	SV2-8	139.96	87.98	374.17	374.15
57		SV2-9	100.34	SV2-2	354.65	108.96	1,168.25	208.50	SV2-9	139.96	87.05	208.50	208.50

Spring Valley - Peak Hour - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
1		11	SV1-5	SV1-6	79.20	305.00	110.00	2.32	0.03	0.000	0.01
2		119	SV2-5	SV2-6	64.38	203.00	110.00	10.88	0.34	0.06	0.96
3		121	SV2-6	SV2-8	86.33	203.00	110.00	10.16	0.31	0.07	0.85
4		123	SV2-8	SV2-10	106.17	203.00	110.00	6.35	0.20	0.04	0.36
5		13	SV1-6	SV1-15	64.17	305.00	110.00	-1.43	0.02	0.000	0.00
6		131	SV2-5	SV2-4	58.35	203.00	110.00	-9.99	0.31	0.05	0.82
7		133	SV2-3	SV2-2	48.33	203.00	110.00	-11.73	0.36	0.05	1.11
8		135	SV2-5	SV1-43	84.78	203.00	110.00	-1.37	0.04	0.00	0.02
9		137	SV1-43	SV1-42	53.95	203.00	110.00	-6.88	0.21	0.02	0.41
10		145	SV1-43	SV1-44	84.81	152.00	100.00	4.61	0.25	0.08	0.96
11		149	SV1-46	SV1-33	70.35	152.00	100.00	-1.03	0.06	0.00	0.06
12		15	SV1-15	SV1-16	82.82	305.00	110.00	-2.08	0.03	0.000	0.01
13		153	SV1-37	SV1-38	45.48	203.00	110.00	-11.72	0.36	0.05	1.11
14		155	SV1-33	SV1-29	79.57	203.00	110.00	3.61	0.11	0.01	0.12
15		157	SV1-46	SV1-47	72.84	152.00	100.00	2.52	0.14	0.02	0.31
16		159	SV1-47	SV2-7	50.12	152.00	100.00	-1.29	0.07	0.00	0.09
17		161	SV2-7	SV2-8	84.81	152.00	100.00	-1.90	0.10	0.02	0.19
18		163	SV1-29	SV1-32	74.57	203.00	110.00	-10.84	0.33	0.07	0.96
19		165	SV1-32	SV1-31	59.01	203.00	110.00	-10.84	0.33	0.06	0.96
20		179	SV2-16	SV2-12	131.31	203.00	110.00	-1.44	0.04	0.00	0.02
21		19	SV1-27	SV2-11	151.15	305.00	110.00	-0.75	0.01	0.000	0.000
22		203	SV1-48	SV1-31	291.64	305.00	110.00	25.79	0.35	0.19	0.66
23		21	SV2-11	SV2-17	67.21	203.00	110.00	4.68	0.14	0.01	0.20
24		211	SV1-1	SV1-2	54.14	305.00	110.00	14.95	0.20	0.01	0.24
25		213	SV1-2	SV1-3	56.68	305.00	110.00	14.95	0.20	0.01	0.24
26		215	SV1-3	SV1-4	135.17	305.00	110.00	14.95	0.20	0.03	0.24
27		217	SV1-4	SV1-5	118.00	305.00	110.00	2.32	0.03	0.000	0.01
28		219	SV1-48	SV1-40	75.37	305.00	110.00	-25.79	0.35	0.05	0.66
29		227	SV1-1	SV1-30	163.92	305.00	110.00	-14.95	0.20	0.04	0.24
30		229	SV1-30	SV1-31	396.96	305.00	110.00	-14.95	0.20	0.09	0.24
31		239	SV1-20	SV1-21	71.89	152.00	100.00	0.96	0.05	0.00	0.05
32		241	SV1-21	SV2-18	24.12	152.00	100.00	3.40	0.19	0.01	0.55
33		243	SV1-40	SV2-1	158.05	305.00	110.00	12.45	0.17	0.03	0.17
34		245	SV1-39	SV1-40	30.50	203.00	110.00	-22.25	0.69	0.11	3.63
35		249	SV1-17	SV1-18	102.11	152.00	100.00	0.34	0.02	0.000	0.01
36		251	SV1-18	SV1-19	102.76	152.00	100.00	-0.64	0.04	0.00	0.02
37		253	SV1-19	SV1-20	74.30	152.00	100.00	1.87	0.10	0.01	0.18
38		255	SV1-19	SV1-27	81.42	203.00	110.00	-3.49	0.11	0.01	0.12
39		257	SV1-17	SV1-6	108.21	203.00	110.00	-3.09	0.10	0.01	0.09
40		259	SV1-15	SV1-12	94.78	203.00	110.00	-0.31	0.01	0.000	0.00
41		261	SV1-12	SV1-9	81.83	203.00	110.00	-1.27	0.04	0.00	0.02
42		263	SV1-16	SV1-14	71.87	203.00	110.00	-1.14	0.04	0.00	0.01
43		265	SV1-16	SV1-27	95.94	305.00	110.00	-1.72	0.02	0.000	0.00
44		269	SV1-24	SV1-25	77.54	152.00	100.00	-0.35	0.02	0.000	0.01
45		27	SV1-24	SV1-23	80.60	152.00	100.00	-0.48	0.03	0.00	0.01
46		271	SV1-25	SV1-26	93.00	152.00	100.00	-1.18	0.07	0.01	0.08
47		273	SV1-26	SV1-21	41.22	152.00	100.00	-1.79	0.10	0.01	0.17

Spring Valley - Peak Hour - Pipe Report

		ID	From Node	To Node	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)	Headloss (m)	HL/1000 (m/km)
48		275	SV2-15	SV2-16	73.73	203.00	110.00	-0.53	0.02	0.000	0.00
49		279	SV1-33	SV1-34	21.72	203.00	110.00	-4.94	0.15	0.00	0.22
50		281	SV1-38	SV1-39	102.49	203.00	110.00	-12.62	0.39	0.13	1.27
51		283	SV1-39	SV1-41	110.52	203.00	110.00	8.80	0.27	0.07	0.65
52		285	SV1-46	SV1-45	52.31	152.00	100.00	-2.33	0.13	0.01	0.27
53		287	SV1-45	SV1-44	69.25	152.00	100.00	-3.47	0.19	0.04	0.57
54		289	SV2-13	SV2-14	78.63	152.00	100.00	0.30	0.02	0.000	0.01
55		29	SV1-23	SV1-22	84.83	152.00	100.00	-1.46	0.08	0.01	0.11
56		291	SV1-34	SV1-36	46.65	203.00	110.00	-4.81	0.15	0.01	0.21
57		293	SV1-36	SV1-37	58.01	203.00	110.00	-10.58	0.33	0.05	0.92
58		295	SV1-34	SV1-35	46.38	203.00	110.00	-1.72	0.05	0.00	0.03
59		297	SV1-35	SV1-36	51.72	203.00	110.00	-4.18	0.13	0.01	0.16
60		301	SV1-8	SV1-9	55.77	203.00	110.00	-1.47	0.05	0.00	0.02
61		303	SV1-9	SV1-11	72.40	203.00	110.00	-3.81	0.12	0.01	0.14
62		31	SV1-22	SV1-17	78.62	152.00	100.00	-2.22	0.12	0.02	0.25
63		311	SV2-2	SV2-1	44.86	203.00	110.00	-12.45	0.38	0.06	1.24
64		313	SV2-4	SV2-3	48.13	203.00	110.00	-10.83	0.33	0.05	0.96
65		315	SV1-42	SV1-41	46.22	203.00	110.00	-7.72	0.24	0.02	0.51
66		317	SV1-14	SV1-13	78.33	203.00	110.00	-2.22	0.07	0.00	0.05
67		319	SV1-6	SV1-7	78.19	203.00	110.00	-0.03	0.000	0.00	0.00
68		321	SV1-7	SV1-8	79.68	203.00	110.00	-0.71	0.02	0.000	0.01
69		323	7002	SV1-40	0.10	900.00	110.00	60.49	0.10	0.00	0.00
70		327	SV2-17	SV1-21	13.52	152.00	100.00	4.68	0.26	0.01	0.99
71		329	SV2-18	SV2-12	52.49	203.00	110.00	3.40	0.11	0.01	0.11
72		37	SV2-10	SV2-11	78.89	203.00	110.00	6.64	0.21	0.03	0.39
73		39	SV2-10	SV2-9	76.14	152.00	100.00	-0.90	0.05	0.00	0.05
74		41	SV2-9	SV1-47	96.88	152.00	100.00	-1.66	0.09	0.01	0.14
75		43	SV1-47	SV1-28	75.21	152.00	100.00	1.69	0.09	0.01	0.15
76		45	SV1-28	SV1-27	136.39	203.00	110.00	5.48	0.17	0.04	0.27
77		47	SV1-28	SV1-29	131.62	203.00	110.00	-4.85	0.15	0.03	0.22
78		49	SV1-29	SV1-11	90.13	203.00	110.00	8.47	0.26	0.05	0.61
79		51	SV1-11	SV1-13	67.86	203.00	110.00	3.00	0.09	0.01	0.09
80		55	SV1-10	SV1-11	78.30	203.00	110.00	-0.61	0.02	0.000	0.00
81		65	SV2-12	SV2-13	55.50	152.00	100.00	1.13	0.06	0.00	0.07
82		67	SV2-14	SV2-15	65.81	152.00	100.00	-0.53	0.03	0.00	0.02

DRAWING LEGEND

DRWG	NAME	DESCRIPTION
102	JOSHUA STREET	STA 1+320 TO STA 1+660
104	FELICITY CRESCENT	STA. 0+440 TO STA. 0+740
106	FOUNTAINHEAD DRIVE	STA 0+420 TO STA 0+660
113	DOVEHAVEN STREET	STA 0+100 TO STA 0+320
115	WINTERHAVEN DRIVE	STA 0+100 TO STA 0+360
116	ESTERBROOK DRIVE	STA. 0+240 TO STA. 0+422
117	KNOTRIDGE DRIVE	STA. 0+100 TO STA. 0+285
118	SPRING VALLEY DRIVE	STA. 0+740 TO STA. 1+045
119	SPRING VALLEY DRIVE	STA. 1+045 TO STA. 1+280
121	STARCROSS STREET	STA. 0+100 TO STA. 0+254

LEGEND

300ø ST.	STORM SEWER
250ø SAN.	SANITARY SEWER
100ø WATERMAIN	WATERMAIN
	SUBDRAIN
STMH	STORM MANHOLE
CBMH	CATCHBASIN MANHOLE
MH1A	SANITARY MANHOLE
HYD	HYDRANT
V&VB	VALVE AND VALVE BOX
CB	CATCH BASIN
CICB	CURB INLET CATCH BASIN
DC	DEPRESSED SIDEWALK
	SERVICE LOCATION
	TWIN SERVICE LOCATION
	CURB, BARRIER CURB EXCEPT WHERE FRONTING TOWNHOUSE ON 18m ROW MOUNTABLE CURB TO BE USED.
	PHASING LINE
	FUTURE WORK

NOTES :

1. ALL WATERMAIN CONSTRUCTION IN ACCORDANCE WITH CURRENT CITY OF OTTAWA DRAWINGS & SPECIFICATIONS.
2. ALL SEWER AND ROADWAY CONSTRUCTION IN ACCORDANCE WITH CURRENT CITY OF OTTAWA DRAWINGS & SPECIFICATIONS.
3. ALL CONNECTIONS TO EXISTING WATERMAIN BY CITY OF OTTAWA FORCES. CONTRACTOR TO EXCAVATE, BACKFILL, COMPACT AND REINSTATE.
4. CATHODIC PROTECTION AS PER CITY OF OTTAWA STANDARDS.
5. INSULATION AT ALL STRUCTURES PER CITY OF OTTAWA DETAIL W23.
6. ALL STREET AND REAR YARD CB'S TO HAVE INLET RESTRICTURES SEE DRAWING 10261-800.
7. DUE TO WATERMAIN PRESSURE THAT MAY EXCEED 80psi, BUILDER SHALL INSTALL A PRESSURE REDUCING VALVE IN THE UNITS AS REQUIRED BY THE BUILDING CODE.
8. FOR LEGAL BOUNDARY INFORMATION REFER TO REGISTERED PLAN 4M- BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
9. BARRIER CURBS AS PER SC 1.2 ARE REQUIRED THROUGHOUT DEVELOPMENT EXCEPT ALONG TOWNHOUSE FRONTAGES ON 18m ROW, WHERE MOUNTABLE CURBS AS PER SC 1.3 IS TO BE USED
10. SEE DRAWING 100B FOR ADDITIONAL NOTES AND DETAILS.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2	REVISED AS PER CITY COMMENTS	DGY	10:09:20
1	REVISED FOR PHASE 2	DGY	09:04:03

CLARIDGE HOMES

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title
CLARIDGE HOMES
SPRING VALLEY

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
PROVINCE OF ONTARIO

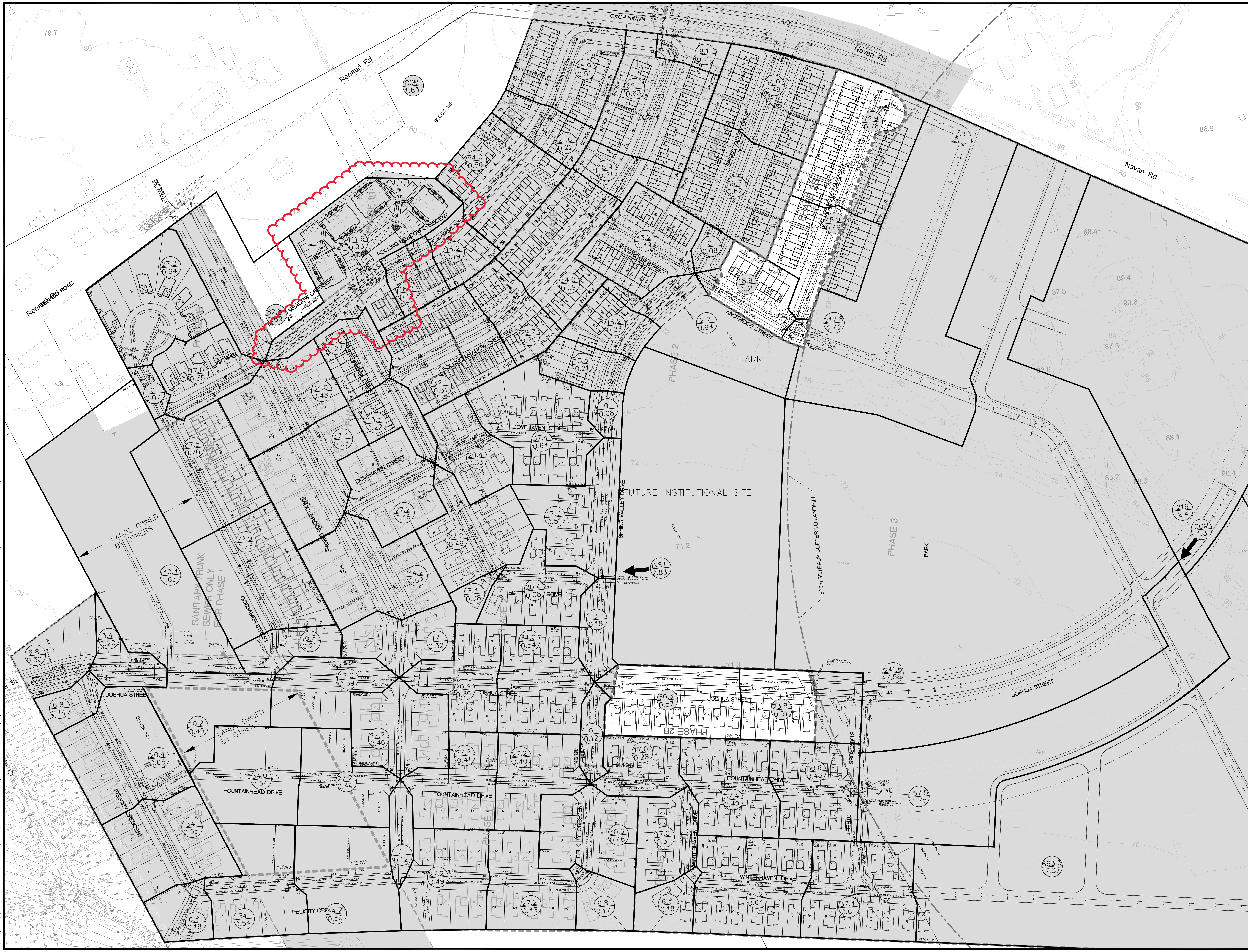
N

Drawing Title
GENERAL PLAN OF SERVICES PHASE 2

Scale
1:1000

Design	Date
D.G.Y.	AUGUST 2006
Drawn	Checked
D.D.	
Project No.	Drawing No.
10261	100-C

APPENDIX B



NOTE:
SEE RESPECTIVE SERVICING PLANS FOR SEWER SIZES AND SLOPES.

LEGEND:

SANITARY

7 — POPULATION
0.19 — AREA IN HECTARES

POPULATION

SINGLE FAMILY = 3.4ppu
TOWNHOUSE = 2.7ppu
INST/COM 50,000 l/s/Ha
LOW-MED DENSITY = 90 ppHa

No.	REVISIONS	By	Date
18	REVISED AS PER CITY COMMENTS	DGY	12:01:18
17	REVISED AS PER CITY COMMENTS	DGY	11:08:11
16	ADDED PHASE 2B LIMITS	DGY	11:06:16
15	REVISED AS PER NEW LEGAL	DGY	10:11:17
14	REVISED AS PER NEW LEGAL	DGY	10:10:25
13	REVISED AS PER CITY COMMENTS	DGY	10:09:20
12	REVISED AS PER NEW LEGAL	DGY	09:06:01
11	REVISED AS PER CITY COMMENTS	DGY	09:01:19
10	PHASE 2	DGY	08:11:21
9	REVISED GOSSAMER	DGY	08:07:23
8	REVISED PRAIRIE/GOSSAMER	DGY	08:06:19
7	REVISED AS PER NEW LEGAL	DGY	08:03:04
6	REVISED AS PER NEW LEGAL	DGY	08:02:20
5	REVISED AS PER NEW SITE PLAN	DGY	07:08:16
4	REVISE DRAFT PLAN	DGY	06:12:21
3	REVISED AS PER CITY COMMENTS	DGY	06:10:30
2	REVISED AS PER CITY COMMENTS	DGY	06:09:13
1	ISSUED FOR APPROVAL	DGY	06:08:16

CLARIDGE HOMES

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title
CLARIDGE HOMES
SPRING VALLEY

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
PROVINCE OF ONTARIO

N

Drawing Title
SANITARY DRAINAGE AREA PLAN PHASE 2B

Scale
1:1250

Design	Date
D.G.Y.	AUGUST 2006
Drawn	Checked
D.D.	
Project No.	Drawing No.
10261	501

IBI GROUP

CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET
PROJECT: CLARIDGE HOMES, NAVAN ROAD
LOCATION: CUMBERLAND
DEVELOPER: CLARIDGE HOMES

JOB: 3625-LD
DATE: Dec 2008
DESIGN: DY
FILE: 3625-LD Sewers.xls

LOCATION			INDIVIDUAL			CUMULATIVE			DESIGN FLOW						PROPOSED SEWER					
STREET	FROM MH	TO MH	com/Inst area Ha	Residential AREA (Ha)	POP.	Com/Inst Area Ha	POP.	AREA (Ha)	Pop PEAK FACT.	POPLN FLOW (l/s)	Com/Inst Peak Fact	Com/Inst Peak Flow	INFILT FLOW (l/s)	PEAK FLOW (l/s)	CAPACITY l/s	VELOCITY (full) m/s	LGTH. (m)	PIPE (mm)	GRADE %	AVAIL. CAP. (%)
Phase 2 & External																				
Fountainhead Drive		162A				0.00	853.70	10.36	3.84	13.29	1.50	0.00	2.90	**16.19**						
Felicity Crescent	162A	195A		0.120	0.0	0.00	853.70	10.48	3.84	13.29	9.50	0.00	2.93	**16.22**	**32.23**	0.64	78	250	0.27	49.67%
Phase 2 & External																				
Joshua Avenue		195A				1.30	669.50	12.81	3.91	10.59	1.50	1.13	3.95	**15.67**						
Phase 2																				
Spring Valley		195A				2.83	667.60	9.43	3.91	10.56	1.50	2.46	3.43	**16.45**						
Joshua Avenue	195A	130B		0.540	34.0	4.13	2224.80	33.26	3.55	31.99	1.50	3.59	10.47	**46.05**	**68.41**	0.60	75	375	0.14	32.69%
Joshua Avenue	130B	130A		0.390	20.4	4.13	2245.20	33.65	3.55	32.25	1.50	3.59	10.58	**46.42**	**68.41**	0.60	75	375	0.14	32.15%
Felicity Crescent	162A	161A		0.480	30.6	0.00	30.60	0.48	4.00	0.50	1.50	0.00	0.13	**0.63**	**27.60**	0.85	66.1	200	0.65	97.72%
Felicity Crescent	161A	160B		0.170	6.8	0.00	37.40	0.65	4.00	0.61	1.50	0.00	0.18	**0.79**	**27.60**	0.85	12.6	200	0.65	97.14%
Felicity Crescent	160B	160A		0.430	27.2	0.00	64.60	1.08	4.00	1.05	1.50	0.00	0.30	**1.35**	**27.60**	0.85	65	200	0.65	95.11%
Felicity Crescent	160A	120B		0.490	27.2	0.00	91.80	1.57	4.00	1.49	1.50	0.00	0.44	**1.93**	**30.40**	0.60	68	250	0.24	93.65%
Saddleridge Drive	120B	201A		0.120	0.0	0.00	91.80	1.69	4.00	1.49	2.50	0.00	0.47	**1.96**	**30.40**	0.60	75.8	250	0.24	93.55%
Fountainhead Drive	203A	223A		0.540	34.0	0.00	34.00	0.54	4.00	0.55	3.50	0.00	0.15	**0.70**	**27.60**	0.85	63.9	200	0.65	97.46%
Fountainhead Drive	223A	201A		0.440	27.2	0.00	61.20	0.98	4.00	0.99	4.50	0.00	0.27	**1.26**	**19.36**	0.60	79.9	200	0.32	93.49%
Fountainhead Drive	162A	123A		0.400	27.2	0.00	27.20	0.40	4.00	0.44	4.50	0.00	0.11	**0.55**	**27.60**	0.85	73.4	200	0.65	98.01%
Fountainhead Drive	123A	201A		0.410	27.2	0.00	54.40	0.81	4.00	0.88	5.50	0.00	0.23	**1.11**	**27.60**	0.85	72.4	200	0.65	95.98%
Saddleridge Drive	201A	130A		0.460	27.2	0.00	234.60	3.94	4.00	3.80	7.50	0.00	1.10	**4.90**	**30.40**	0.60	78.1	250	0.24	83.88%
Rolling Meadow Crescent	142B	142A		0.120	8.1	0.00	8.10	0.12	4.00	0.13	1.50	0.00	0.03	**0.16**	**57.27**	1.77	9.7	200	2.80	99.72%
Rolling Meadow Crescent	142A	141A		0.630	62.1	0.00	70.20	0.75	4.00	1.14	1.50	0.00	0.21	**1.35**	**57.27**	1.77	83.2	200	2.80	97.64%
Rolling Meadow Crescent	141A	140A		0.210	18.9	0.00	89.10	0.96	4.00	1.44	1.50	0.00	0.27	**1.71**	**57.27**	1.77	34.9	200	2.80	97.01%
Rolling Meadow Crescent	140A	139A		0.590	54.0	0.00	143.10	1.55	4.00	2.32	1.50	0.00	0.43	**2.75**	**66.71**	2.06	100.1	200	3.80	95.88%
Rolling Meadow Crescent	139A	138A		0.290	29.7	0.00	172.80	1.84	4.00	2.80	1.50	0.00	0.52	**3.32**	**34.21**	1.06	35	200	1.00	90.30%
Rolling Meadow Crescent	138A	137A		0.610	62.1	0.00	234.90	2.45	4.00	3.81	1.50	0.00	0.69	**4.50**	**34.21**	1.06	90	200	1.00	86.85%
Esterbrook Drive	143A	137A		0.270	21.6	0.00	21.60	0.27	4.00	0.35	1.50	0.00	0.08	**0.43**	**41.90**	1.29	52.1	200	1.50	98.97%
Esterbrook Drive	137A	136A		0.220	13.5	0.00	270.00	2.94	4.00	4.38	1.50	0.00	0.82	**5.20**	**34.21**	1.06	75	200	1.00	84.80%
Dovehaven Street	136A	133A		0.460	27.2	0.00	297.20	3.40	4.00	4.82	1.50	0.00	0.95	**5.77**	**24.19**	0.75	79	200	0.50	76.15%
Rolling Meadow Crescent	155A	154A		0.510	45.9	0.00	45.90	0.51	4.00	0.74	1.50	0.00	0.14	**0.88**	**57.27**	1.77	55.8	200	2.80	98.46%
Rolling Meadow Crescent	154A	153A		0.220	21.6	0.00	67.50	0.73	4.00	1.09	1.50	0.00	0.20	**1.29**	**72.58**	2.24	31.5	200	4.50	98.22%
Rolling Meadow Crescent	153A	152A		0.560	54.0	0.00	121.50	1.29	4.00	1.97	1.50	0.00	0.36	**2.33**	**72.58**	2.24	79.9	200	4.50	96.79%
Rolling Meadow Crescent	152A	151A		0.190	16.2	0.00	137.70	1.48	4.00	2.23	1.50	0.00	0.41	**2.64**	**72.58**	2.24	31.5	200	4.50	96.36%
Rolling Meadow Crescent	151A	150A		0.190	16.2	0.00	153.90	1.67	4.00	2.49	1.50	0.00	0.47	**2.96**	**51.56**	1.59	39.2	200	2.27	94.26%
~~Rolling Meadow Crescent~~	~~150A~~	~~300A~~		~~0.000~~	~~0.0~~	~~0.00~~	~~153.90~~	~~1.67~~	~~4.00~~	~~2.49~~	~~1.50~~	~~0.00~~	~~0.47~~	~~**2.96**~~	**21.63**	0.67	13.4	200	0.40	86.32%
Rolling Meadow Crescent	300A	145A		0.930	111.6	0.00	265.50	2.60	4.00	4.30	1.50	0.00	0.73	**5.03**	**21.63**	0.67	103.4	200	0.40	76.75%
Saddleridge Drive	156A	145A		0.690	82.8	0.00	82.80	0.69	4.00	1.34	1.50	0.00	0.19	**1.53**	**41.90**	1.29	70	200	1.50	96.35%

Where Q = average daily per capita flow 350 l/cap/d
I = Unit of peak extraneous flow 0.28 l/sec/Ha
M = Peaking Factor = 1+(14/(4+P)^0.5)), P=POP. IN 1000'S, Max of 4
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Population = AVERAGE Per unit = 3.4 singles
2.7 Townhouses
General Population Densities Low Density = 120 pers / per gross hectare
Commercial and School - Average flow 50,000 l/ha/day with Peaking Factor = 1.5

SPECIFY
Coeff. of friction (n) = 0.013

REV. # : 9 15-Dec-08

IBI GROUP

CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8

SANITARY SEWER DESIGN SHEET

PROJECT: CLARIDGE HOMES, NAVAN ROAD
LOCATION: CUMBERLAND
DEVELOPER: CLARIDGE HOMES

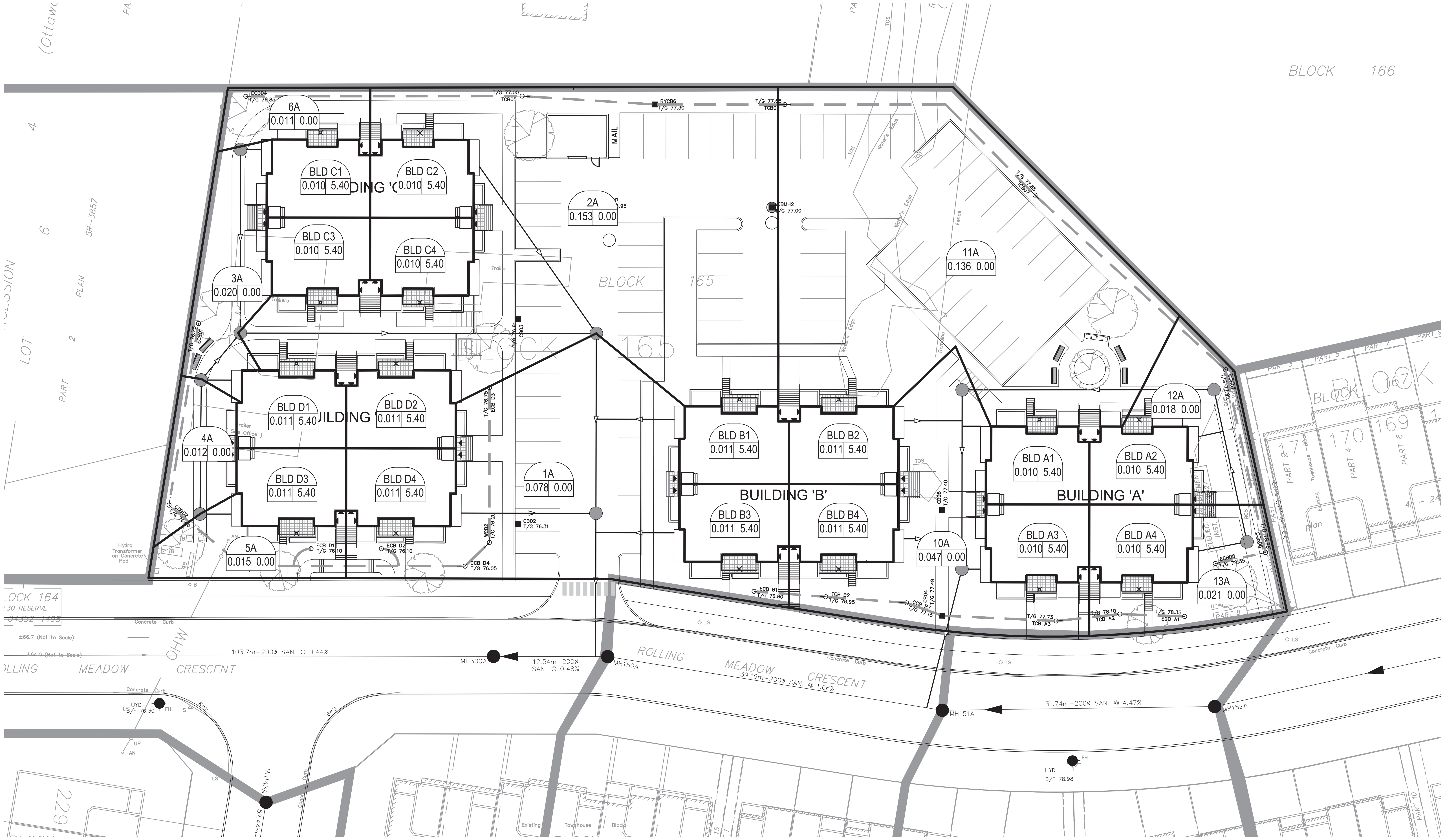
JOB: 3625-LD
DATE: Dec 2008
DESIGN: DY
FILE: 3625-LD Sewers.xls

LOCATION			INDIVIDUAL			CUMULATIVE			DESIGN FLOW						PROPOSED SEWER					
STREET	FROM MH	TO MH	com/Inst area Ha	Residential AREA (Ha)	Residential POP.	Com/Inst Area Ha	POP.	AREA (Ha)	Pop PEAK FACT.	POPLN FLOW (l/s)	Com/Inst Peak Fact	Com/Inst Peak Flow	INFILT FLOW (l/s)	PEAK FLOW (l/s)	CAPACITY l/s	VELOCITY (full) m/s	LGTH. (m)	PIPE (mm)	GRADE %	AVAIL. CAP. (%)
Gossamer St	200A	201A		0.640	27.2	0.00	27.20	0.64	4.00	0.44	1.50	0.00	0.18	**0.62**	**27.60**	0.85	40	200	0.65	97.75%
Gossamer St	201A	202A		0.070	0.0	0.00	27.20	0.71	4.00	0.44	1.50	0.00	0.20	**0.64**	**24.19**	0.75	41.5	200	0.50	97.35%
Prairie St	202A	145A		0.350	17.0	0.00	44.20	1.06	4.00	0.72	1.50	0.00	0.30	**1.02**	**39.22**	0.77	87	250	0.40	97.40%
Saddleridge Drive	145A	134A		0.480	34.0	0.00	426.50	4.83	4.00	6.91	1.50	0.00	1.35	**8.26**	**41.90**	1.29	65.8	200	1.50	80.29%
Saddleridge Drive	134A	133A		0.530	37.4	0.00	463.90	5.36	3.99	7.50	1.50	0.00	1.50	**9.00**	**41.90**	1.29	65.8	200	1.50	78.52%
Saddleridge Drive	133A	132A		0.620	44.2	0.00	805.30	9.38	3.86	12.59	1.50	0.00	2.63	**15.22**	**24.19**	0.75	93.7	200	0.50	37.09%
Saddleridge Drive	132A	130A		0.320	17.0	0.00	822.30	9.70	3.85	12.84	1.50	0.00	2.72	**15.56**	**24.19**	0.75	44	200	0.50	35.68%
Joshua Street	130A	127B		0.390	17.0	4.13	3319.10	47.68	3.40	45.78	1.50	3.59	14.51	**63.88**	**68.41**	0.60	95.05	375	0.14	6.62%
Phase 1B & External																				
Gossamer St	203A	204A		0.700	67.5	0.00	67.50	0.70	4.00	1.09	1.50	0.00	0.20	**1.29**	**34.21**	1.06	87	200	1.00	96.23%
Gossamer St	204A	205A		0.730	72.9	0.00	140.40	1.43	4.00	2.28	1.50	0.00	0.40	**2.68**	**34.21**	1.06	86.7	200	1.00	92.17%
Gossamer St	205A	127B		0.210	10.8	0.00	151.20	1.64	4.00	2.45	1.50	0.00	0.46	**2.91**	**24.19**	0.75	36.6	200	0.50	87.97%
Joshua Street	127B	116A		0.450	10.2	4.13	3480.50	49.77	3.39	47.75	1.50	3.59	15.09	**66.43**	**68.41**	0.60	65.5	375	0.14	2.90%
Joshua Street	116A	104D				4.13	3480.50	49.77	3.39	47.75	1.50	3.59	15.09	**66.43**	**68.41**	0.60	78	375	0.14	2.90%
Felicity Crescent	120A	111B		0.590	44.2	0.00	44.20	0.59	4.00	0.72	3.50	0.00	0.17	**0.89**	**27.60**	0.85	76	200	0.65	96.78%
Felicity Crescent	111B	101A		0.540	34.0	0.00	78.20	1.13	4.00	1.27	1.50	0.00	0.32	**1.59**	**30.40**	0.60	69.5	250	0.24	94.77%
Felicity Crescent	101A	101B		0.180	6.8	0.00	85.00	1.31	4.00	1.38	1.50	0.00	0.37	**1.75**	**30.40**	0.60	13	250	0.24	94.24%
Felicity Crescent	101B	102A		0.550	34.0	0.00	119.00	1.86	4.00	1.93	1.50	0.00	0.52	**2.45**	**313.75**	1.08	74	600	0.24	99.22%
Felicity Crescent	102A	103A		0.650	20.4	0.00	139.40	2.51	4.00	2.26	1.50	0.00	0.70	**2.96**	**313.75**	1.08	75	600	0.24	99.06%
Felicity Crescent	103A	104D		0.140	6.8	0.00	146.20	2.65	4.00	2.37	1.50	0.00	0.74	**3.11**	**311.13**	1.07	32.8	600	0.24	99.00%
External																				
Street 1	116C	116B		1.630	140.4	0.00	140.40	1.63	4.00	2.28	1.50	0.00	0.46	**2.74**	**30.40**	0.60	32	250	0.24	90.99%
Joshua Street	116B	104C		0.200	3.4	0.00	143.80	1.83	4.00	2.33	1.50	0.00	0.51	**2.84**	**30.40**	0.60	60.4	250	0.24	90.66%
Joshua Street	104A	104C		0.300	6.8	0.00	6.80	0.30	4.00	0.11	1.50	0.00	0.08	**0.19**	**27.60**	0.85	45	200	0.65	99.31%
Joshua Street	104C	104D				0.00	150.60	2.13	4.00	2.44	1.50	0.00	0.60	**3.04**	**62.02**	1.22	2.5	250	1.00	95.10%
Joshua Street	104D	EX				4.13	3777.30	54.55	3.36	51.34	1.50	3.59	16.43	**71.36**	**85.85**	0.75	49.6	375	0.22	16.88%

Where Q = average daily per capita flow 350 l/cap/d
I = Unit of peak extraneous flow 0.28 l/sec/Ha
M = Peaking Factor = 1+(14/(4+P)^0.5)), P=POP. IN 1000'S, Max of 4
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)
Population = AVERAGE Per unit = 3.4 singles
2.7 Townhouses
General Population Densities Low Density = 120 pers / per gross hectare
Commercial and School - Average flow 50,000 l/ha/day with Peaking Factor = 1.5

SPECIFY
Coeff. of friction (n) = 0.013

REV. # : 9 15-Dec-08



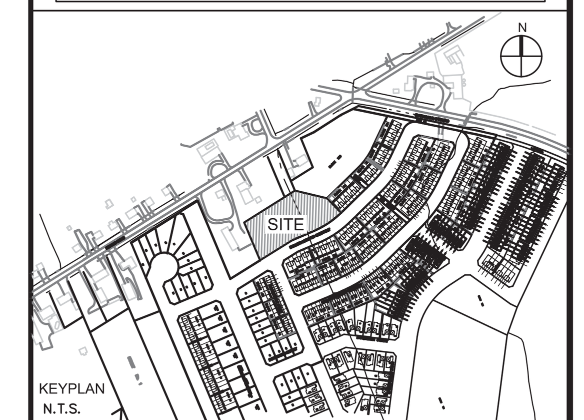
LEGEND

(solid black line)	SANITARY TRIBUTARY OUTLINE
(grey band)	TRIBUTARY OUTLINE PREVIOUS PHASE

BLD C2 ← AREA IDENTIFICATION
0.010 5.40 ← POPULATION; 0.010 ← AREA IN HECTARES

POPULATION:
STACKED TOWNHOUSE = 1.8 PPU

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



KEYPLAN
N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P OY6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS
WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2018/10/11
PROVINCE OF ONTARIO

Drawing Title

SANITARY DRAINAGE AREA PLAN

Scale	1:250
Design: R.M./A.Z.	Date: OCTOBER 2018
Drawn: E.H.	Checked: D.G.Y.
Project No.: 115201	Drawing No.: 400

CITY PLAN No.####

CITY FILE No.####

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

Spring Valley Trails ZENS
CITY OF OTTAWA
Claridge Homes

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units	UNIT TYPES				AREA w/o Units	POPULATION		RES PEAK FACTOR	PEAK FLOW	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
														INSTITUTIONAL		COMMERCIAL		INDUSTRIAL																
STREET	AREA ID	FROM MH	TO MH	(Ha)	SF	SD	TH	APT	(Ha)	IND	CUM		(L/s)	IND	CUM	IND	CUM	IND	CUM		(L/s)	IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
										121.5																								
Rolling Meadow Cres.		MH 152A	MH 151A	0.190			6		0.00	16.2	137.7	3.56	1.59	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	0.19	0.06	0.00	0.00	1.65	44.08	39.19	200	1.66	1.359	42.43	96.25%
	BLD A4	BLD A4	MH 13A	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.01	0.00	0.00	0.00	0.07	15.89	5.74	150	1.00	0.871	15.82	99.57%
	BLD A2	BLD A2	MAIN	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.02	0.01	0.00	0.00	0.07	18.24	2.91	150	2.00	1.000	18.17	99.60%
	13A	MH 13A	MH 12A	0.021					0.00	0.0	10.8	3.73	0.13	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.02	0.04	0.01	0.00	0.00	0.14	48.39	18.01	200	2.00	1.492	48.25	99.70%
	12A	MH 12A	MH 11A	0.018					0.00	0.0	10.8	3.73	0.13	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.02	0.06	0.02	0.00	0.00	0.15	48.39	29.91	200	2.00	1.492	48.24	99.69%
	BLD B2	BLD B2	MAIN	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.07	0.02	0.00	0.00	0.09	15.89	5.96	150	1.00	0.871	15.80	99.44%
	BLD A1	BLD A1	MAIN	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.08	0.03	0.00	0.00	0.09	15.89	2.89	150	1.00	0.871	15.80	99.42%
	BLD B4	BLD B4	MAIN	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.09	0.03	0.00	0.00	0.10	15.89	5.98	150	1.00	0.871	15.79	99.40%
	BLD A3	BLD A3	MAIN	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.10	0.03	0.00	0.00	0.10	15.89	2.86	150	1.00	0.871	15.79	99.38%
	11A	MH 11A	MH 10A	0.136					0.00	0.0	32.4	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.14	0.24	0.08	0.00	0.00	0.46	48.39	24.99	200	2.00	1.492	47.92	99.04%
	10A	MH 10A	MAIN	0.047					0.00	0.0	32.4	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.05	0.28	0.09	0.00	0.00	0.48	42.87	12.28	200	1.57	1.322	42.39	98.88%
Rolling Meadow Cres.		MH 151A	MH 150A	0.190			6		0.00	16.2	186.3	3.53	2.13	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.19	0.47	0.16	0.00	0.00	2.29	44.08	39.19	200	1.66	1.359	41.80	94.81%
	BLD D3	BLD D3	MH 5A	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.30	0.10	0.00	0.00	0.16	15.89	3.61	150	1.00	0.871	15.72	98.97%
	5A	MH 5A	MH 4A	0.015					0.00	0.0	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.02	0.31	0.10	0.00	0.00	0.17	34.22	15.51	200	1.00	1.055	34.05	99.51%
	BLD D1	BLD D1	MH 4A	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.31	0.10	0.00	0.00	0.17	15.89	3.49	150	1.00	0.871	15.72	98.95%
	4A	MH 4A	MH 3A	0.012					0.00	0.0	10.8	3.73	0.13	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.32	0.11	0.00	0.00	0.24	34.22	7.07	200	1.00	1.055	33.98	99.31%
	BLD C1	BLD C1	MH 6A	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.33	0.11	0.00	0.00	0.18	15.89	2.41	150	1.00	0.871	15.71	98.90%
	BLD C3	BLD C3	MAIN	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.34	0.11	0.00	0.00	0.18	15.89	2.41	150	1.00	0.871	15.71	98.88%
	6A	MH 6A	MH 3A	0.011					0.00	0.0	10.8	3.73	0.13	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.35	0.12	0.00	0.00	0.25	34.22	21.25	200	1.00	1.055	33.97	99.28%
	BLD D2	BLD D2	MAIN	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.36	0.12	0.00	0.00	0.19	15.89	4.31	150	1.00	0.871	15.70	98.83%
	BLD C4	BLD C4	MAIN	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.37	0.12	0.00	0.00	0.19	15.89	4.35	150	1.00	0.871	15.70	98.81%
	3A	MH 3A	MH 2A	0.020					0.00	0.0	32.4	3.68	0.39	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.02	0.39	0.13	0.00	0.00	0.52	34.22	41.19	200	1.00	1.055	33.70	98.49%
	BLD C2	BLD C2	MH 2A	0.010				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.40	0.13	0.00	0.00	0.20	15.89	23.61	150	1.00	0.871	15.69	98.75%
	BLD B1	BLD B1	MAIN	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.42	0.14	0.00	0.00	0.20	15.89	9.04	150	1.00	0.871	15.69	98.73%
	2A	MH 2A	MH 1A	0.153					0.00	0.0	0.0	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.15	0.56	0.18	0.00	0.00	0.18	34.22	20.82	200	1.00	1.055	34.03	99.46%
	BLD D4	BLD D4	MH 1A	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.43	0.14	0.00	0.00	0.21	15.89	15.60	150	1.00	0.871	15.68	98.70%
	BLD B3	BLD B3	MH 1A	0.011				3	0.00	5.4	5.4	3.75	0.07	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.01	0.44	0.14	0.00	0.00	0.21	15.89	9.54	150	1.00	0.871	15.68	98.68%
	1A	MH 1A	MAIN	0.078					0.00	0.0	54.0	3.65	0.64	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.08	0.52	0.17	0.00	0.00	0.81	34.22	16.59	200	1.00	1.055	33.41	97.64%
Rolling Meadow Cres.		MH 150A	MH 300A				2		0.00	5.4	245.7	3.49	2.78	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.52	0.17	0.00	0.00	2.95	23.71	12.54	200	0.48	0.731	20.76	87.56%
Rolling Meadow Cres.		MH 300A	MH 145A	0.250			1		0.00	19.8	265.5	3.48	2.99	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.25	0.25	0.08	0.00	0.00	3.08	22.70	103.70	200	0.44	0.700	19.62	86.44%
				0.87			15	48		265.5	TRUE																							

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	##	L/Ha/day	
APT	1.8	p/p/u	COM	##	L/Ha/day	
Other	60	p/p/Ha	IND	##	L/Ha/day	MOE Chart
				##	L/Ha/day	

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area,
   1.5 if greater than 20%, otherwise 1.0

Designed: A.Z.

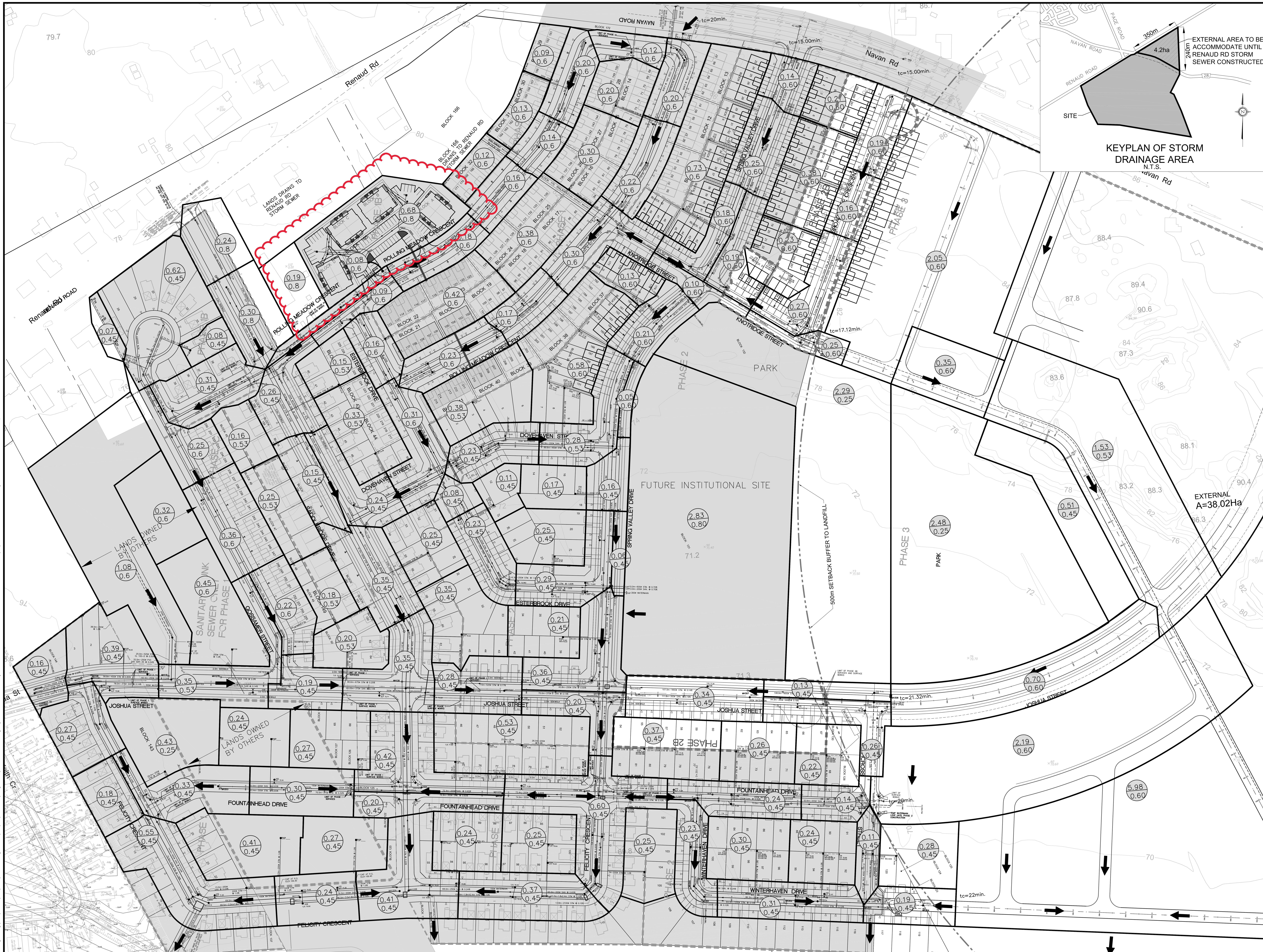
Checked: R.M.

Dwg. Reference: 115201-400

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2018-10-05

File Reference:	Date:	Sheet No:
115201.5.7.1	2018-10	1 of 1

APPENDIX C



NOTE:

SEE RESPECTIVE SERVICING PLANS FOR SEWER SIZES AND SLOPES.

LEGEND:

STORM

0.19 — AREA IN HECTARES

0.43 — RUNOFF COEFFICIENT

MAJOR STORM ROUTE

RUNOFF COEFFICIENT

0.25 – PARK/OPEN SPACE
0.45 – SINGLE
0.53 – SINGLES/TOWNS
0.60 – TOWNHOUSES
0.80 – COMMERCIAL/ INSTITUTIONAL

No.	REVISIONS	By	Date
19	REVISED AS PER CITY COMMENTS	DGY	12:01:18
18	REVISE AS PER CITY COMMENTS	DGY	11:08:11
17	ADDED PHASE 2B LIMITS	DGY	11:06:16
16	REVISED AS PER NEW LEGAL	DGY	10:11:17
15	REVISED AS PER NEW LEGAL	DGY	10:10:25
14	REVISED AS PER CITY COMMENTS	DGY	10:09:20
13	REVISED AS PER NEW LEGAL	DGY	09:06:01
12	REVISED FOR PHASE 2	DGY	09:02:02
11	REVISED AS PER CITY COMMENTS	DGY	09:01:19
10	REVISED GOSSAMER	DGY	08:07:23
9	REVISED PRAIRIE/GOSSAMER	DGY	08:06:19
8	REVISED AS PER NEW LEGAL	DGY	08:03:04
7	REVISED AS PER NEW LEGAL	DGY	08:02:20
6	REVISED AS PER NEW LEGAL	DGY	07:08:16
5	REVISED AS PER CITY COMMENTS JAN 16, 2007	DGY	07:01:23
4	REVISE DRAFT PLAN	DGY	06:12:21
3	REVISED AS PER CITY COMMENTS	DGY	06:10:30
2	REVISED AS PER CITY COMMENTS	DGY	06:09:13
1	ISSUED FOR APPROVAL	DGY	06:08:16

CLARIDGE HOMES

IBI GROUP

333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title

CLARIDGE HOMES SPRING VALLEY

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos PROVINCE OF ONTARIO

N

Drawing Title

STORM DRAINAGE AREA PLAN PHASE 2B

Scale
1:1250

Design	Date
D.G.Y.	AUGUST 2006
Drawn	Checked
D.D.	
Project No.	Drawing No.
10261	500

IBI GROUP

CCL/IBI
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C 0P8

STORM SEWER DESIGN SHEET
PROJECT: SPRING VALLEY
LOCATION: CITY OF OTTAWA
DEVELOPER: CLARIDGE HOMES

JOB #: 3625-LD
DATE: JULY 2006
DESIGN: DY

LOCATION			AREA (Ha.)							DESIGN FLOW					SEWER DATA						
STREET	FROM MH	TO MH	C= 0.25	C= 0.45	C= 0.53	C= 0.6	C= 0.8	INDIV. 2.78AC	ACCUM. 2.78AC	INLET (min.)	TIME IN PIPE	TOTAL	I (mm/Hr)	PEAK FLOW (l/s)	CAP. (l/s)	LENGTH (M)	PIPE (mm)	SLOPE (%)	n	VEL. (M/s)	AVAIL. CAP. (%)
Street 1	Stub	116				1.40		2.34	2.34	15.00	0.29	15.29	83.60	**195.62**	**317.31**	25.0	525	0.5	0.013	1.42	38.35%
Joshua Avenue	116	108		0.39				0.49	2.83	15.00	0.59	15.59	83.60	**236.59**	**274.17**	58.8	450	0.85	0.013	1.67	13.71%
Joshua Avenue	108	104						0.00	2.83	15.59	0.05	15.63	81.70	**231.21**	**473.15**	7.9	450	2.53	0.013	2.882	51.13%
Joshua Avenue	104B	104		0.16				0.20	0.20	10.00	0.36	10.36	104.20	**20.84**	**87.71**	37.0	250	2	0.013	1.731	76.24%
Felicity Crescent	104	103						0.00	3.03	15.63	0.20	15.83	81.60	**247.25**	**515.18**	37.0	450	3	0.013	3.138	52.01%
Felicity Crescent	103	102	0.430	0.45				0.86	3.89	15.83	0.59	16.42	81.00	**315.09**	**511.50**	81.0	525	1.3	0.013	2.289	38.40%
Felicity Crescent	102	101		0.88				1.10	4.99	16.42	0.53	16.95	79.20	**395.21**	**527.14**	75.5	525	1.38	0.013	2.359	25.03%
Rolling Meadow Crescent	155	154				0.09		0.15	0.15	15.00	0.46	15.46	83.60	**12.54**	**103.82**	56.9	250	2.8	0.013	2.049	87.92%
Rolling Meadow Crescent	154	153				0.20		0.33	0.48	15.46	0.20	15.66	82.10	**39.41**	**131.59**	31.2	250	4.5	0.013	2.597	70.05%
Rolling Meadow Crescent	153	152				0.55		0.92	1.40	15.66	0.51	16.17	81.50	**114.10**	**131.59**	79.6	250	4.5	0.013	2.597	13.29%
Rolling Meadow Crescent	152	151				0.00		0.00	1.40	16.17	0.18	16.35	79.90	**111.86**	**214.01**	31.3	300	4.5	0.013	2.933	47.73%
Rolling Meadow Crescent	151	150B				0.18		0.30	1.70	16.35	0.30	16.66	79.40	**134.98**	**156.95**	39.2	300	2.42	0.013	2.151	14.00%
Rolling Meadow Crescent	150B	300				0.08	0.87	2.07	3.77	16.66	0.21	16.86	78.60	**296.32**	**350.82**	14.9	600	0.3	0.013	1.202	15.53%
Rolling Meadow Crescent	300	145						0.00	3.77	16.86	1.46	18.32	78.00	**294.06**	**350.82**	104.9	600	0.3	0.013	1.202	16.18%
Saddleridge Drive	156	145					0.54	1.20	1.20	10.00	0.68	10.68	104.20	**125.04**	**142.65**	80.0	300	2	0.013	1.955	12.34%
Gossamer	200	201		0.15				0.19	0.19	15.00	0.74	15.74	83.60	**15.88**	**43.88**	38.5	250	0.5	0.013	0.866	63.80%
Gossamer	201	202		0.62				0.78	0.97	15.74	0.58	16.32	81.20	**78.76**	**129.29**	39.3	375	0.5	0.013	1.134	39.08%
Prairie	202	145		0.31				0.39	1.36	16.32	1.21	17.53	79.50	**108.12**	**129.29**	82.4	375	0.5	0.013	1.134	16.37%
Saddleridge Drive	145	134		0.26	0.310			0.78	7.11	18.32	0.42	18.74	74.20	**527.56**	**784.53**	68.2	600	1.5	0.013	2.688	32.75%
Saddleridge Drive	134	133						0.00	7.11	18.74	0.41	19.15	73.10	**519.74**	**784.53**	66.0	600	1.5	0.013	2.688	33.75%
External		143B	4.200					2.92	2.92	20.00	0.11	20.11	70.30	**205.28**	**205.33**	12.0	375	1.26	0.013	1.801	0.03%
Rolling Meadow Crescent	143B	142				0.12		0.20	3.12	20.11	0.05	20.17	70.00	**218.40**	**306.11**	8.7	375	2.8	0.013	2.685	28.65%
Rolling Meadow Crescent	142	141				0.40		0.67	3.79	20.17	0.53	20.69	69.90	**264.92**	**306.11**	84.7	375	2.8	0.013	2.685	13.46%
Rolling Meadow Crescent	141	140						0.00	3.79	20.69	0.24	20.93	68.80	**260.75**	**306.11**	38.2	375	2.8	0.013	2.685	14.82%
Rolling Meadow Crescent	140	139				0.82		1.37	5.16	20.93	0.46	21.39	68.30	**352.43**	**579.86**	97.3	450	3.8	0.013	3.532	39.22%
Rolling Meadow Crescent	139	138				0.38		0.63	5.79	21.39	0.29	21.68	67.30	**389.67**	**448.70**	35.3	525	1	0.013	2.008	13.16%
Rolling Meadow Crescent	138	137				0.40		0.67	6.46	21.68	0.67	22.35	66.80	**431.53**	**640.64**	88.7	600	1	0.013	2.195	32.64%

Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)
I = Rainfall Intensity in Millimeters per Hour (mm/hr) `
C = Runoff Coefficient

I=998.07/(6.053 +TC)^0.814

REV. # : July 22, 2008

IBI GROUP
1770 WOODWARD DRIVE
OTTAWA, ONTARIO
K2C OP8
CCL/IBI

STORM SEWER DESIGN SHEET
PROJECT: **SPRING VALLEY**
LOCATION: **CITY OF OTTAWA**
DEVELOPER: **CLARIDGE HOMES**

JOB #: 3625-LD
DATE: JULY 2006
DESIGN: DY

LOCATION			AREA (Ha.)							DESIGN FLOW					SEWER DATA						
STREET	**FROM** MH	**TO** **MH**	**C=** 0.25	**C=** 0.45	**C=** 0.53	**C=** 0.6	**C=** 0.8	INDIV. 2.78AC	ACCUM. 2.78AC	**INLET** **(min.)**	**TIME** **IN PIPE**	**TOTAL**	**I** **(mm/Hr)**	**PEAK FLOW** **(l/s)**	**CAP.** **(l/s)**	**LENGTH** **(M)**	**PIPE** **(mm)**	**SLOPE** **(%)**	**n**	**VEL.** **(M/s)**	**AVAIL.** **CAP. (%)**
Esterbrook Drive	143	137				0.67		1.12	1.12	15.00	0.62	15.62	83.60	**93.63**	**123.53**	63.0	300	1.5	0.013	1.693	24.20%
Esterbrook Drive	137	136				0.31		0.52	8.10	22.35	0.57	22.92	65.50	**530.55**	**640.64**	75.0	600	1	0.013	2.195	17.18%
Dovehave Street	136	133		0.24	0.330			0.79	8.89	22.92	0.83	23.75	64.40	**572.52**	**620.21**	83.5	675	0.5	0.013	1.679	7.69%
Saddleridge Drive	133	132		0.75	0.430			1.57	17.57	23.75	0.90	24.65	63.00	**1,106.91**	**1,117.03**	91.5	900	0.35	0.013	1.701	0.91%
Saddleridge Drive	132	130						0.00	17.57	24.65	0.37	25.02	61.50	**1,080.56**	**1,117.03**	38.2	900	0.35	0.013	1.701	3.27%
Joshua Avenue	130C	130		0.98				1.23	1.23	15.00	2.32	17.32	83.60	**102.83**	**185.02**	115.0	525	0.17	0.013	0.828	44.42%
Joshua Avenue	127D	127C			0.350	0.45		1.27	1.27	15.00	0.40	15.40	83.60	**106.17**	**142.65**	47.3	300	2	0.013	1.955	25.57%
Gossamer	203	204				0.25		0.42	0.42	10.00	1.19	11.19	104.20	**43.76**	**62.02**	87.0	250	1	0.013	1.224	29.44%
Gossamer	204	205				0.36		0.60	1.02	11.19	0.91	12.10	98.30	**100.27**	**182.87**	87.6	375	1	0.013	1.604	45.17%
Gossamer	205	127C				0.22		0.37	1.39	12.10	0.38	12.47	94.30	**131.08**	**317.31**	32.0	525	0.5	0.013	1.42	58.69%
Joshua Avenue	127C	130		0.19	0.200			0.53	3.19	15.40	1.27	16.68	82.30	**262.54**	**438.47**	90.6	675	0.25	0.013	1.187	40.12%
Saddleridge Drive	130	201		0.42				0.53	22.52	25.02	0.91	25.93	60.90	**1,371.47**	**1,818.89**	84.6	1200	0.2	0.013	1.558	24.60%
Fountainhead Drive	203	223		0.24				0.30	0.30	15.00	0.95	15.95	83.60	**25.08**	**81.36**	63.4	300	0.65	0.013	1.115	69.17%
Fountainhead Drive	223	201		0.57				0.57	0.87	15.95	1.39	17.33	80.60	**70.12**	**103.52**	75.5	375	0.32	0.013	0.908	32.26%
Fountainhead Drive	123	201		0.53				0.66	0.66	15.00	1.15	16.15	83.60	**55.18**	**81.36**	76.9	300	0.65	0.013	1.115	32.18%
Saddleridge Drive	201	120		0.20				0.25	24.30	25.93	0.83	26.76	59.50	**1,445.85**	**1,818.89**	77.5	1200	0.2	0.013	1.558	20.51%
Phase 2																					
Spring Valley		195							20.46	20.11											
EXTERNAL & Phase 2																					
Joshua Avenue		195							61.07	23.47											
Joshua Avenue	130C	195						0.00	0.00	15.00	0.81	15.81	83.60	**0.00**	**43.88**	42.0	250	0.5	0.013	0.866	100.00%
Felicity Crescent	195	162		0.270				0.34	81.87	23.47	0.74	24.21	63.50	**5,198.75**	**6,768.10**	84.5	2100	0.14	0.013	1.893	23.19%
Fountainhead Drive	123	162						0.00	0.00	15.00	1.12	16.12	83.60	**0.00**	**81.36**	74.9	300	0.65	0.013	1.115	100.00%
Phase 2 & External																					
Fountainhead Drive		162							16.79	26.96											
Felicity Crescent	162	161		0.82				1.03	99.69	26.96	0.58	27.54	57.90	**5,772.05**	**6,521.40**	63.3	2100	0.13	0.013	1.824	11.49%
Felicity Crescent	161	160C							99.69	27.54	0.15	27.69	57.10	**5,692.30**	**5,116.29**	12.8	2100	0.08	0.013	1.431	-11.26%
Felicity Crescent	160C	160							99.69	27.69	0.29	27.98	56.90	**5,672.36**	**6,745.47**	27.3	1.8 X2.4	0.159	0.013	1.56	15.91%
Felicity Crescent	160	120		1.27				1.59	101.28	27.98	1.17	29.16	56.50	**5,722.32**	**6,745.47**	109.9	1.8 X2.4	0.097	0.013	1.56	15.17%
Felicity Crescent	120	111		0.51				0.64	126.22	29.16	0.66	29.82	55.00	**6,942.10**	**11,668.00**	86.0	1.8X3.0	0.16	0.013	2.16	40.50%
Felicity Crescent	111	101		0.41				0.51	126.73	29.82	0.53	30.35	54.10	**6,856.09**	**11,668.00**	68.5	1.8X3.0	0.17	0.013	2.16	41.24%
BLOCK	101	OUT						0.00	131.72	30.35	0.34	30.69	53.50	**7,047.02**	**9,374.00**	37.7	1.2X4.2	0.16	0.013	1.86	24.82%

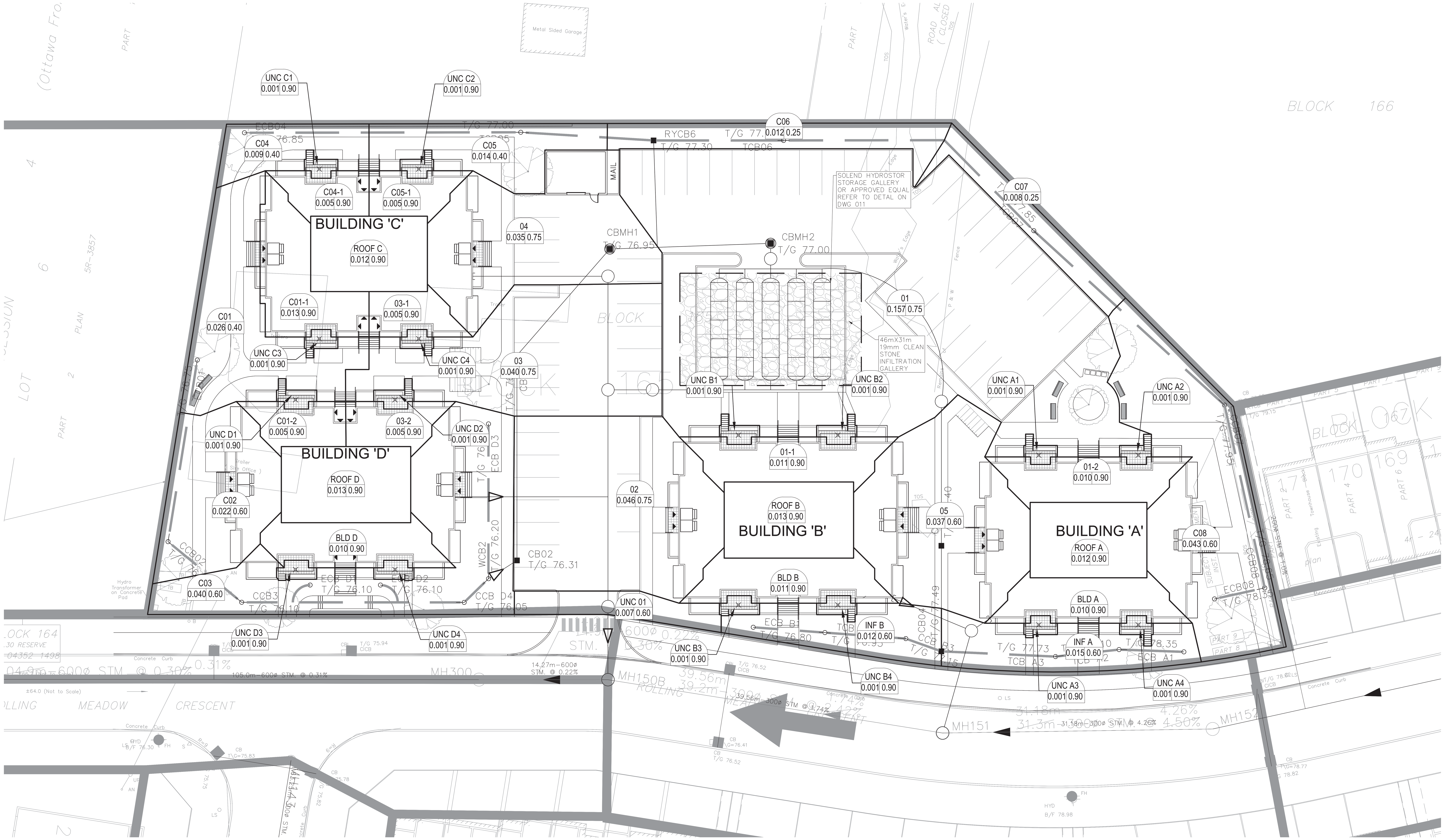
Q = 2.78AIC, where:
Q = Peak Flow in Litres per Second (l/s)
A = Area in Hectares (ha.)

REV. # : Feb 3 2009

I = Rainfall Intensity in Millimeters per Hour (mm/hr)

C = Runoff Coefficient

$I=998.07/(6.053+TC)^{0.814}$



LEGEND

- STORM TRIBUTARY OUTLINE
- TRIBUTARY OUTLINE PREVIOUS PHASES
- ROOF C — AREA NUMBER
- 0.012 — AREA (ha)
- 0.90 — COEFFICIENT

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEYPLAN

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS

WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2018/10/11 PROVINCE OF ONTARIO

Drawing Title

STORM DRAINAGE AREA PLAN

Scale: 1:250	
Design: R.M./A.Z.	Date: OCTOBER 2018
Drawn: E.H.	Checked: D.G.Y.
Project No.: 115201	Drawing No.: 500

CITY PLAN No. ####

CITY FILE No. ####

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET

Spring Valley Trails ZENS
City of Ottawa
Claridge Homes

LOCATION				AREA (Ha)							RATIONAL DESIGN FLOW															SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.60	C= 0.75	C= 0.90	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
Rolling Meadow Cres.		*MH 152*	*MH 151*								*1.40*	*1.40*	*10.43*	*0.18*	*10.61*	*75.21*	*102.00*	*119.55*	*174.76*	*105.29*	*142.80*	*167.38*	*244.66*		*105.29*	*208.22*	*31.18*	*300*			*4.26*	*2.854*	*102.93*	*49.43%*
	ROOF A & UNC A	BLD A	MH 10							0.017	0.04	0.04	10.00	0.05	10.05	76.81	104.19	122.14	178.56	3.27	4.43	5.20	7.59		3.27	15.89	2.59	150			1.00	0.871	12.62	79.44%
	ROOF B & UNC B	BLD B	MH 10							0.016	0.04	0.04	10.00	0.19	10.19	76.81	104.19	122.14	178.56	3.07	4.17	4.89	7.15		3.07	15.89	9.87	150			1.00	0.871	12.81	80.65%
		MH 10	*MH 151*								0.00	0.08	10.19	0.24	10.43	76.09	103.21	120.98	176.85	6.28	8.52	9.99	14.60		6.28	43.87	12.30	250			0.50	0.866	37.59	85.68%
Rolling Meadow Cres.		*MH 151*	*MH 150B*								*0.30*	*1.78*	*13.52*	*0.31*	*13.83*	*65.49*	*88.65*	*103.85*	*151.69*	*116.74*	*158.03*	*185.11*	*270.40*		*116.74*	*156.94*	*39.56*	*300*			*2.42*	*2.151*	*40.20*	*25.61%*
	C08	ECB 08	CCB 08					0.043			0.07	0.07	10.00	0.11	10.11	76.81	104.19	122.14	178.56	5.51	7.47	8.76	12.81		5.51	43.87	5.95	250			0.50	0.866	38.36	87.44%
		CCB 08	TCB 07								0.00	0.07	10.11	0.98	11.10	76.37	103.59	121.43	177.52	5.48	7.43	8.71	12.73		5.48	43.87	51.09	250			0.50	0.866	38.39	87.51%
	C07	TCB 07	TCB 06		0.008						0.01	0.08	11.10	0.64	11.74	72.83	98.73	115.71	169.11	5.63	7.63	8.94	13.07		5.63	43.87	33.34	250			0.50	0.866	38.24	87.17%
	C06	TCB 06	RYCB 06		0.012						0.01	0.09	11.74	0.29	12.03	70.71	95.82	112.28	164.08	6.05	8.20	9.61	14.05		6.05	43.87	15.04	250			0.50	0.866	37.81	86.20%
	C04 & C04-1	ECB 04	CCB 05			0.009				0.005	0.02	0.02	10.00	0.62	10.62	76.81	104.19	122.14	178.56	1.73	2.35	2.75	4.02		1.73	43.87	31.97	250			0.50	0.866	42.14	96.06%
	C05 & C05-1	CCB 05	RYCB 06			0.014				0.005	0.03	0.05	10.62	0.30	10.91	74.52	101.05	118.44	173.12	3.77	5.11	5.99	8.76		3.77	43.87	15.40	250			0.50	0.866	40.10	91.41%
		RYCB 06	MAIN								0.00	0.14	12.03	0.25	12.28	69.80	94.57	110.81	161.91	9.51	12.88	15.09	22.06		9.51	26.50	12.38	200			0.60	0.817	17.00	64.12%
	C01 & C01-1 & C01-2	ECB 01	CCB 02			0.026				0.018	0.07	0.07	10.00	0.56	10.56	76.81	104.19	122.14	178.56	5.68	7.70	9.03	13.20		5.68	43.87	29.26	250			0.50	0.866	38.19	87.05%
	C02	CCB 02	CBMH 3					0.022			0.04	0.11	10.56	0.21	10.78	74.71	101.31	118.74	173.57	8.27	11.21	13.14	19.20		8.27	43.87	11.04	250			0.50	0.866	35.60	81.16%
	C03	CBMH 3	CCB D4					0.040			0.07	0.18	10.78	0.50	11.27	73.95	100.27	117.52	171.77	13.12	17.78	20.84	30.46		13.12	43.87	25.75	250			0.50	0.866	30.75	70.10%
	BLD D	CCB D4	CBMH 2							0.010	0.03	0.20	11.27	0.08	11.35	72.25	97.92	114.76	167.72	14.62	19.82	23.23	33.94		14.62	43.87	3.93	250			0.50	0.866	29.25	66.67%
		CBMH 2	CB 02								0.00	0.20	11.35	0.08	11.42	71.99	97.58	114.35	167.12	14.57	19.75	23.14	33.82		14.57	43.87	3.91	250			0.50	0.866	29.30	66.79%
	02	CB 02	CB 03						0.046		0.10	0.30	11.42	0.51	11.93	71.74	97.24	113.95	166.52	21.40	29.00	33.99	49.67		21.40	39.24	23.73	250			0.40	0.774	17.84	45.46%
	03 & 03-1 & 03-2	CB 03	CBMH 4						0.040	0.010	0.11	0.41	11.93	0.35	12.29	70.10	94.98	111.30	162.63	28.51	38.63	45.27	66.14		28.51	39.24	16.35	250			0.40	0.774	10.73	27.33%
	04	CBMH 4	CBMH 1						0.035		0.07	0.62	12.29	0.31	12.60	69.02	93.50	109.55	160.06	42.51	57.58	67.47	98.58		42.51	50.02	18.63	250			0.65	0.987	7.51	15.01%
	01 & 01-1 & 01-2	CBMH 1	OGS						0.157	0.021	0.38	1.00	12.60	0.04	12.64	68.08	92.21	108.03	157.84	67.80	91.82	107.58	157.17		67.80	81.33	2.96	300			0.65	1.115	13.54	16.64%
		OGS	Gallery						0.000	0.000	0.00	1.00	12.64	0.04	12.69	67.95	92.03	107.82	157.53	67.67	91.65	107.37	156.87		67.67	81.33	2.96	300			0.65	1.115	13.67	16.80%
	INF A & BLD A	ECB A1	CB 04					0.015		0.010	0.05	0.05	10.00	0.53	10.53	76.81	104.19	122.14	178.56	3.84	5.21	6.11	8.94		3.84	15.89	27.73	150			1.00	0.871	12.04	75.81%
	INF B & BLD B	ECB B1	CB 04					0.012		0.011	0.05	0.05	10.00	0.46	10.46	76.81	104.19	122.14	178.56	3.65	4.95	5.81	8.49		3.65	15.89	23.79	150			1.00	0.871	12.24	77.02%
		CB 04	CB 05								0.00	0.10	10.53	0.06	10.59	74.83	101.47	118.94	173.85	7.30	9.90	11.61	16.96		7.30	26.50	2.83	200			0.60	0.817	19.20	72.45%
	05	CB 05	MH 5					0.037			0.06	0.16	10.59	0.49	11.07	74.62	101.18	118.60	173.35	11.89	16.12	18.89	27.61		11.89	26.50	23.79	200			0.60	0.817	14.62	55.15%
		MH 5	Gallery								0.00	0.16	11.07	0.05	11.13	72.92	98.85	115.84	169.31	11.61	15.75	18.45	26.97		11.61	43.87	2.83	250			0.50	0.866	32.25	73.52%
	Infiltration Gallery	OGS	MH 2								0.00	1.16	12.69	0.12	12.81	67.82	91.86	107.62	157.23	78.34	106.10	124.31	181.61		78.34	93.01	9.32	300			0.85	1.275	14.67	15.77%
		MH 2	MH 3								0.00	1.16	12.81	0.07	12.88	67.47	91.37	107.05	156.39	77.94	105.54	123.65	180.64		77.94	93.01	5.17	300			0.85	1.275	15.07	16.21%
	ROOF C & UNC C	BLD C	MH 4							0.016	0.04	0.04	10.00	0.30	10.30	76.81	104.19	122.14	178.56	3.07	4.17	4.89	7.15		3.07	15.89	15.65	150			1.00	0.871	12.81	80.65%
		MH 4	MH 3								0.00	0.04	10.30	0.24	10.54	75.67	102.64	120.31	175.87	3.03	4.11	4.82	7.04		3.03	43.87	12.67	250			0.50	0.866	40.84	93.09%
	ROOF D & UNC D	BLD D	MAIN							0.017	0.04	0.04	10.00	0.34	10.34	76.81	104.19	122.14	178.56	3.27	4.43	5.20	7.59		3.27	15.89	17.70	150			1.00	0.871	12.62	79.44%
		MH 3	MH 1								0.00	1.24	12.88	0.48	13.36	67.28	91.11	106.73	155.93	83.27	112.76	132.10	192.99		83.27	100.18	25.57	375			0.30	0.879	16.92	16.89%
		MH 1	*MH 150B*								0.00	1.24	13.36	0.16	13.52	65.92	89.25	104.55	152.72	81.59	110.46	129.40	189.02		81.59	100.18	8.47	375			0.30	0.879	18.59	18.56%
Rolling Meadow Cres.		*MH 150B*	*MH 300*								*0.00*	*3.02*	*13.52*	*0.20*	*13.72*	*65.49*	*88.65*	*103.85*	*151.69*	*197.79*	*267.75*	*313.64*	*458.15*		*197.79*	*350.85*	*14.27*	*600*			*0.30*	*1.202*	*153.06*	*43.63%*
					0.020	0.049		0.169	0.278	0.156	3.02	TRUE																						
										0.672	TOTAL AREA TO SEWER																							
										0.007	UNCONTROLLED RELEASE OFFSITE																							
										0.679	TOTAL SITE AREA																							

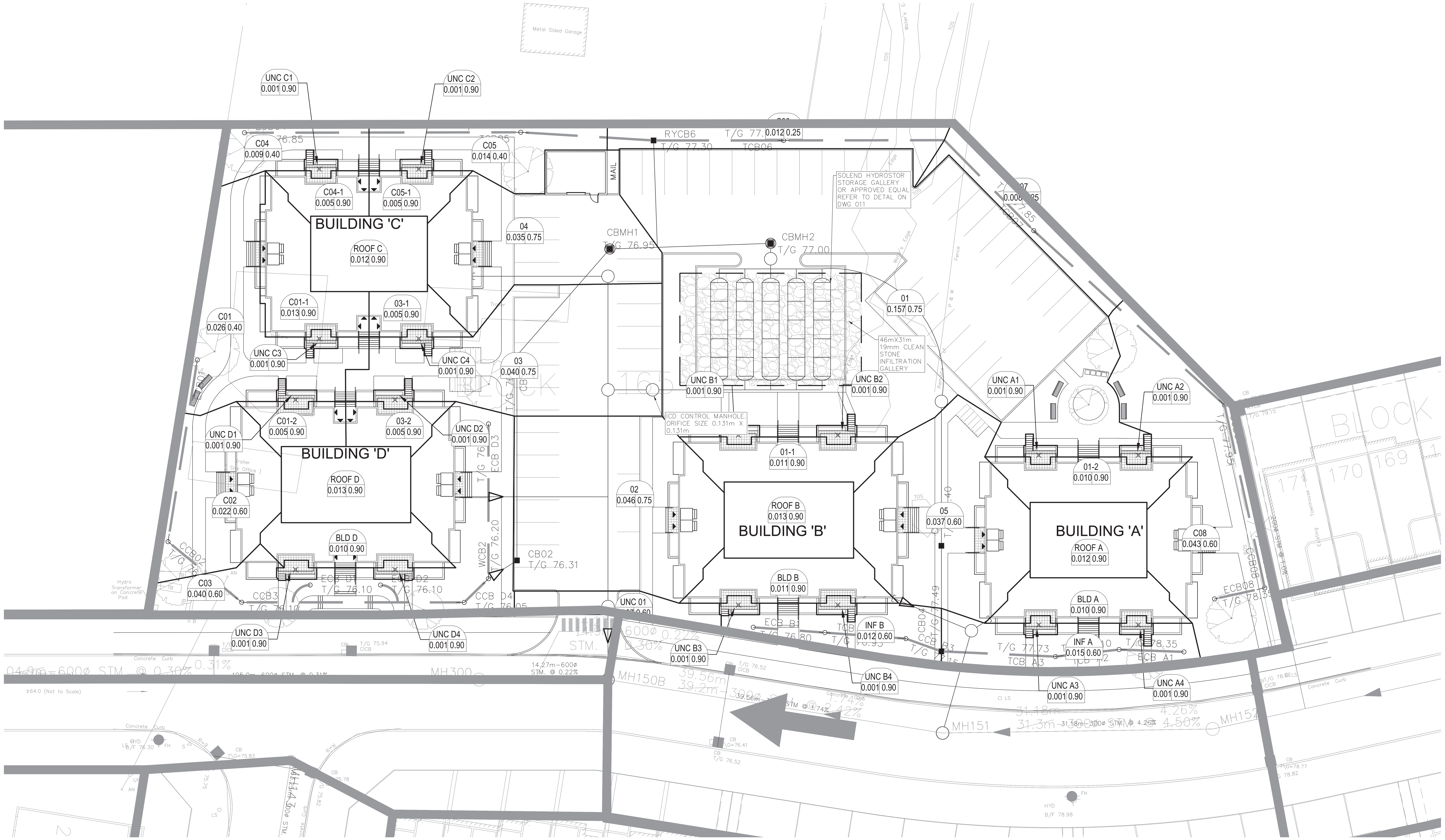
Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 732.951 / (TC+6.199)^0.810] 2 YEAR
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: W.Z.
Checked: R.M.
Dwg. Reference: 115201-500

No.	Revision	Date
1.	Servicing Brief - Submission No. 1	2018-10-05

File Reference:	Date:	Sheet No:
115201.5.7.1	2018-08-24	1 of 1



LEGEND

- STORM TRIBUTARY OUTLINE
- TRIBUTARY OUTLINE PREVIOUS PHASES
- ROOF C 0.012 0.90 — AREA NUMBER, COEFFICIENT, AREA (ha)

SEE 010, 011, 012 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS

KEYPLAN N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS

WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER D. G. Yannoulopoulos 2018/10/11 PROVINCE OF ONTARIO

Drawing Title

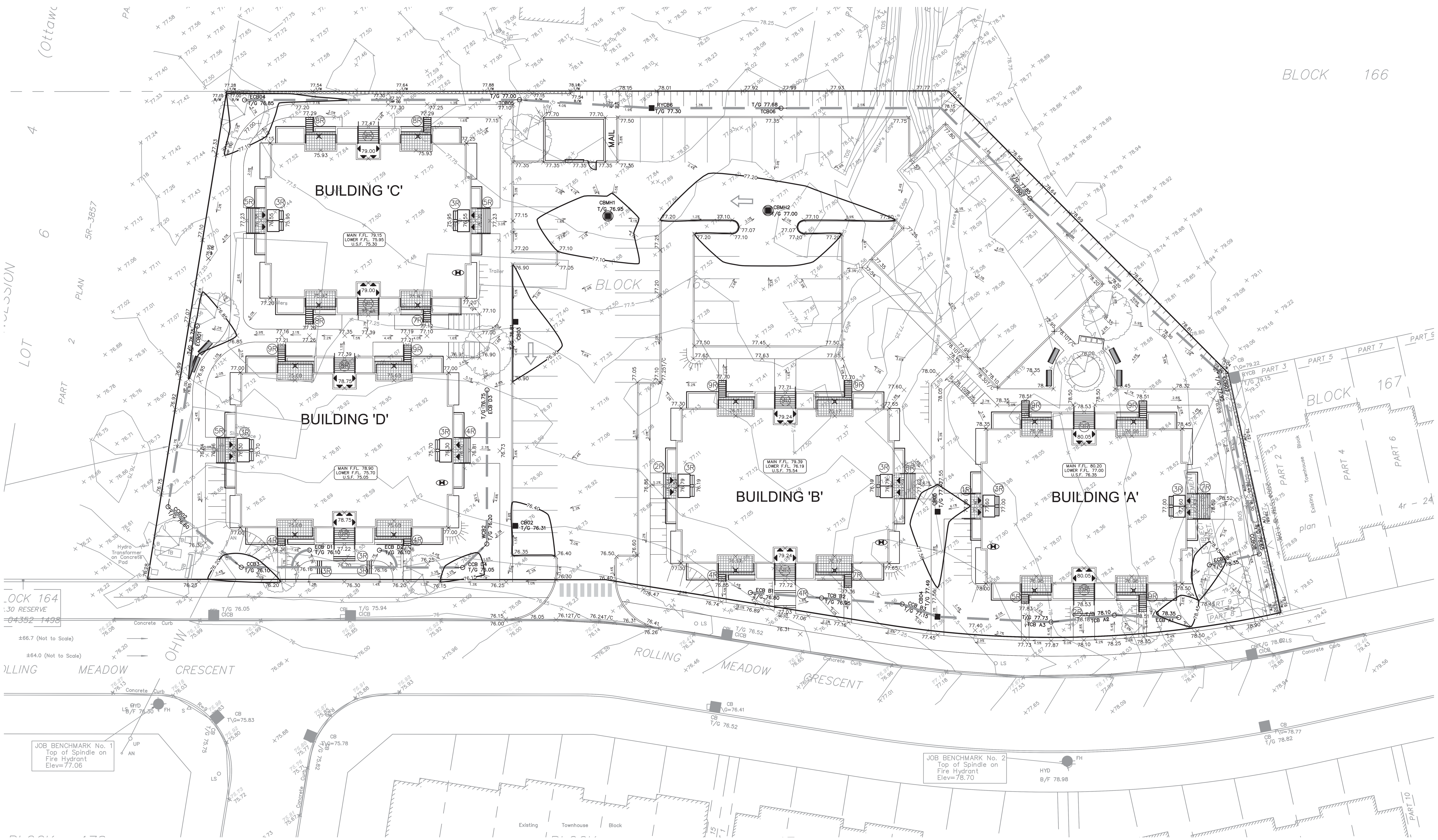
ICD AND INFIILTRATION DRAINAGE AREA PLAN

Scale 1:250

Design	Date
R.M./A.Z.	OCTOBER 2018
Drawn	Checked
E.H.	D.G.Y.
Project No.	Drawing No.
115201	501

CITY PLAN No. ####

CITY FILE No. ####



LEGEND :

MAXIMUM PONDING AREA

KEYPLAN N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS
WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2018/10/11
PROVINCE OF ONTARIO

Drawing Title

PONDING PLAN

Scale: 1:250

Design	Date
R.M./A.Z.	OCTOBER 2018
Drawn	Checked
E.H.	D.G.Y.
Project No.	Drawing No.
115201	600

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

PROJECT:	SVT Zens
DATE:	10/5/2018
FILE:	39617-5.9
REV #:	-
DESIGNED BY:	AZ
CHECKED BY:	RM

ORIFICE SIZING

Orifice coefficients	
Cv =	0.60
Cv =	0.65

	Invert	Diameter	Centre ICD	Max. Pond Elevation	Hydraulic Slope	Target Flow	Theoretical Orifice	Theoretical Actual Flow	Recommended Orifice	Recommended Actual Flow
	(m)	(mm)	(m)	(m)	(m)	(l/s)	(m)	(l/s)	(m)	(l/s)
Area 1	74.590	300	74.740	75.75	1.006	46.00	0.1314	46.00	0.131	45.74
						46.00				**45.74**

Max Pond Elevation (used to determine Hydraulic Head/Slope) set to the top of the HydroStor HS180 model. Top of unit 1.176m

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

PROJECT:	SVT Zens
DATE:	10/5/2018
FILE:	115201-5.7
REV #:	-
DESIGNED BY:	A.Z.
CHECKED BY:	R.M.

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = 732.951 / $(T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = 998.071 / $(T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = 1735.688 / $(T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate (based on 85 L/s/Ha)

A_{site} = 0.68 Ha

$Q_{restricted}$ = 57.80 L/s

Uncontrolled Release ($Q_{uncontrolled}$ = 2.78*C*i_{100yr}*$A_{uncontrolled}$)

C = 0.81
T_c = 10 min
i_{100yr} = 178.56 mm/hr
$A_{uncontrolled}$ = 0.023 Ha

$Q_{uncontrolled}$ = 9.23 L/s

Maximum Allowable Release Rate ($Q_{max\ allowable}$ = $Q_{restricted}$ - $Q_{uncontrolled}$)

$Q_{max\ allowable}$ = 48.57 L/s

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area	BLD A
Area (Ha)	0.012
C =	1.00

Restricted Flow Q_r (L/s)= 0.63

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
42	72.57	2.42	0.63	1.79	4.513
44	70.18	2.34	0.63	1.71	4.518
45	69.05	2.30	0.63	1.67	**4.519**
46	67.96	2.27	0.63	1.64	4.519
48	65.89	2.20	0.63	1.57	4.516

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.52	4.50	0.00	0.02

* Assume roof top storage of 150mm over 75% of flat roof

overflows to: A1

Drainage Area	BLD A
Area (Ha)	0.012
C =	0.90

Restricted Flow Q_r (L/s)= 0.63

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
22	66.15	1.99	0.63	1.36	1.79
24	62.54	1.88	0.63	1.25	1.80
25	60.90	1.83	0.63	1.20	**1.80**
26	59.35	1.78	0.63	1.15	1.80
28	56.49	1.70	0.63	1.07	1.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.80	4.50	0.00	0.00

overflows to: A1

Drainage Area	BLD A
Area (Ha)	0.012
C =	0.90

Restricted Flow Q_r (L/s)= 0.63

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
16	59.50	1.79	0.63	1.16	1.11
18	55.49	1.67	0.63	1.04	1.12
19	53.70	1.61	0.63	0.98	**1.12**
20	52.03	1.56	0.63	0.93	1.12
22	49.02	1.47	0.63	0.84	1.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.12	4.50	0.00	0.00

overflows to: A1

Drainage Area	BLD B		
Area (Ha)	0.013		
C =	1.00	Restricted Flow Q_r (L/s)=	0.63

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
45	69.05	2.50	0.63	1.87	5.037
47	66.91	2.42	0.63	1.79	5.042
48	65.89	2.38	0.63	1.75	**5.044**
49	64.91	2.35	0.63	1.72	5.044
51	63.03	2.28	0.63	1.65	5.043

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.04	4.88	0.00	0.17

overflows to: A1

Drainage Area	BLD B		
Area (Ha)	0.013		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
24	62.54	2.03	0.63	1.40	2.02
26	59.35	1.93	0.63	1.30	2.03
27	57.88	1.88	0.63	1.25	**2.03**
28	56.49	1.84	0.63	1.21	2.03
30	53.93	1.75	0.63	1.12	2.02

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.03	4.88	0.00	0.00

overflows to: A1

Drainage Area	BLD B		
Area (Ha)	0.013		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
17	57.42	1.87	0.63	1.24	1.26
19	53.70	1.75	0.63	1.12	1.27
20	52.03	1.69	0.63	1.06	**1.27**
21	50.48	1.64	0.63	1.01	1.27
23	47.66	1.55	0.63	0.92	1.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.27	4.88	0.00	0.00

overflows to: A1

Drainage Area	BLD C		
Area (Ha)	0.012		
C =	1.00	Restricted Flow Q_r (L/s)=	0.63

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
42	72.57	2.42	0.63	1.79	4.513
44	70.18	2.34	0.63	1.71	4.518
45	69.05	2.30	0.63	1.67	**4.519**
46	67.96	2.27	0.63	1.64	4.519
48	65.89	2.20	0.63	1.57	4.516

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	4.52	4.50	0.00	0.02

overflows to: A1

Drainage Area	BLD C		
Area (Ha)	0.012		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
22	66.15	1.99	0.63	1.36	1.79
24	62.54	1.88	0.63	1.25	1.80
25	60.90	1.83	0.63	1.20	**1.80**
26	59.35	1.78	0.63	1.15	1.80
28	56.49	1.70	0.63	1.07	1.79

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.80	4.50	0.00	0.00

overflows to: A1

Drainage Area	BLD C		
Area (Ha)	0.012		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
16	59.50	1.79	0.63	1.16	1.11
18	55.49	1.67	0.63	1.04	1.12
19	53.70	1.61	0.63	0.98	**1.12**
20	52.03	1.56	0.63	0.93	1.12
22	49.02	1.47	0.63	0.84	1.11

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.12	4.50	0.00	0.00

overflows to: A1

Drainage Area	BLD D		
Area (Ha)	0.013		
C =	1.00	Restricted Flow Q_r (L/s)=	0.63

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{100yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
45	69.05	2.50	0.63	1.87	5.037
47	66.91	2.42	0.63	1.79	5.042
48	65.89	2.38	0.63	1.75	**5.044**
49	64.91	2.35	0.63	1.72	5.044
51	63.03	2.28	0.63	1.65	5.043

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	5.04	4.88	0.00	0.17

overflows to: A1

Drainage Area	BLD D		
Area (Ha)	0.013		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

5-Year Ponding

T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{5yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 5yr (m^3)
24	62.54	2.03	0.63	1.40	2.02
26	59.35	1.93	0.63	1.30	2.03
27	57.88	1.88	0.63	1.25	**2.03**
28	56.49	1.84	0.63	1.21	2.03
30	53.93	1.75	0.63	1.12	2.02

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	2.03	4.88	0.00	0.00

overflows to: A1

Drainage Area	BLD D		
Area (Ha)	0.013		
C =	0.90	Restricted Flow Q_r (L/s)=	0.63

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow Q_p=2.78xCi_{2yr}A (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
17	57.42	1.87	0.63	1.24	1.26
19	53.70	1.75	0.63	1.12	1.27
20	52.03	1.69	0.63	1.06	**1.27**
21	50.48	1.64	0.63	1.01	1.27
23	47.66	1.55	0.63	0.92	1.27

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	1.27	4.88	0.00	0.00

overflows to: A1

Drainage Area	A1				
Area (Ha)	0.605				
C =	0.79	Restricted Flow Q_r (L/s)=		45.74	
100-Year Ponding					
T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
22	112.88	149.31	45.74	103.57	136.71
24	106.68	141.10	45.74	95.36	137.32
25	103.85	137.36	45.74	91.62	**137.43**
26	101.18	133.83	45.74	88.09	137.42
28	96.27	127.34	45.74	81.60	137.10

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.37	137.81	0.00	173.00	0.00

**Storage based on design provided by Soleno Representative

overflows to: Rolling Meadow Cre

Total Restricted Flow Q_r (L/s)=	48.26	0.00
Allowable=	48.57	

Drainage Area	A1				
Area (Ha)	0.605				
C =	0.66	Restricted Flow Q_r (L/s)=		45.74	
5-Year Ponding					
T_c Variable (min)	i_{5yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{5yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 5yr (m^3)
10	104.19	114.85	45.74	69.11	41.47
12	94.70	104.38	45.74	58.64	42.22
13	90.63	99.90	45.74	54.16	**42.24**
14	86.93	95.82	45.74	50.08	42.07
16	80.46	88.69	45.74	42.95	41.23

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	42.24	0.00	173.00	0.00

overflows to: ıg Meadow Cre

Drainage Area	A1				
Area (Ha)	0.605				
C =	0.66	Restricted Flow Q_r (L/s)=		45.74	
2-Year Ponding					
T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
6	96.64	106.52	45.74	60.78	21.88
8	85.46	94.20	45.74	48.46	23.26
9	80.87	89.14	45.74	43.40	**23.44**
10	76.81	84.66	45.74	38.92	23.35
12	69.89	77.04	45.74	31.30	22.54

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	23.44	0.00	173.00	0.00

overflows to: ıg Meadow Cre

SOLENO
Mastering Storm Water

Ottawa, Tuesday October 9th, 2018

Ryan Magladry

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

Subject: Explanation of the 173 m^3 Storage Calculation

Dear Sir,

As per your request, the following is an explanation of the storage calculations for the storm water retention basin as detailed in the attached drawing (Soleno Reference no. 94447) for the project known as Spring Valley Zens located at 380 Rolling Meadow Crescent in Ottawa, Ontario.

This basin will consist of 25 Hydrostor HS-180 chambers and 10 HS-180 end caps laid out in a basin that is *13 m* long and *16 m* wide. There will be 5 rows consisting of 5 chambers and 2 end caps each, with a *1.0 m* spacing between the rows, complete with pipes to evenly fill the rows of chambers and to provide downstream drainage. The storage of storm water is provided in the chambers and surrounding voids (rated at 40%) of the clean stone fill. The amount of storage in the clean stone below the chambers is not considered in this basin.

The HS-180 chambers and end caps have an internal storage capacity of *3.22* m^3 and *0.54* m^3, respectively. With 25 chambers and 10 end caps, they will provide a total storage of *85.90* m^3.

The amount of storage in the clean stone is 40% of its volume (neglecting the clean stone below the chambers). The volume of clean stone is determined by taking the height considered for storage (*1.46 m*, from bottom of the chamber to the top of clean stone), multiplying this by the width of *16.0 m* and the length of *13.0 m*, then subtracting this with the storage volume in the chambers and end caps. This gives a volume of clean stone of *218* m^3. For this basin, 40% of this volume is *88.8* m^3.

The total amount of storage in the basin is the sum of the storage in the chambers and end caps, and the surrounding storage in the voids of the clean stone. The total storage for this basin is *173* m^3.

Should you have any questions about the presented storage volume, feel free to contact the undersigned.

Best Regards,

Kevin Dutrisac

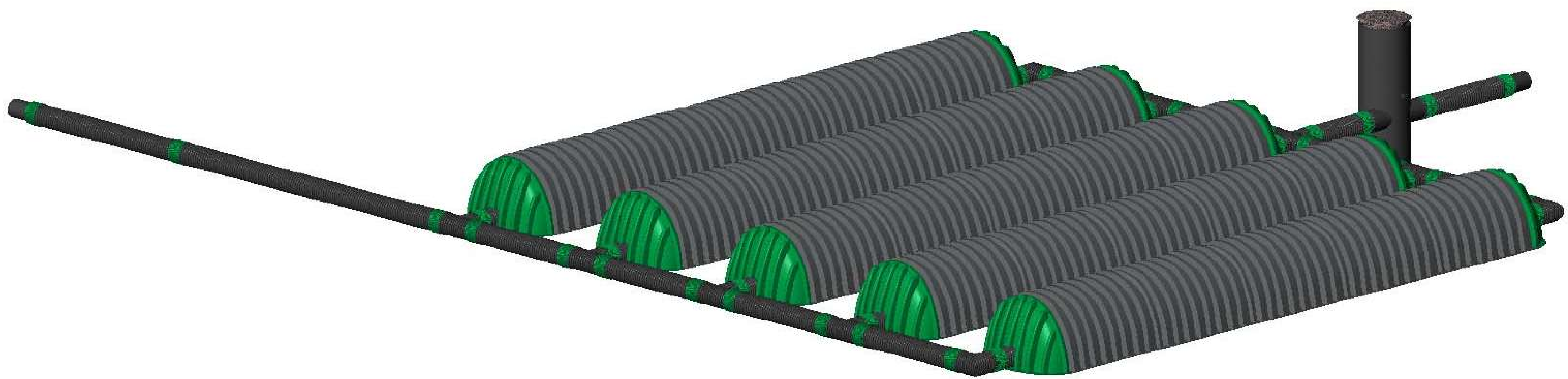
Kevin Dutrisac, P.Eng, ing.
Engineer, Technical Service

Attachment:

- 94447 Soleno Hydrostor HS180 System 25 Chambers 173 m^3

94447 SOLENO HYDROSTOR HS180 SYSTEM 25 CHAMBERS 173m^3

PROJECT: SPRING VALLEY ZENS
JOB LOCATION: OTTAWA (ON)
CONTACT:
OWNER/ENGINEERING FIRM/CONTRACTOR NAME:

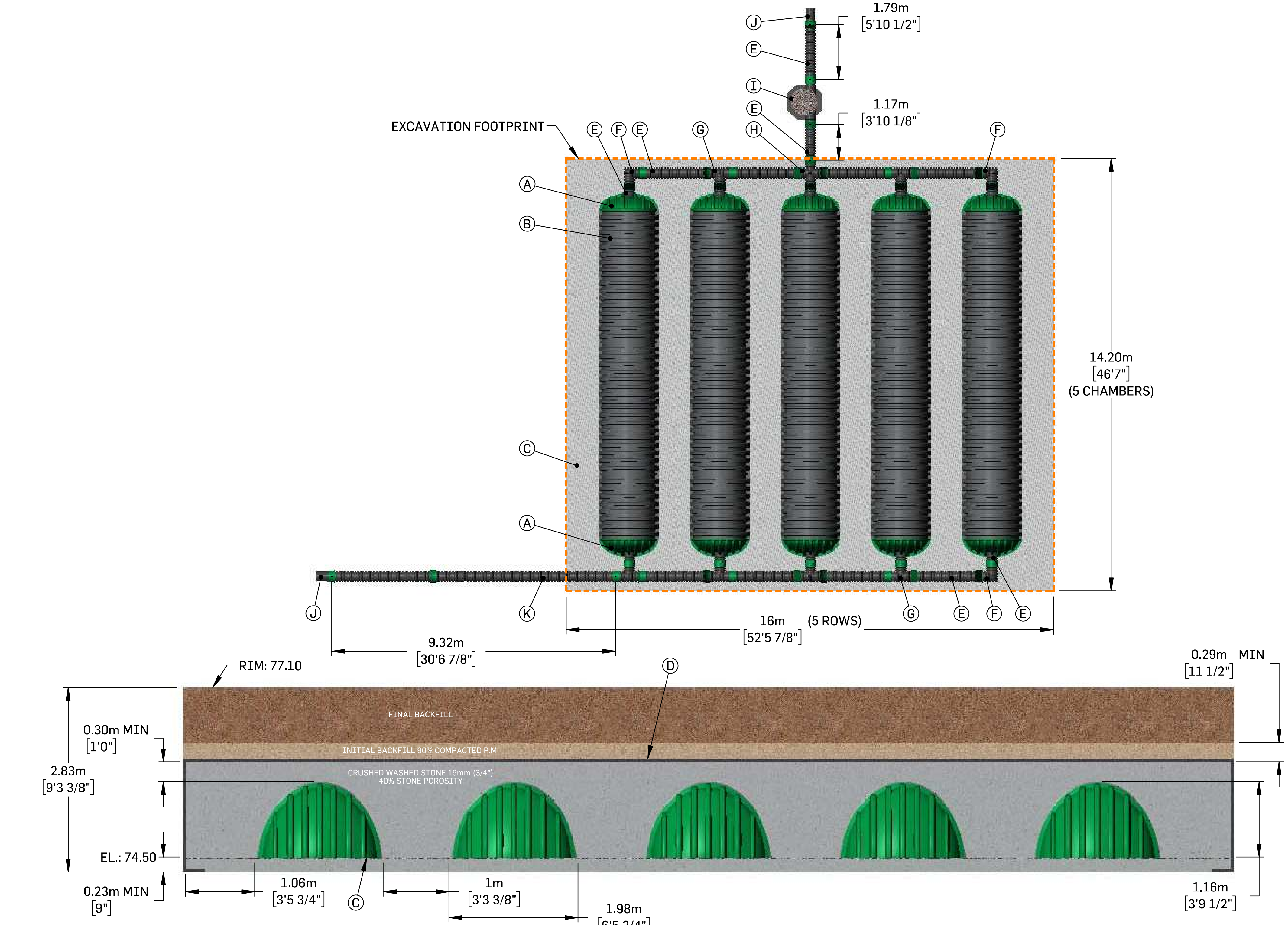


1. INSTALLATION MUST BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
2. SYSTEM IS DESIGNED TO WITHSTAND TRAFFIC LOAD CSA CL-625 AND AASHTO H-20.
3. HS180 CHAMBERS MUST BE MINIMALLY BACKFILLED WITH 300 mm (12'') OF CRUSHED STONE AND 285 mm (11.5'') OF GRANULAR MATERIAL COMPACTED AT 90% P.M.
4. HYDROSTOR GEOGRID FOR FOUNDATION STABILIZATION IS CONSIDERED UNDER ALL THE CHAMBERS.
5. STORAGE IN BASE COURSE NOT CONSIDERED

APPROVAL : ___________________________

2018-10-09

94447 SOLENO HYDROSTOR HS180 SYSTEM 25 CHAMBERS 173m³



PART	DESCRIPTION	QTY
A	HYDROSTOR END CAP HS180	10
B	HYDROSTOR CHAMBER HS180	25
C	STABILIZATION NETTING HYDROSTOR	2
D	SOLENO TX-90 SEPARATION NONWOVEN GEOTEXTILE, ABOVE AND ON THE SIDES	1
E	STD LENGTH 6m (236") SOLFLO MAX 300mm (12")	7
F	ELBOW SOLFLO MAX 300mm (12")	3
G	TEE SOLFLO MAX 300mm (12")	6
H	CROSS SOLFLO MAX 300mm (12")	1
I	AS-2	1
J	MANHOLE ADAPTER FOR PVC 300mm (12'') DR35	2
K	STD LENGTH 6m (236") SOLFLO MAX 300mm (12") DBIGC	1

APPROVAL : ____________________

2018-10-09

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	02/10/2018
Project Name	Ottawa
Project Number	-
Location	Ottawa

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 300 achieves the water quality objective removing 76% TSS for a Fine (organics, silts and sand) particle size distribution and 90% runoff volume.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

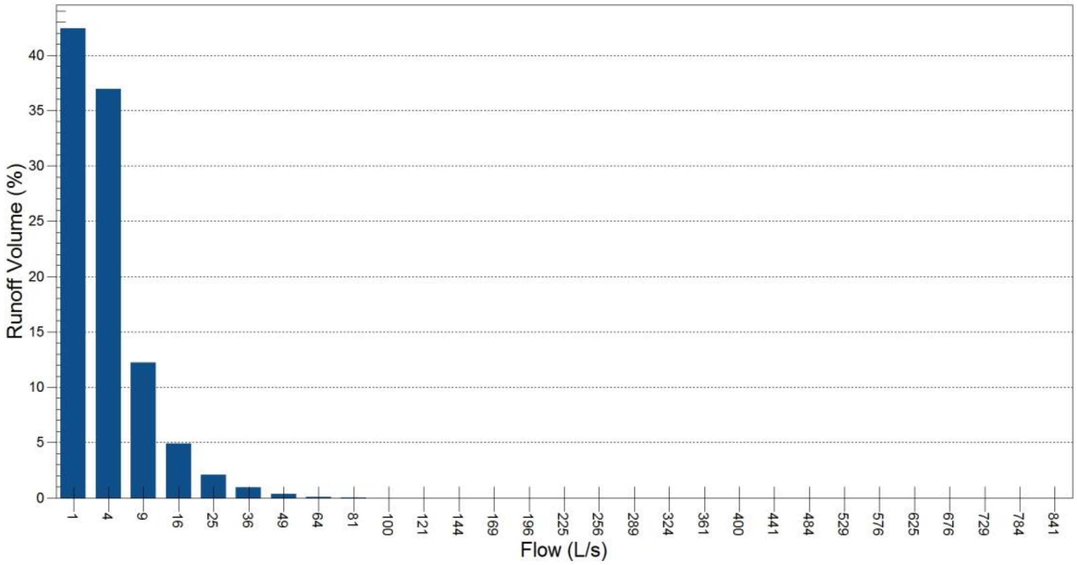


Figure 1. Runoff Volume by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – ON 6000, 1967 to 2003 for 0.521 ha, 64% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

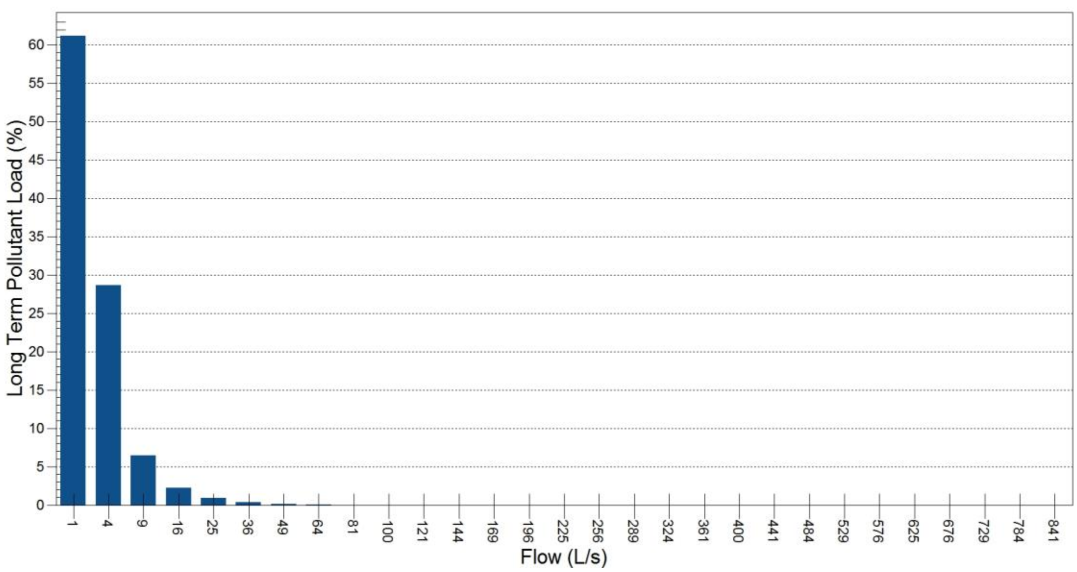
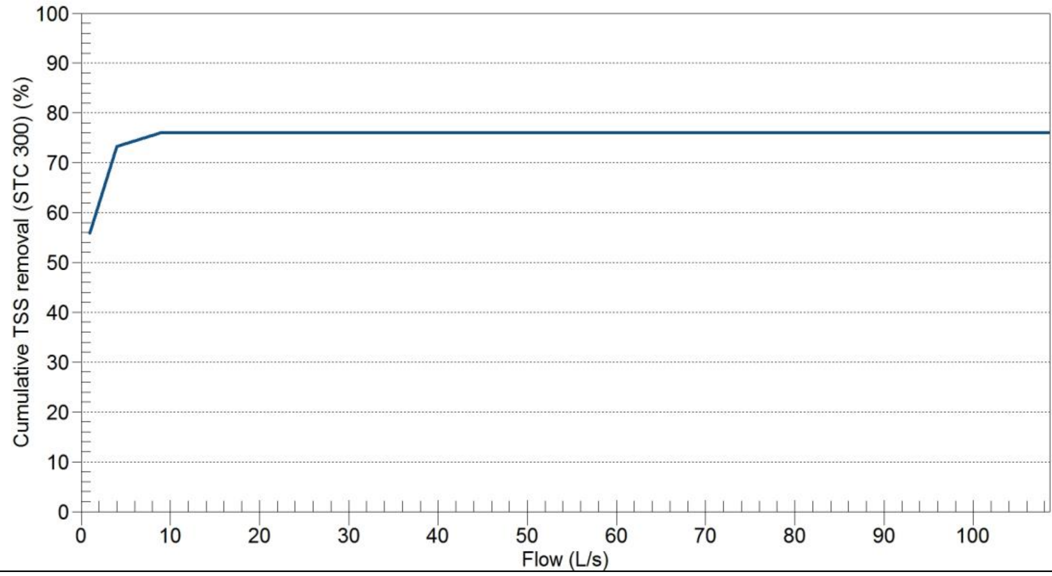


Figure 2. Long Term Pollutant Load by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003 for 0.521 ha, 64% impervious. The majority of the annual pollutant load is transported by small frequent storm events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 300	Drainage Area (ha)	0.521
TSS Removal (%)	76	Impervious (%)	64

Figure 3. Cumulative TSS Removal by Flow Rate for OTTAWA MACDONALD-CARTIER INT'L A – 6000, 1967 to 2003. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

Stormceptor®

Appendix 1
Stormceptor Design Summary

Project Information

Date	02/10/2018
Project Name	Ottawa
Project Number	-
Location	Ottawa

Designer Information

Company	IBI Group
Contact	Amy Zhuang

Notes

N/A

Drainage Area

Total Area (ha)	0.521
Imperviousness (%)	64

The Stormceptor System model STC 300 achieves the water quality objective removing 76% TSS for a Fine (organics, silts and sand) particle size distribution and 90% runoff volume.

Rainfall

Name	OTTAWA MACDONALD-CARTIER INT'L A
State	ON
ID	6000
Years of Records	1967 to 2003
Latitude	45°19'N
Longitude	75°40'W

Water Quality Objective

TSS Removal (%)	70
Runoff Volume (%)	85

Upstream Storage

Storage (ha-m)	Discharge (L/s)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %	Runoff Volume %
STC 300	**76**	**90**
STC 750	83	97
STC 1000	84	97
STC 1500	84	97
STC 2000	88	99
STC 3000	89	99
STC 4000	91	100
STC 5000	92	100
STC 6000	93	100
STC 9000	95	100
STC 10000	95	100
STC 14000	96	100

Stormceptor®

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor version 1.0
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 300 is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 750 to STC 6000 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 300	STC 750 to STC 6000	STC 9000 to STC 14000
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Imbrium Systems Inc., 1-800-565-4801.

Stormceptor®

Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ha)	0.521	Imperviousness (%)	64

Surface Characteristics

Width (m)	144.3607
Slope (%)	2
Impervious Depression Storage (mm)	0.508
Pervious Depression Storage (mm)	5.08
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.

Maintenance Frequency (months)	12

Infiltration Parameters

Horton's equation is used to estimate infiltration

Max. Infiltration Rate (mm/h)	61.98
Min. Infiltration Rate (mm/h)	10.16
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Evaporation

Daily Evaporation Rate (mm/day)	2.54

Dry Weather Flow

Dry Weather Flow (L/s)	No

Winter Months

Winter Infiltration	False

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ha-m	Discharge L/s
0	0

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

Fine (organics, silts and sand)								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
20	20	1.3	0.0004					
60	20	1.8	0.0016					
150	20	2.2	0.0108					
400	20	2.65	0.0647					
2000	20	2.65	0.2870					

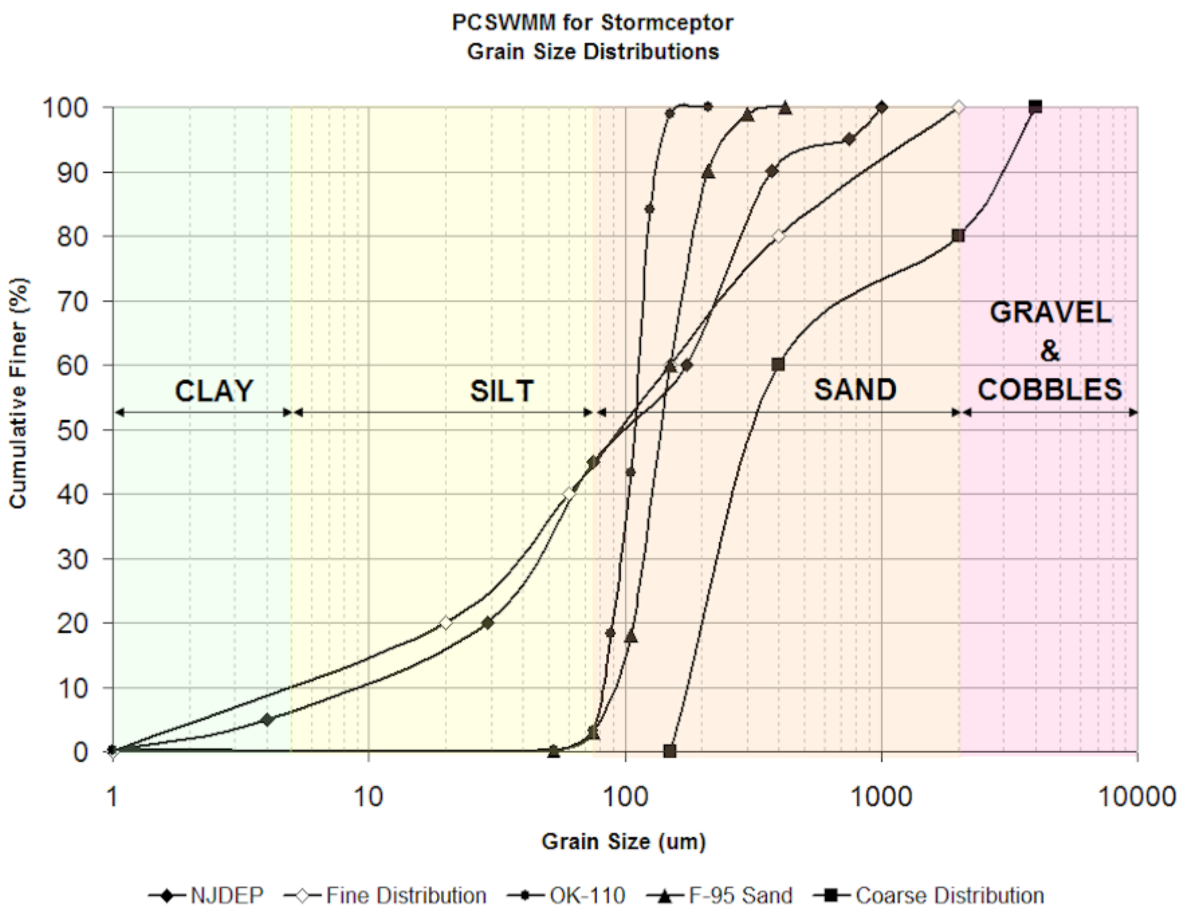


Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

Stormceptor®

TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Buildup/Washoff Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

TSS Availability Parameters

Availability = A + Bi^{C}

Availability Constant A	0.057
Availability Factor B	0.04
Availability Exponent C	1.1
Min. Particle Size Affected by Availability (µm)	400

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

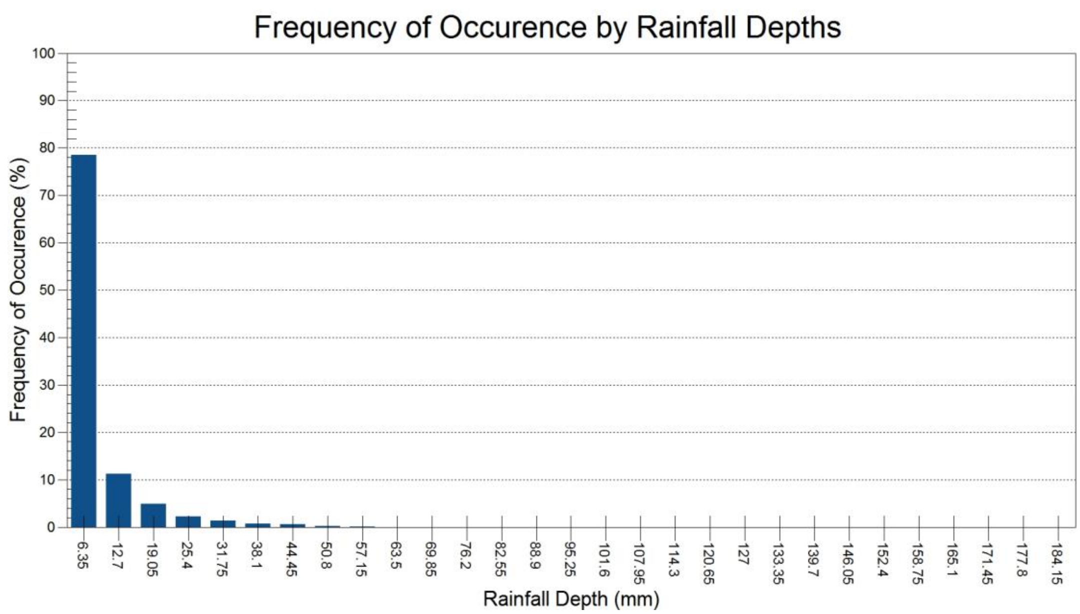
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	OTTAWA MACDONALD-CARTIER INT'L A		
Rainfall File Name	ON6000.NDC	Total Number of Events	4536
Latitude	45°19'N	Total Rainfall (mm)	20974.3
Longitude	75°40'W	Average Annual Rainfall (mm)	566.9
Elevation (m)	371	Total Evaporation (mm)	1208.7
Rainfall Period of Record (y)	37	Total Infiltration (mm)	7531.2
Total Rainfall Period (y)	37	Percentage of Rainfall that is Runoff (%)	58.8

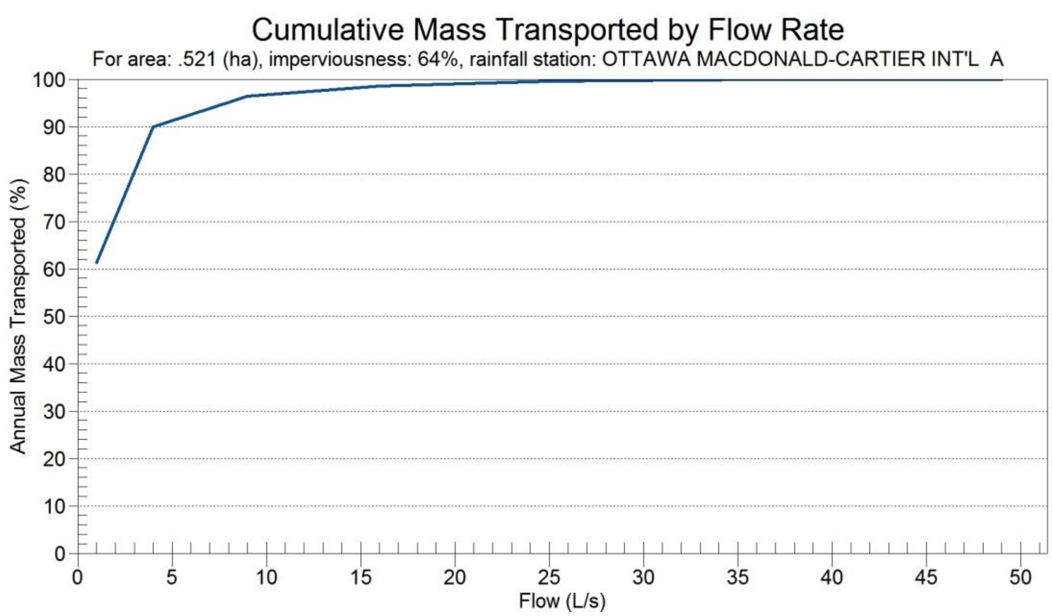
Rainfall Event Analysis

Rainfall Depth mm	No. of Events	Percentage of Total Events %	Total Volume mm	Percentage of Annual Volume %
6.35	3563	78.5	5667	27.0
12.70	508	11.2	4533	21.6
19.05	223	4.9	3434	16.4
25.40	102	2.2	2244	10.7
31.75	60	1.3	1704	8.1
38.10	33	0.7	1145	5.5
44.45	28	0.6	1165	5.6
50.80	9	0.2	416	2.0
57.15	5	0.1	272	1.3
63.50	1	0.0	63	0.3
69.85	1	0.0	64	0.3
76.20	1	0.0	76	0.4
82.55	0	0.0	0	0.0
88.90	1	0.0	84	0.4
95.25	0	0.0	0	0.0
101.60	0	0.0	0	0.0
107.95	0	0.0	0	0.0
114.30	1	0.0	109	0.5
120.65	0	0.0	0	0.0
127.00	0	0.0	0	0.0
133.35	0	0.0	0	0.0
139.70	0	0.0	0	0.0
146.05	0	0.0	0	0.0
152.40	0	0.0	0	0.0
158.75	0	0.0	0	0.0
165.10	0	0.0	0	0.0
171.45	0	0.0	0	0.0
177.80	0	0.0	0	0.0
184.15	0	0.0	0	0.0
190.50	0	0.0	0	0.0
196.85	0	0.0	0	0.0
203.20	0	0.0	0	0.0
209.55	0	0.0	0	0.0
>209.55	0	0.0	0	0.0



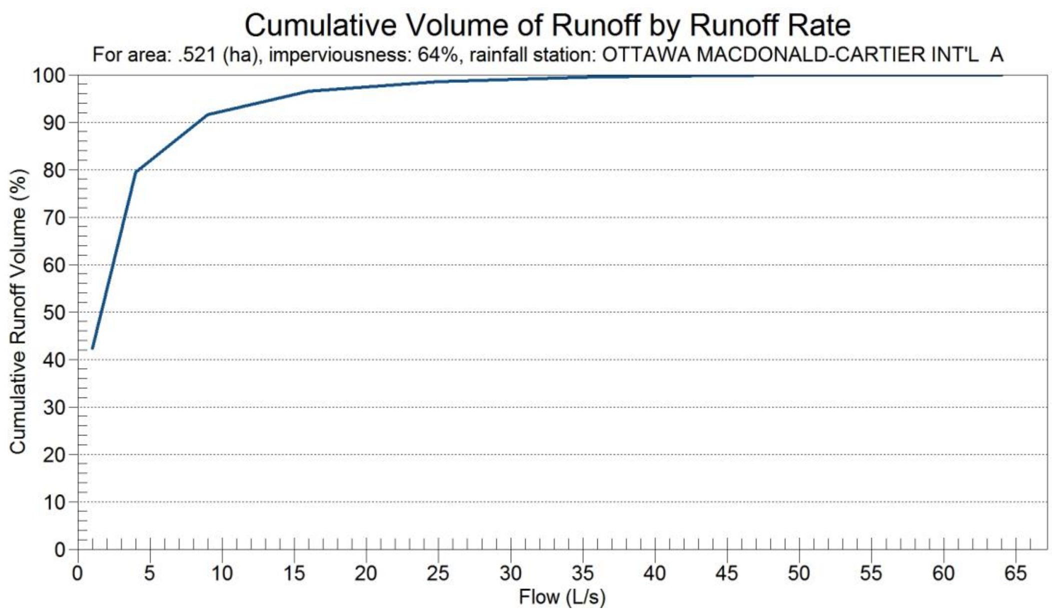
Pollutograph

Flow Rate L/s	Influent Mass kg	Effluent Mass kg	Total Mass kg	Cumulative Mass %
1	15118	9581	24666	61.3
4	22191	2484	24666	90.0
9	23775	894	24666	96.4
16	24323	343	24666	98.6
25	24541	125	24666	99.5
36	24633	33	24666	99.9
49	24655	11	24666	100.0
64	24665	1	24666	100.0
81	24666	0	24666	100.0
100	24666	0	24666	100.0
121	24666	0	24666	100.0
144	24666	0	24666	100.0
169	24666	0	24666	100.0
196	24666	0	24666	100.0
225	24666	0	24666	100.0
256	24666	0	24666	100.0
289	24666	0	24666	100.0
324	24666	0	24666	100.0
361	24666	0	24666	100.0
400	24666	0	24666	100.0
441	24666	0	24666	100.0
484	24666	0	24666	100.0
529	24666	0	24666	100.0
576	24666	0	24666	100.0
625	24666	0	24666	100.0
676	24666	0	24666	100.0
729	24666	0	24666	100.0
784	24666	0	24666	100.0
841	24666	0	24666	100.0
900	24666	0	24666	100.0



Cumulative Runoff Volume by Runoff Rate

Runoff Rate L/s	Runoff Volume m³	Volume Overflowed m³	Cumulative Runoff Volume %
1	27273	36976	42.4
4	51000	13264	79.4
9	58844	5423	91.6
16	61997	2270	96.5
25	63355	913	98.6
36	63974	294	99.5
49	64198	71	99.9
64	64262	6	100.0
81	64269	0	100.0
100	64269	0	100.0
121	64269	0	100.0
144	64269	0	100.0
169	64269	0	100.0
196	64269	0	100.0
225	64269	0	100.0
256	64269	0	100.0
289	64269	0	100.0
324	64269	0	100.0
361	64269	0	100.0
400	64269	0	100.0
441	64269	0	100.0
484	64269	0	100.0
529	64269	0	100.0
576	64269	0	100.0
625	64269	0	100.0
676	64269	0	100.0
729	64269	0	100.0
784	64269	0	100.0
841	64269	0	100.0
900	64269	0	100.0



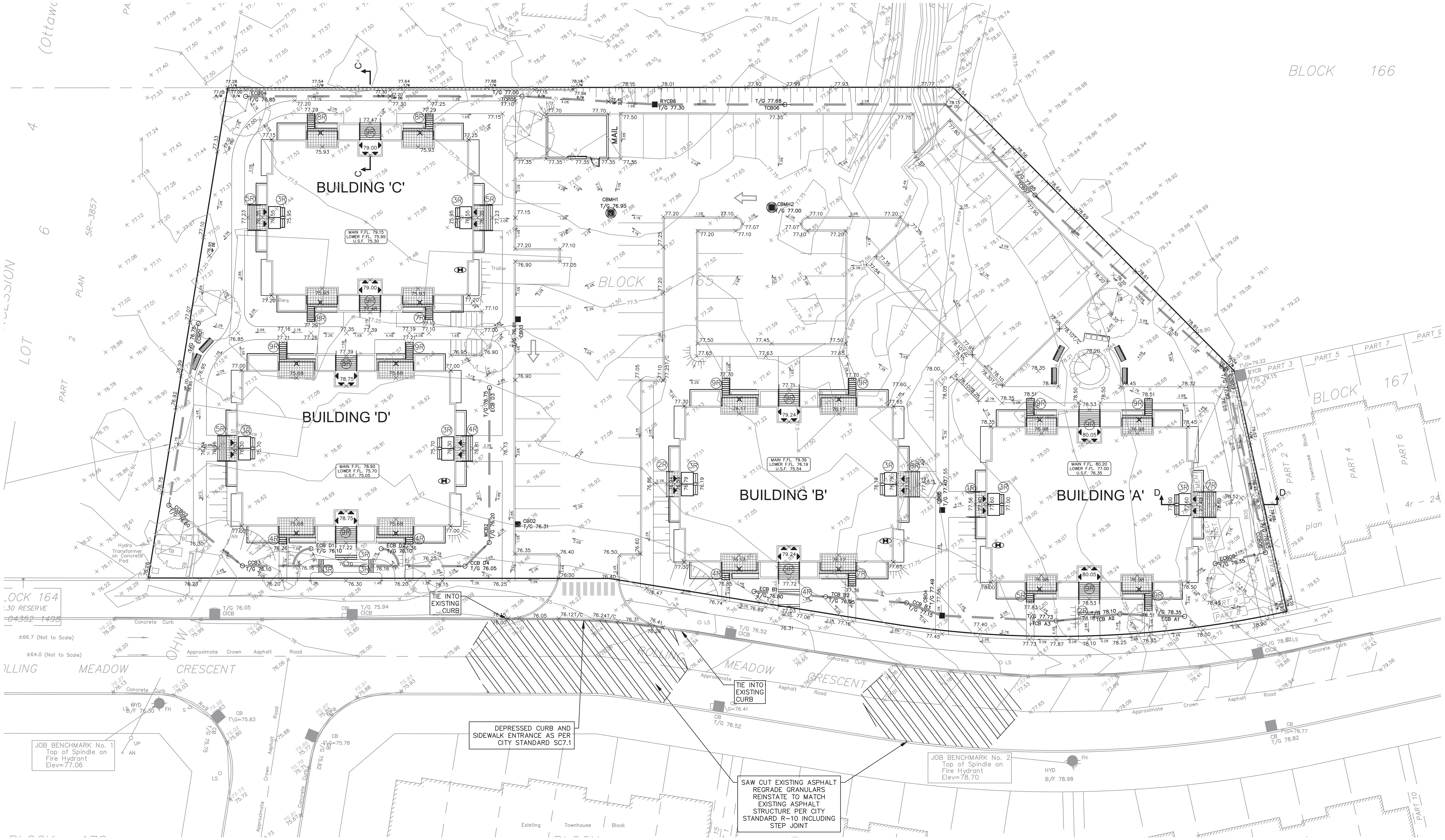
INFILTRATION GALLERY SIZING CALCULATION

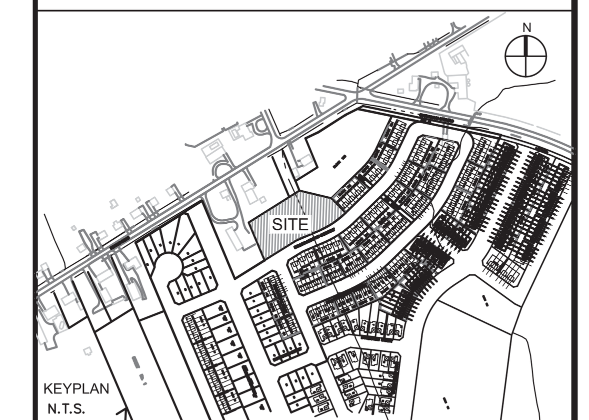
Claridge Homes
SVT Zens
Date: 2018-10-05
Prepared by: W.Z.
Checked by : R.M.

INFIL 1	6050	m^2
Effective Runoff	66%	
Percolation	1.03	(m/day, 43mm/hr as per Geo)
INFILTRATION GALLERY SIZING		
Width	21	m
Length	13	m
depth	1	m
Number Cells	1	
void ratio	0.38	(19mm clear stone with non-woven geotextile)
	103.74	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	
25mm/day Event	25	1.042	99.8	99.8	99.8	0.0	99.8	0.0	0.0

APPENDIX D





No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11

CLARIDGE HOMES (CARSON) INC.
2001-210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613-233-6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS

WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2018/10/11
PROVINCE OF ONTARIO

Drawing Title

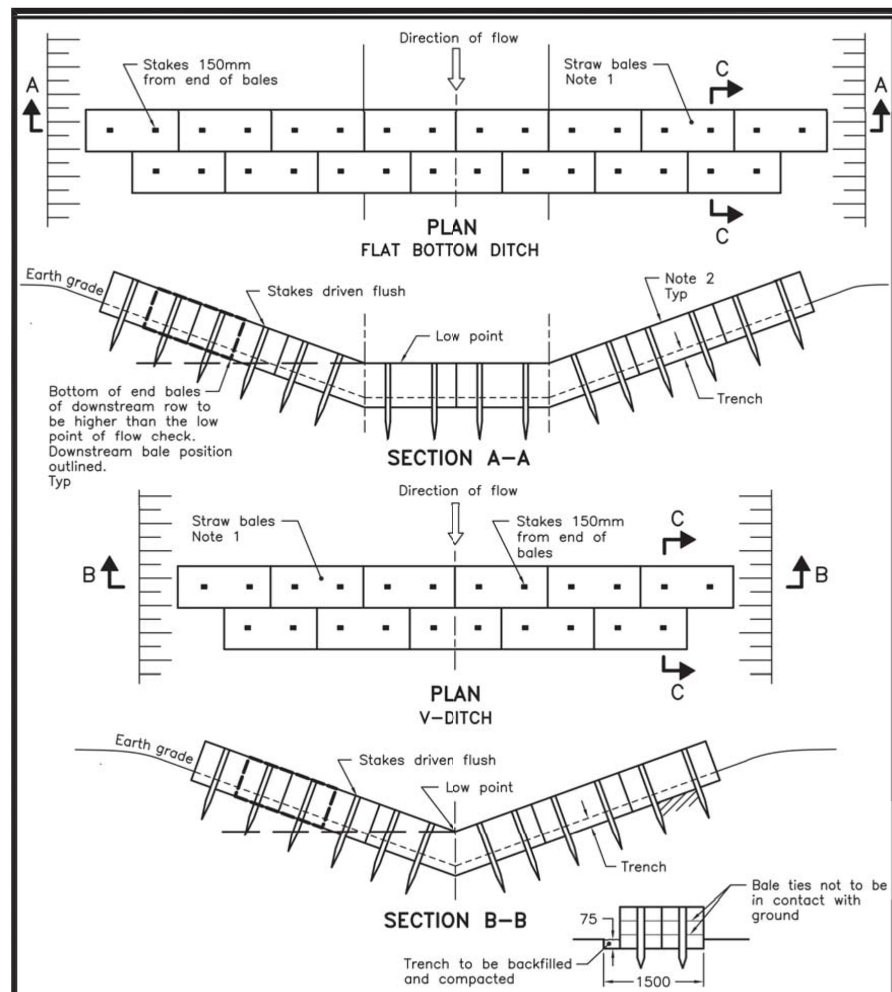
GRADING PLAN

Scale 1:250

Design	Date
R.M./A.Z.	OCTOBER 2018
Drawn	**Checked**
E.H.	D.G.Y.
Project No.	**Drawing No.**
115201	200

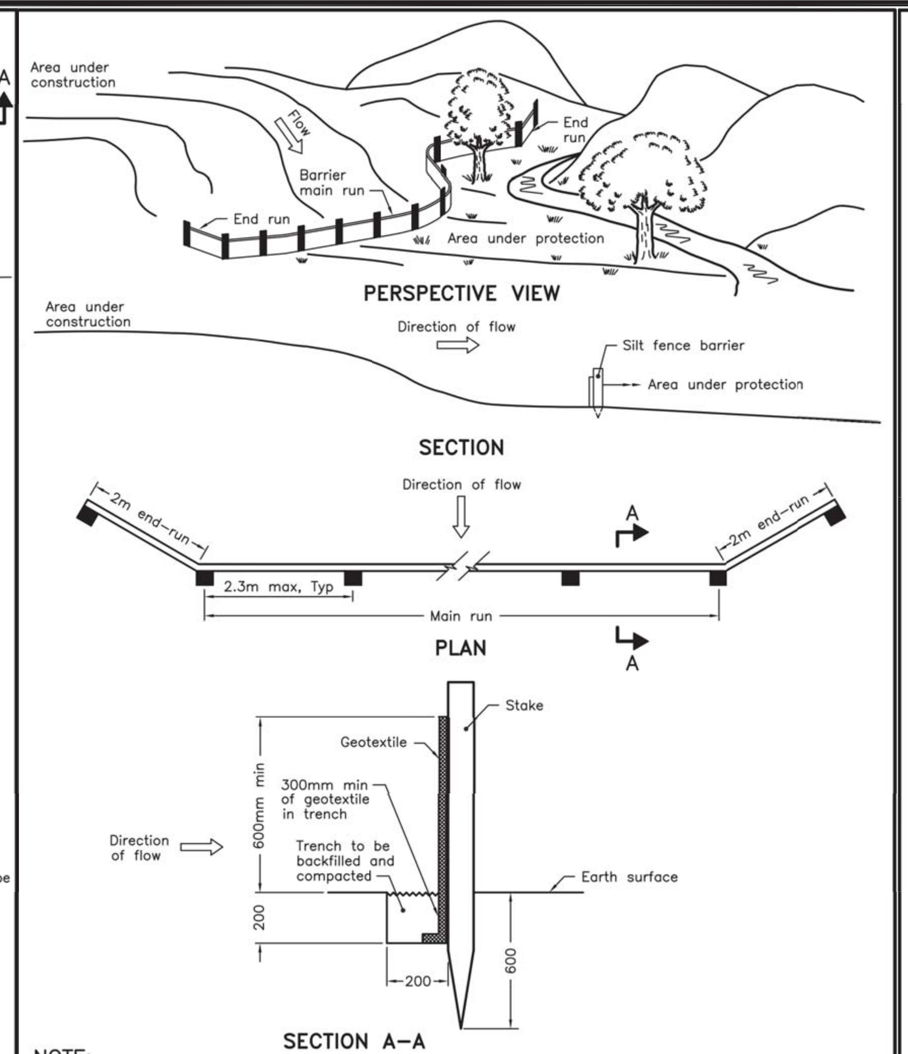
CITY PLAN No. ####

CITY FILE No. ####



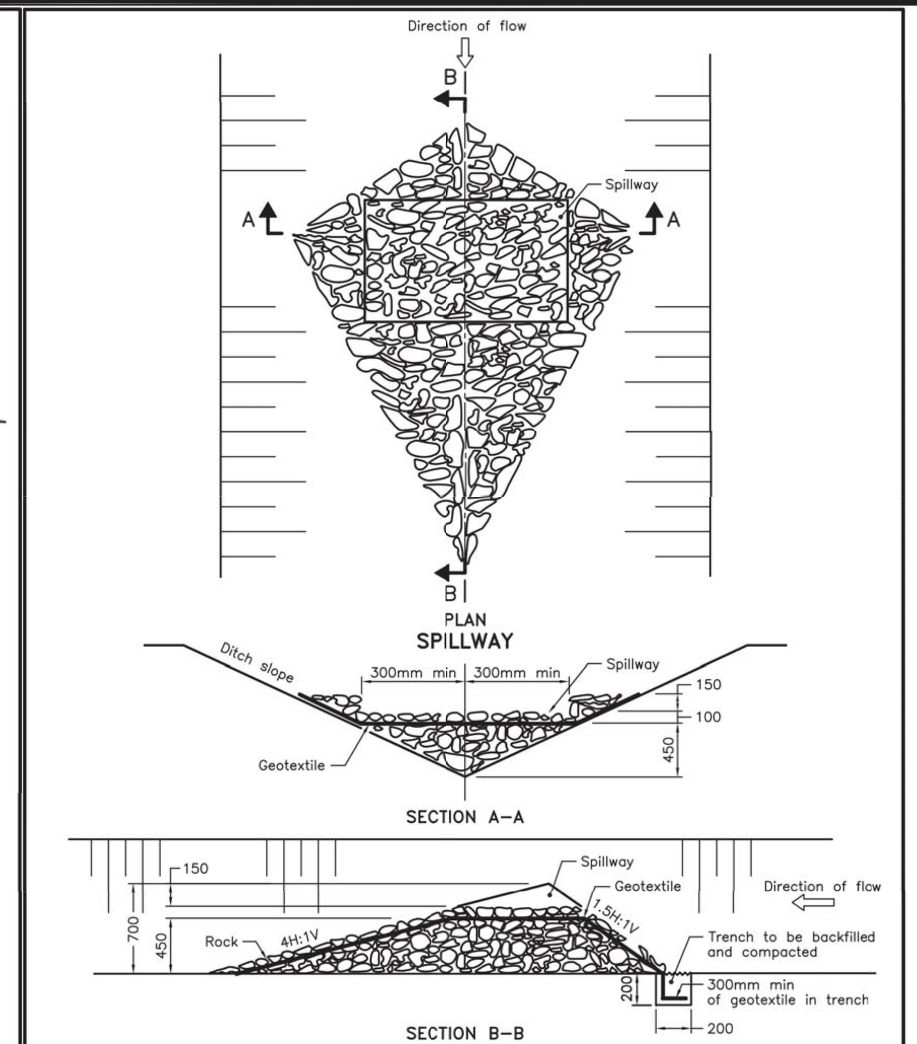
NOTES:
1 Number of bales varies to suit ditch.
2 Straw bales to be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
STRAW BALE FLOW CHECK DAM	OPSD 219.180	



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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
LIGHT–DUTY SILT FENCE BARRIER	OPSD 219.110	



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

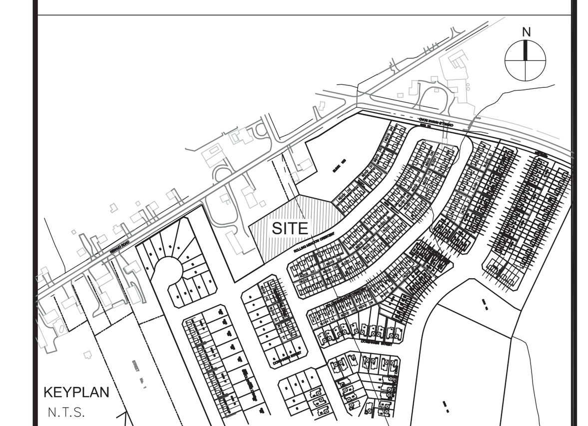
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2006	Rev 1
ROCK FLOW CHECK DAM V–DITCH	OPSD 219.210	

NOTES:

1. SILT FENCE TO BE ERECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
2. STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
3. SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET CBs TO REMAIN UNTIL ALL CURBS ARE CONSTRUCTED. GEOTEXTILE FABRIC IN RYCBs TO REMAIN UNTIL VEGETATION IS ESTABLISHED. ALL CATCHBASINS TO BE REGULARLY INSPECTED AND CLEANED, AS NECESSARY, UNTIL SOD AND CURBS ARE CONSTRUCTED.
4. CONTRACTOR TO PROVIDE DETAILS ON LOCATION(S) AND DESIGN OF DEWATERING TRAP(S) PRIOR TO COMMENCING WORK. CONTRACTOR ALSO RESPONSIBLE FOR MAINTAINING TRAP(S) AND ADJUSTING SIZE(S) IF DEEMED REQUIRED BY THE ENGINEER DURING CONSTRUCTION.
5. CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.

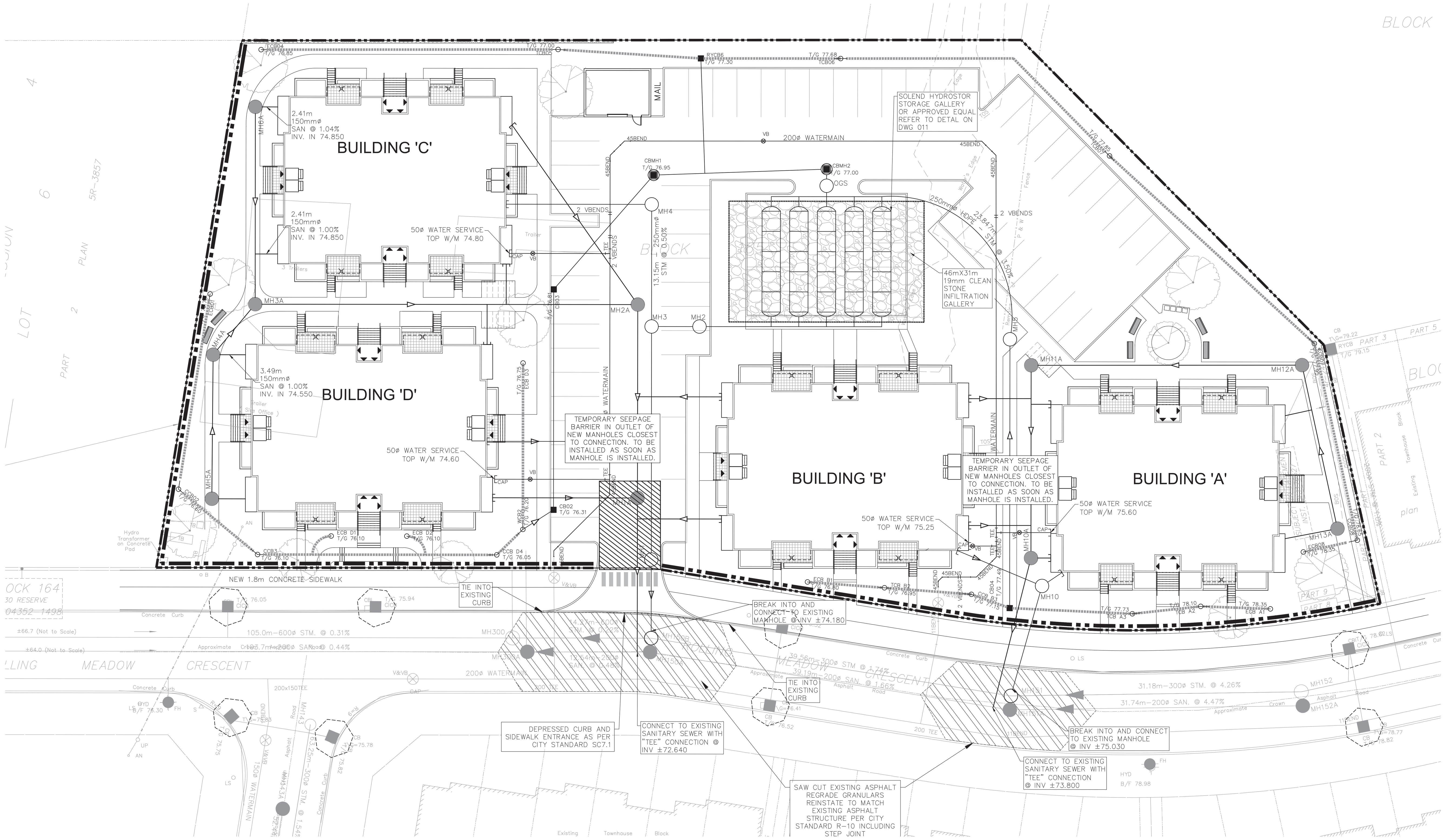
LEGEND

- HEAVY DUTY SILT FENCE
- SNOW FENCE
- STRAW BALE CHECK DAM
- STRAW BALE CHECK DAM WITH FILTER CLOTH
- ROCK CHECK DAM
- SEDIMENT SACK PLACED UNDER EXISTING CB COVER
- TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH



KEYPLAN
N.T.S.

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4			
3			
2			
1	ISSUED FOR CITY REVIEW	DGY	18:10:11



CLARIDGE HOMES

CLARIDGE HOMES (CARSON) INC.
2001–210 GLADSTONE AVE
OTTAWA, ON
K2P 0Y6
613–233–6030

IBI GROUP
400 – 333 Preston Street
Ottawa ON K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

Project Title

SPRING VALLEY TRAILS ZENS
WALK-UP TOWNHOUSES

LICENSED PROFESSIONAL ENGINEER
D. G. Yannoulopoulos
2018/10/11
PROVINCE OF ONTARIO

Drawing Title

EROSION AND SEDEMENTATION CONTROL PLAN

Scale	
1:500	
Design: R.M./A.Z.	Date: OCTOBER 2018
Drawn: E.H.	Checked: D.G.Y.
Project No.: 115201	Drawing No.: 900

CITY PLAN No. ####

CITY FILE No. ####