



REPORT
PROJECT: 126715-6.4.3

DESIGN BRIEF

CRT Ph 1 Blk 324

FERNBANK COMMUNITY



Prepared for: Claridge Homes
By: IBI GROUP

JANUARY 2021

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1 INTRODUCTION

1.1 Background

In 2009, the City of Ottawa completed the Fernbank Community Design Plan (FCDP). The FCDP covers approximately 675 gross hectares of land between the established communities of Stittsville, Kanata West and Kanata South.

In conjunction with preparation of the Community Design Plan, several Class Environmental Assessment Studies/Master Plans were also prepared. Two of those were the Master Servicing Study (MSS) for water and sanitary and an Environmental Management Plan (EMP) for the natural environment and stormwater management. Those reports identify planning level solutions for on-site storm drainage, wastewater collection and water supply and distribution to the community.

1.2 Objective

IBI Group Professional Services Inc. (IBI Group) has been retained by Claridge Homes to provide engineering and consulting services for the Block 324 with CRT Phase 1 Lands in the Fernbank Community, the site location is illustrated in Figure 1.1 in Appendix A. IBI Group has completed the Detail Design for CRT Lands Phases 1 and 2, with Phase 1 now in service and Phase 2 works now under construction. This report will provide a logical framework to assist reviewers with evaluation of the design of Block 324 within Phase 1 of the development.

This report will provide a recommended servicing plan for the major municipal infrastructure needed to support development of the subject lands. This report will demonstrate how the proposed municipal servicing is in conformance with the previously approved subdivision design. Any deviation from the approved subdivision design will be identified with rationalization for the change.

This report was prepared in accordance with the Servicing Study Guidelines for Development Applications in the City of Ottawa. **Appendix A** contains a checklist of those guidelines.

1.3 Subject Property

The current Site Plan as prepared Architects DCA for the subject property, is in **Appendix A**. The property covers a total area of approximately 1.8 ha and is bounded by Robert Grant Ave to the east, Putney Cres to the west, the Hydro corridor to the north, future residential block to the south.

The proposed land use for the subject phase, which is in general conformance with the FCDP, will include back to back townhouse units on private services and roads.

1.4 Phasing

All site plan works will be completed in one phase.

1.5 Previous Studies

The Fernbank Community development process included a number of background studies that are pertinent to the subject site. Three integrated Class Environmental Assessment Studies/Master Plans were prepared in support of the FCDP which include:

- Transportation Master Plan;
- Environmental Management Plan (EMP);
- Master Servicing Study (MSS).

In 2011, IBI Group completed a Conceptual Site Servicing Plan for the CRT Lands. That report was designed to assist the City in preparation of draft conditions for development of the subject property.

In January 2012, Novatech Engineering Consultants Ltd. completed the Fernbank Community Sanitary Trunk Sewer Design Report of the Fernbank Trunk Sewer. That sewer was identified in the 2009 MSS report. The 2012 report built upon previous design elements and included some changes to the proposed sewer design originally identified in the 2009 document. It is the latter report that will provide the design framework for the sanitary sewer design for the subject site.

Subsequent development applications under the Planning Act will be supported by these studies/plans. IBI Group completed the detail design in July 2017 for Phase 1 and September 2020 for Phase 2 of the CRT Lands.

The subject property will follow closely the recommendations of those reports. With respect to the provision of water supply, wastewater disposal and treatment of stormwater runoff, the recommendations of the above noted reports provided development criteria on which the subject property will develop. Any deviations from the previous report criteria will be identified in later sections of this report.

1.6 Pre-Consultation

A preconsultation meeting was held with the City planning and Engineering staff along with the owner, a copy of the meeting notes is included in **Appendix A**.

1.7 Geotechnical Considerations

A Geotechnical Investigative Report entitled “Geotechnical Investigation Proposed Residential Development CRT Lands – Phase 1, Fernbank Road Ottawa, Ontario”, number PG2236-2R, and dated July 23, 2014, was prepared by Paterson Group Inc. The scope of this report also included investigation on the subject lands. The objectives of the investigation include:

- Determination of the subsoil and groundwater conditions;
- Provision of preliminary geotechnical recommendations pertaining to the design and development of the subject site including construction considerations.

Among other items, the report commented on the following:

- Site grading;
- Foundation design;
- Pavement structure;
- Infrastructure construction;
- Groundwater control;
- Tree planting.

Among other considerations, the report confirmed that there are no grade raise limitations for the the subject site.

A site specific geotechnical report is being prepared and while no changes to the subdivision report recommendations are anticipated the report and it's conclusions and recommendations including a grading plan review and sign off by the Geotechnical Consultant will be provided with 2nd submission to the City.

2 WATER SUPPLY

2.1 Existing Condition

As part of Phase 1 of the CRT subdivision, a 200mm diameter watermain was constructed within Putney Crescent adjacent to Block 324.

2.2 Design Criteria

2.2.1 Water Demands

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 water demand calculation sheet is included in **Appendix B** and the total water demands are summarized as follows:

- Average Day 1.23 l/s
- Maximum Day 3.06 l/s
- Peak Hour 6.74 l/s

2.2.2 System Pressure

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

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

2.2.3 Fire Flow Rates

Block 324 consist of back to back townhouses with the majority having 12 units and are 3 stories above ground. A Fire Underwriters Survey (FUS) calculation for a 12 unit 3 storey wood frame construction building results in a fire flow of 20,000 l/min (333 l/s) which is not practical to supply. In order to reduce the fire flow the building can be broken up into smaller fire units by installing 2 hour rated firewalls. Firewalls are proposed to be installed to separate the building into 4 unit segments. A FUS calculation is included in **Appendix B** which calculates a fire flow for the 4 units on the east end of the 12 unit townhouse block between Streets 4 and 5 adjacent to Putney Crescent. The 4 units has external exposures in three directions and an exposure to the 2 hour firewall as shown in the calculation. The resulting fire flow demand is 11,000 l/min (183.3 l/s) which represents the highest fire flow for the Block 324 site and is used in the water model.

2.2.4 Boundary Conditions

As part of the CRT Phase 1 design the City of Ottawa has provided hydraulic boundary conditions at two locations along the Trans Canada Trail 400 mm watermain. Separate boundary conditions have been given for the max day plus fire scenario for a 204 l/s and 262 l/s fire flow. As the fire demand for Block 324 is 183.3 l/s per Section 2.2.3 the 204 l/s boundary condition is used in the fire analysis. A copy of the boundary condition is included in **Appendix B** and summarized as follows:

	CONNECTION 1	CONNECTION 2
Max HGL (Basic Day)	161.1 m	161.4 m
Peak Hour	154.7 m	154.8 m
Max Day + Fire (204 l/s Fire Flow)	152.8 m	153.0 m
Max Day + Fire (262 l/s Fire Flow)	150.6 m	150.9 m

2.2.5 Hydraulic Model

Block 324 has been added to the water model for CRT Phase 1, the model is developed with the Infowater 12.4 program that was converted from the previous CRT Phase 1 H₂O Map water program. Boundary conditions from Section 2.2.4 have been incorporated into the model. In Block 324 the fire flows are evaluated at the proposed hydrant locations represented by Nodes B50 to B60. A schematic of the water model for Block 524 and the overall CRT Phase 1 water model are included in Appendix B.

2.3 Proposed Water Plan

2.3.1 Modeling Results

The hydraulic model was run under basic day, maximum day with fire flows and under peak hour conditions for Block 324. Water pipes are sized to provide sufficient pressure and to deliver the required fire flows.

Results of the hydraulic model are included in **Appendix B** and are summarized below, the General Plan :

Scenario

Basic Day (Max HGL) Pressure Range	519.4 to 542.9 kPa
Peak Hour Pressure Range	450.4 to 475.9 kPa

Max Day + 204 l/s Fire Design Flow Range 234.3 l/s to 298.1 l/s

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

Maximum Pressure:	All nodes have basic day pressures under 552 kPa, therefore pressure reducing control is not required for this development.
Minimum Pressure:	All nodes in the model exceed the minimum value of 276 kPa (40 psi).
Fire Flow:	All hydrant nodes exceed the 183.3 l/s required fire flow.

3 WASTEWATER DISPOSAL

3.1 Existing Conditions

The Fernbank Trunk sewer was extended as part of CRT Lands Phase 1 development. The main trunk sewer for the subject lands was previously constructed in block 328 and 336 and Putney Crescent with servicing stubs designed for this site, it should be noted that it appears from as built records these stubs were not constructed.

The CRT Phase 1 sewer design included an allocation into MH209A for the subject site and surrounds lands. The design of Phase 1 was completed based on the previous Ottawa Sewer Design Guidelines, for which a demand of 350L/Day/cap and infiltration allowance of 0.28l/s/Ha was used. The Phase 1 design had estimated an area allocation of 11.57 Ha and a total population allowance of 512.6 yielding a total peak flow to MH209A of 11.55L/s under the design criteria at the time.

3.2 Block 324 Design Criteria

The sanitary sewers for the subject site will be based on the recommendations of the 2009 MSS, the updated design guidelines the City of Ottawa and the requirements of provincial Ministry of the Environment. Some of the key criteria will include the following:

Average Day Residential Flow	280 l/cap/day
Residential Peaking Factor	Harmon Formula: (min. -2.0, max, -4.0)
Infiltration Rate	0.33 l/s/ha
Townhouse Unit Population Density	2.5 ppu
Velocities	Min 0.6 m/s Max 3.0 m/s

Table 3-1 Minimum Allowable Slopes

DIAMETER (MM)	SLOPE (%)
200	0.320
250	0.240
300	0.816

DIAMETER (MM)	SLOPE (%)
375	0.140
450	0.111
525 and larger	0.100

Where practical and where there are less than 10 residential connections, the first lengths of sanitary sewers are designed as 200 mm diameter pipes with a minimum slope of 0.65%.

The proposed site plan has a tributary area of 1.87Ha, and a population contribution of 280 to MH 209A. The total peak flow to MH209A from Phase 1 including the subject parcel is 11.89 L/s, which is very similar to the original design of 11.55l/s, hence no negative impact on downstream sewers is anticipated, a copy of the original design sheet and the updated design sheet is included in **Appendix C**.

3.3 Local Extraneous Flows

All sanitary sewers will be constructed to City of Ottawa standards, including testing prior to being put into service. There are no unusual local conditions within the subject site that are expected to contribute extraneous flows higher than those noted in the City’s guidelines.

3.4 Sewer Calculations

Detailed sanitary sewer design sheets, using recommendations from the MSS, and criteria of the City of Ottawa and the provincial Ministry of Environment, and Sanitary Drainage Area Plans Drawings 126715-400 are provided in **Appendix C**. they demonstrate the sewers have been designed to meet governmental requirements.

4 SITE STORMWATER MANAGEMENT

4.1 Background

The subject site is part of the larger development referred to as Fernbank Community Development. The stormwater management strategy was outlined in the following reports:

- *Conceptual site servicing plan stormwater management plan and erosion and sediment control plan CRT lands Fernbank community (IBI Group, August 2011)*
- *Design brief CRT Lands – Phase 1 Fernbank Community Development (IBI Group, July 2017)*

The subject site is part of the drainage area that ultimately discharges to the Pond 6 SWM Facility. The trunk storm sewer to the pond and the pond itself were previously constructed.

4.2 Objective

The purpose of this report section is to present the dual drainage design, including the minor and major system, for block 324 in CRT Ph 1 in the Fernbank Community. The design includes the sizing of inlet control devices, maximum depth of surface ponding. The stormwater system concept is discussed in subsequent sections and has been developed based on the October 2012 City of

Ottawa Sewer Design Guidelines and February 2014 City of Ottawa Technical Bulletin ISDTB-2014-01.

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 1:2 year return (Ottawa)
- Rational Method Sewer Sizing
- Initial Time of Concentration 10 minutes
- Runoff Coefficients
 - Landscaped Areas C = 0.2
 - Landscaped Area with Pathway C = 0.5
 - Building and Roof Area C = 0.9
 - Parking Area and Driveway C = 0.9
- Pipe Velocities 0.80 m/s to 3.0 m/s
- Minimum Pipe Size 250 mm diameter (200 mm CB Leads)
- Minimal Allowable Slopes

DIAMETER (MM)	SLOPE (%)
250	0.432
300	0.340
375	0.250
450	0.195
525	0.160
600	0.132
750 and larger	0.100

4.4 System Concept

According to the CRT Phase 1 report prepared by IBI Group, the development of the downstream stormwater system included the expected stormwater servicing needs of the subject property. The existing storm sewers constructed adjacent to the site were oversized to provide the needed capacity for minor storm runoff from the subject site. Minor storm runoff from the subject site will connect to the existing 975 mmØ sewer in block 316. See **Appendix D** for CRT Ph 1 sewer design sheet, and tributary area plan, where the service stub for the site was allocated 493.82 l/s, however this included 112.87 l/s for 0.56 Ha of the adjacent parcel, therefore the allocation for this block is 380.95 l/s

4.4.1 Dual Drainage Design

The dual drainage system proposed for the subject site will accommodate both major and minor stormwater runoff. Minor flow from the subject site will be conveyed through the storm sewer network and discharge into the existing 975 mmØ sewer in Block 316.

The surface flow not captured by the minor system during rainfalls more than the 1:100yr event will be conveyed via the major system. Storage will be provided in subsurface storage facility (Stormtech units) sized to accommodate the 1:100yr rainfall events, to this end no ponding during the 1:2 year event will occur. If the maximum storage is utilized or if the inlet is blocked, the excess flow will cascade to the next downstream sag. Major flow up to 100-year storm event will be restricted and detained on-site, except a small area fronting Putney Cres and a small area abutting the existing dry pond in block 316. Emergency overflow will be directed towards aforementioned dry pond.

4.4.2 Proposed Minor System

Using the criteria identified in Section 4.2, 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**.

The owner of the site will be responsible for regular maintenance of the on-site sewers, catch basins, storage chambers and inlet control devices (ICDs). Maintenance includes but is not limited to the cost of regular cleaning of the storage chambers, storm sewer 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.

4.5 Stormwater Management

4.5.1 Water Quality Control

The subject site is part of the larger Fernbank development where an end of pipe quality control Storm Water Management facility has been constructed and is operational. This site was identified to be developed with a runoff coefficient of 0.8, the actual is runoff coefficient is approximately 0.77 therefore no negative impact is anticipated on the downstream Pond 6 SWM facility.

4.5.2 Water Quantity Control

As noted in section 4.4 above, the downstream sewer design limits the subject site to a maximum minor system release rate of 380.95 l/s into the existing 975 mm Dia storm sewer system. Surface flows in excess of the site's allowable release rate will be stored in strategic subsurface storage facilities and gradually released into the minor system to respect the site's allowable release rate. Due to the proposed sloped roofs, and relatively flat site grading roof top or surface storage are not being utilized. The proposed storage system is an underground storage system SteormTech (or approved equal), it has been sized to accommodate the design volume in excess of the 1:100yr event. Therefore, no surface storage is being utilized and there will be no surface ponding during the 2 yr storm event. However should an inlet be blocked or during extreme events a minimum 300mm freeboard is provided between an overflow elevation and building envelope or opening. Overland flow routes are provided to permit emergency overland flow away from buildings and out to the adjacent dry pond. A copy of Stormtech info sheet for the model SC3500 and SC4500 is included in **Appendix C**.

The Modified Rational Method (MRM) was used to determine the volume, since the storage is subsurface, the release rate used in calculating the storage volume was reduced by 50% per City requirements, the MRM spreadsheet is included **Appendix C** and illustrates the required volume

for each cell and required release rate, and is summarized in the table below. In addition to the piped minor system a small section of boulevard flows uncontrolled to the existing storm sewer system, corresponding the Allowable release rate has been reduced to 350.77l/s to account for this area, see MRM calculation. The design proposes a total release rate from the ICD's of 349l/s there no negative impact on the down stream sewer is anticipated. All ICD's for the site will be custom IPEX Tempest ICD's sized to meet the below flow rates under the identified Head.

DRAINAGE AREA #	STORAGE REQUIRED (M ³)	STORAGE PROVIDED (M ³)	ICD LOCATION (MH #)	RELEASE RATE (L/S)	HEAD (M)
112	96.33	98.03	112	130	3.08
116	152.64	158.01	116	90	3.50
120	34.95	43.09	203	50	2.04
121	73.55	83.05	122	50	2.50
123	33.1	40.82	205	29	2.37
TOTAL	390.57	423.00		349.0	

4.6 Hydraulic Grade Line Analysis

As part of the Phase 1 design the storm HGL was established at various points, at MH 209 the HGL was established at 100.97, the invert of the storm sewer at MH 109 which connect to MH 209 is 100.89, since the sewers are sized to accommodate the 5 yr design event, and ICD's limit flow into the sewers to the 5yr even the HGL within the site is deemed to follow the obvert of the sewer.

5 CONVEYANCE CONTROLS

5.1 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 swale drainage.

5.2 Flat Vegetated Swales

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

5.3 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.

5.4 Pervious Swale Drainage

Some of the landscaped swales make use of a filter wrapped perforated drainage pipe constructed below the 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 rear yard catchbasins structures with solid grates located within the street, at regular intervals as per City Standards.

6 SEDIMENT AND EROSION CONTROL PLAN

6.1 General

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

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

6.2 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.

6.3 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 outletting sewer. This bulkhead will trap any sediment carrying flows, thus preventing any construction –related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed.

6.4 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. 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.

6.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures will be covered to prevent sediment from entering the minor storm sewer system. Until reyards 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.

6.6 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.

The construction of this development will involve a rock blasting and breaking, at this time no crushing operation is anticipated. Given the existing topography, and the relatively flat requirement for back to back town on a private road network a fill operation is require in the northern section of the site as noted on the grading plan which is in Appendix A. As part of this operation, materials will be manipulated onsite, and provided the sediment and erosion control measures are in place, are generally inconsequential to the surrounding environment.

A copy of the Erosion and Sedimentation Control Plan is included in **Appendix G**.

7 ROADS AND NOISE ATTENUATION

Vehicular access to the site is provided by five road connections to Putney Cresc. The proposed plan identifies all roads within the site as private and are either 6m or 7m wide.

A public walkway block was established as part of the plan of subdivision immediately south of the site, this walkway is to be constructed by the subdivision developers after this site plan has been constructed.

An Environmental Noise Impact Assessment was prepared by IBI Group, dated January, 2021. Since the site consists of all back to back units with no rear yards or amenity space noise barriers are not required for this site. Various units will require noise clauses or upgraded building components.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

This report and the accompanying working drawings demonstrate that the proposed development meets the requirements of the stakeholder regulators, including the City of Ottawa, provincial MOECP. With minor exceptions, the proposed development is in general conformance with the 2009 Master Servicing Report and current City of Ottawa design standards.

Downstream sanitary sewers were designed with the proposed development area included. There is a reliable water supply available adjacent to the proposed development.

8.2 Recommendations

Water, wastewater and stormwater systems required to develop the site are designed in accordance with MOECP 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.

It is recommended that the regulators review this submission with an aim of providing the requisite approvals to permit the owners to proceed to the development stage of the subject site.

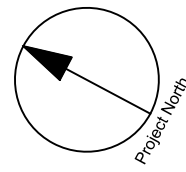
Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

- Commence Work Notification: City of Ottawa
- ECA (sewers): MOECP
- Commence Work Notification (utilities): City of Ottawa

Report prepared and electronically sealed on January 22, 2021 by:



Demetrius Yannouloupoulos, P. Eng.
Director

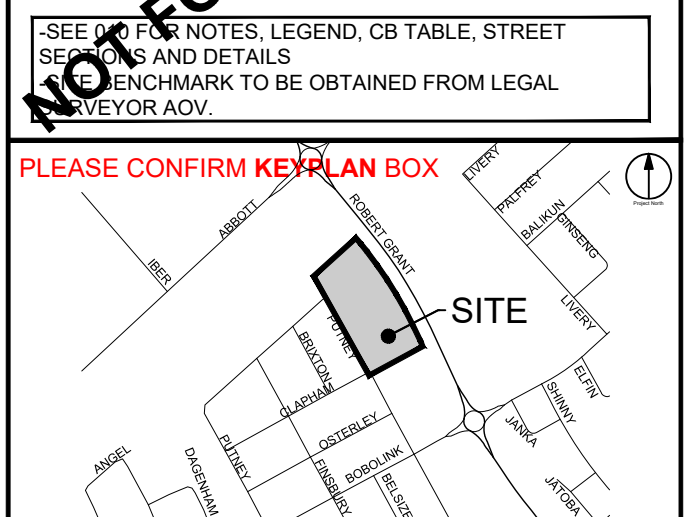


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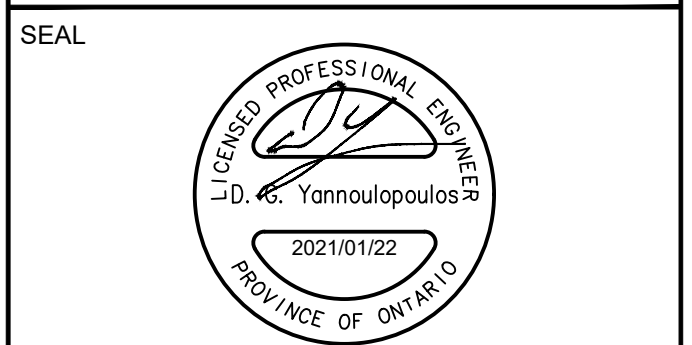
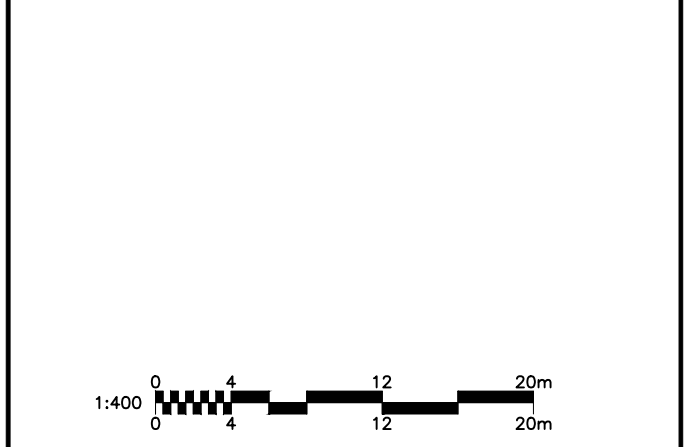
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ISSUES		
No.	DESCRIPTION	DATE
1	ISSUED TO CITY FOR REVIEW	2021/01/28



CONSULTANTS



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PROJECT

CRT

BLOCK 324

PROJECT NO:
126715

DRAWN BY:
D.D. E.H.

CHECKED BY:
DGY

PROJECT MGR:
DGY

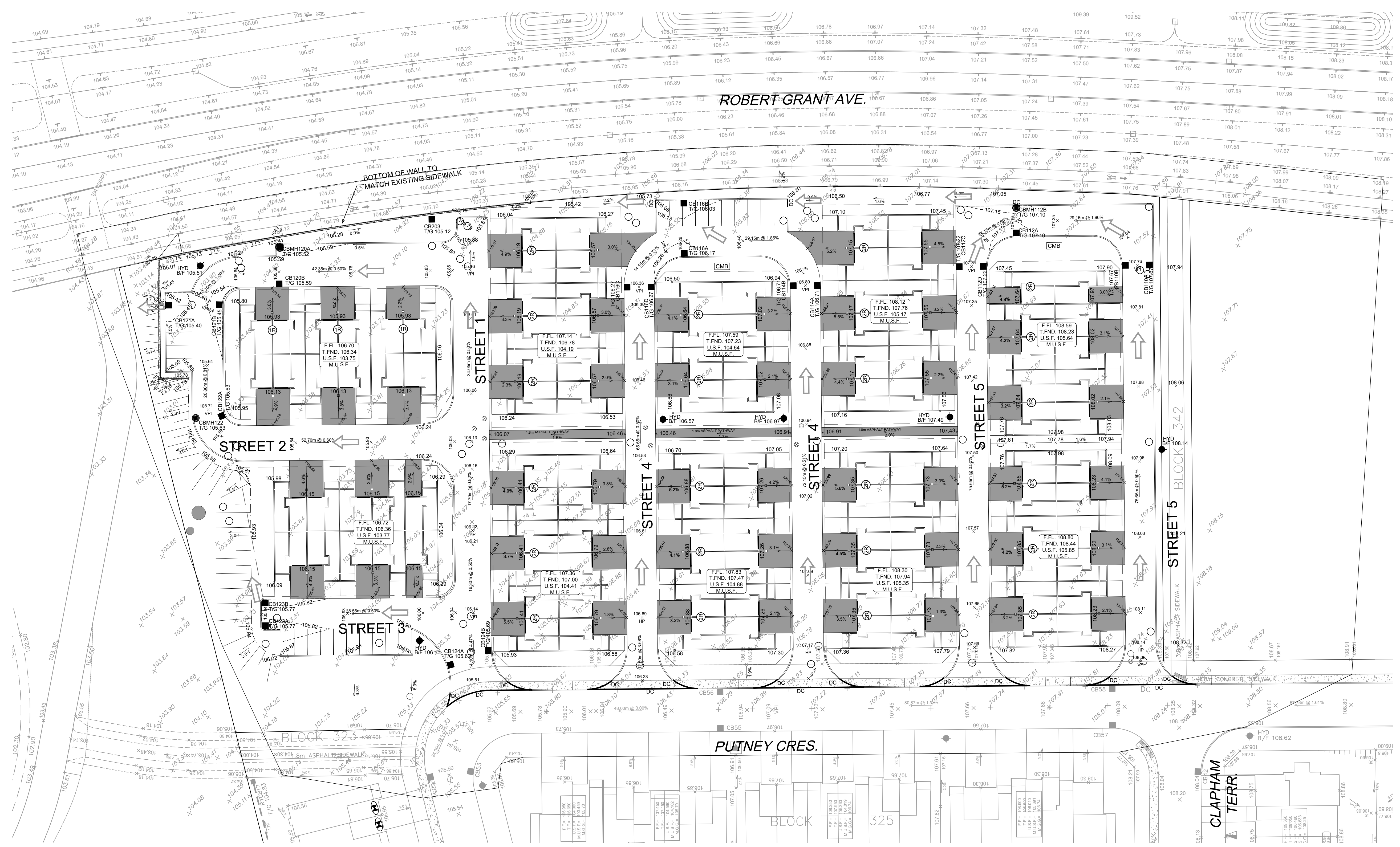
APPROVED BY:
DGY

SHEET TITLE

GRADING PLAN

SHEET NUMBER
200

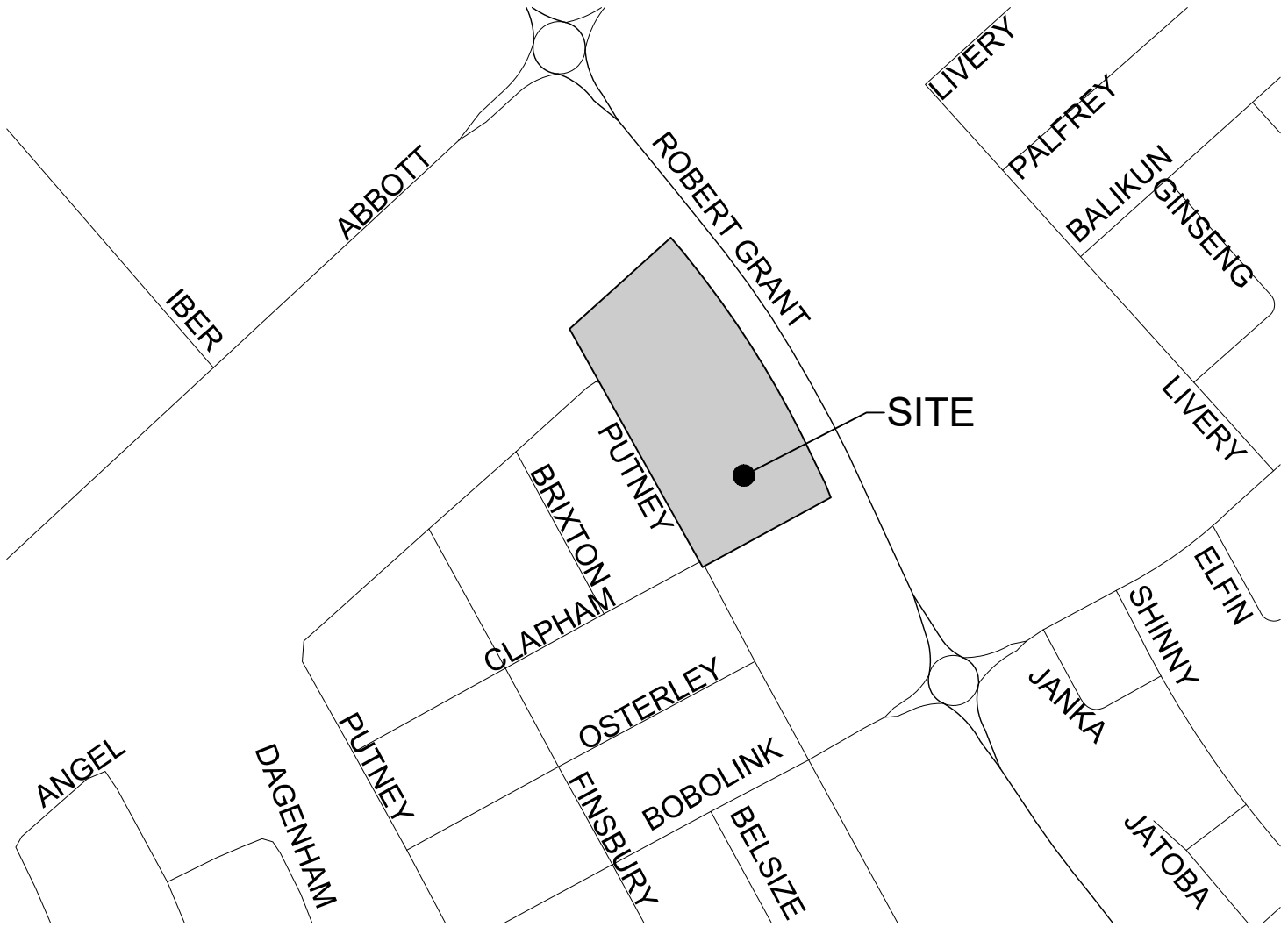
ISSUE
1



APPENDIX A

Figure 1.1 Location Plan
Development Servicing Study Checklist
Architects DCA Site Plan
Pre-consult meeting notes
126715-200 Grading Plan

J:\126715_CRT_Block324\7.0_Production\7.0_Design\04_Civil\Content\Figure1\LocationPlan.dwg Layout Name: Layout1



Project Title
CRT
BLOCK 324

Drawing Title
SITE LOCATION PLAN

Sheet No.
FIGURE 1

From: Rygus, Kathy <Kathy.Rygus@ottawa.ca>

Sent: Friday, May 22, 2020 2:54 PM

To: Vincent Denomme <vincent.denomme@claridgehomes.com>

Cc: Surprenant, Eric <Eric.Surprenant@ottawa.ca>; Giampa, Mike <Mike.Giampa@ottawa.ca>; Wang, Randolph <Randolph.Wang@ottawa.ca>

Subject: Preconsultation Putney Crescent - Comments

Hi Vincent,

Attached are the comments regarding your site plan concept for Block 324 on Putney Crescent in CRT's Westwood subdivision. Sorry for our delay in providing this.

Planning & Urban Design (see 2 attached PDF's)

- Alternative site plans should be explored because we are not convinced that the circulated plan is best option for the site.
- The repetitive pattern of the buildings and streets may be concerning.
- There are a number of practical questions which are noted on the attached map.
- A Design Brief is required for the site plan. The Terms Of Reference for the Design Brief are outlined on the attached checklist with boxes for required information checked.

Transportation

- Please submit a TIA screening form for this site. If the expected traffic generation was captured through a subdivision traffic study, the TIA requirement may be waived.
- Five accesses on a crescent for 112 units is excessive and may not meet the Private Approach bylaw for access spacing. The number of intersections with Putney Crescent should be reduced and the access on the curve eliminated.

Engineering

- Comments attached as separate PDF

The application type would be 'Complex Site Plan Control application (Manager Approval, Public Consultation) with a fee of \$35,487.53 together with Conservation Authority review fee of \$1015.00 and deposit for Engineering Design Review and Inspection Fees (based on value of works). These preconsultation comments are valid for a period of one year. Please let me know if you have any questions.

The linked image cannot be displayed. This file may have been moved, renamed, or deleted. Verify that the link points to the correct file and location.



Kathy Rygus

Planner/ Urbaniste

Development Review West / Services d'examen demandes d'aménagements Ouest

Planning, Infrastructure and Economic Development Department

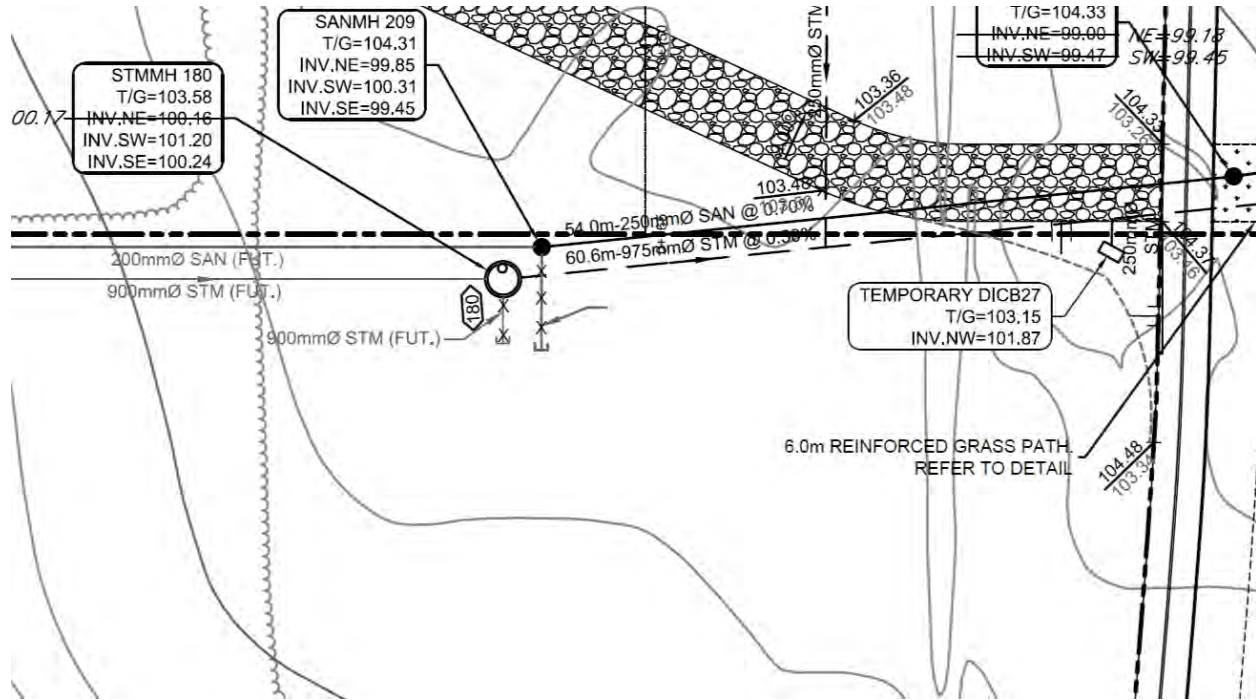
City of Ottawa | Ville d'Ottawa

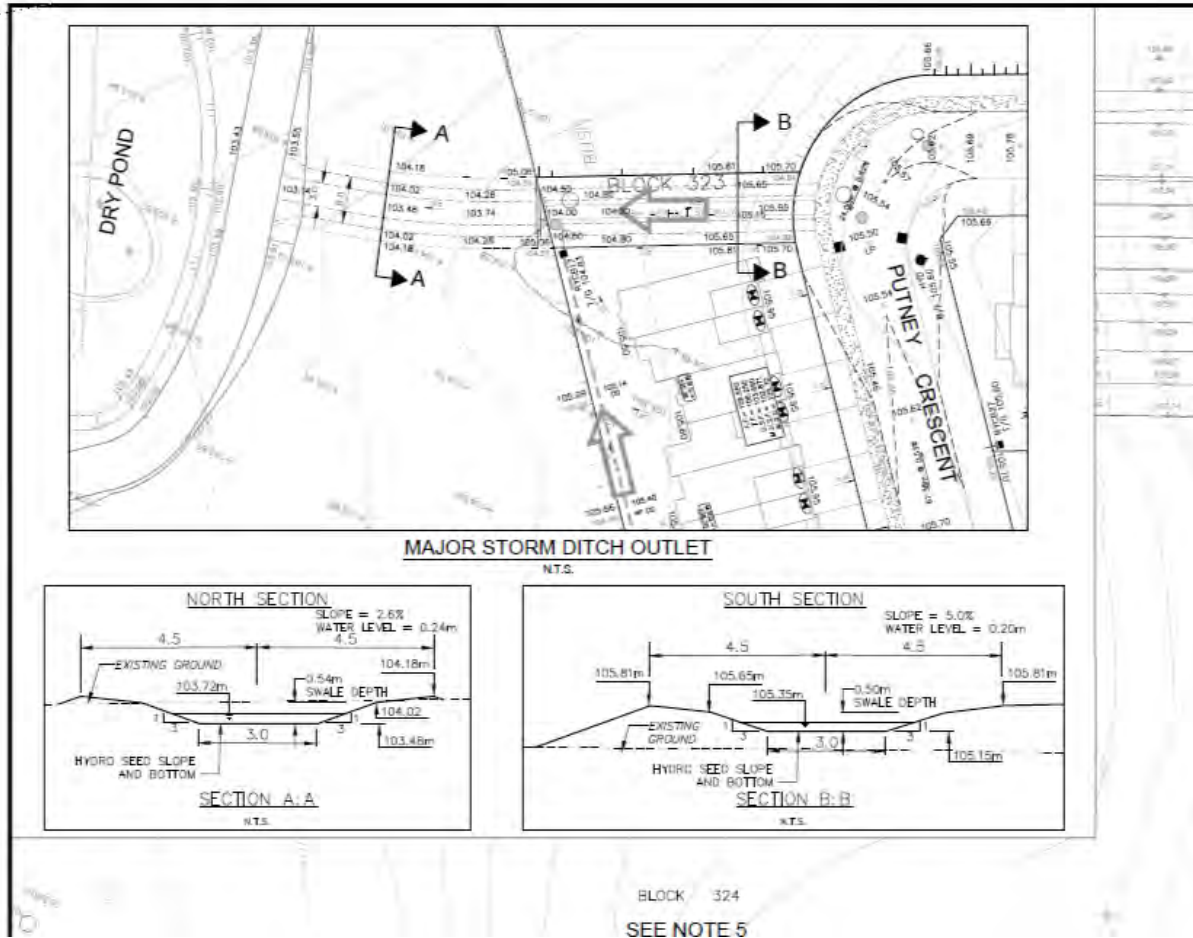
613-580-2424, Ext/poste 28318
Kathy.rygus@ottawa.ca

'
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SERVICING: Preconsultation Notes Block 324, Plan 4M-1619 (Putney Crescent)

From a servicing standpoint, sanitary and storm servicing was to be North of site however from the as-built drawings it would seem that the service laterals were not dropped for the site. An easement for the sewers will be required along North edge of site. It will be the owner's responsibility to make connections.





It will be important to coordinate grading tie in with Block 323 since this block conveys major overland flows. Site assigned runoff coefficient is as per CRT development Storm Drainage Area plan, which is 0.8 as indicated below.



List of required reports and plans is attached.

Fire Route will need to be circulated to emergency services to be adopted through by-law.

APPENDIX B

Water Demand Calculation
F.U.S. Calculation
Boundary Conditions
Hydraulic Model Output
126715-001 General Plan of Services

Boundary Conditions at CRT Lands

Information Provided:

Date provided: 16 Nov 2016

Criteria	Demand (L/s)
Average Demand	16.9
Maximum Daily Demand	36.9
Peak Hourly Demand	77.8
Fire Flow Demand	167
Fire Flow Demand	225
Maximum Daily + Fire Flow Demand	204 & 262

Location:



Results

Connection1:

Criteria	Head (m)	Pressure (psi)
Max HGL	161.1	75.8
PKHR	154.7	66.7
MXDY + Fire Flow (204 L/s)	152.8	64
MXDY + Fire Flow (262 L/s)	150.6	60.9

Connection2:

Criteria	Head (m)	Pressure (psi)
Max HGL	161.4	85.4
PKHR	154.8	76.0
MXDY + Fire Flow (204 L/s)	153	73.4
MXDY + Fire Flow (262 L/s)	150.9	70.5

Considerations

1. According to the City of Ottawa Water Design Guidelines as well as the Ontario Building Code, the maximum pressure at any point within a distribution system shall not exceed 80 psi in occupied areas. Measures should be taken to try to reduce the residual pressure below 80 psi without the use of special pressure control equipment. In circumstances where the residual pressure cannot be reduced below 80 psi without the use of pressure control equipment, a pressure reducing valve (**PRV**) should be installed at site.

Disclaimer

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



IBI GROUP
333 PRESTON STREET
OTTAWA, ONTARIO
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : CRT Phase 1 - Block 324
CLIENT : Claridge Homes

FILE: 126715
DATE PRINTED: 17-Jan-21
DESIGN: LE
PAGE: 1 OF 1

NODE	RESIDENTIAL				NON-RESIDENTIAL (ICI)			AVERAGE DAILY DEMAND (l/s)			MAXIMUM DAILY DEMAND (l/s)			MAXIMUM HOURLY DEMAND (l/s)			FIRE DEMAND (l/min)
	SINGLE FAMILY UNITS	TOWN HOUSE UNITS	MEDIUM DENSITY (ha)	POPULATION	INDUST. (ha)	COMM. (ha)	INSTIT. (ha)	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	RESIDENTIAL	ICI	TOTAL	
B01		4		10.80				0.04		0.04	0.11		0.11	0.24		0.24	
B02		7		18.90				0.08		0.08	0.19		0.19	0.42		0.42	
B03		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	
B04		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	
B06		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	
B07		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	
B08		3		8.10				0.03		0.03	0.08		0.08	0.18		0.18	
B09		9		24.30				0.10		0.10	0.25		0.25	0.54		0.54	
B10		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	
B11		5		13.50				0.05		0.05	0.14		0.14	0.30		0.30	
B12		4		10.80				0.04		0.04	0.11		0.11	0.24		0.24	
B50		6		16.20				0.07		0.07	0.16		0.16	0.36		0.36	11,000
B52		12		32.40				0.13		0.13	0.33		0.33	0.72		0.72	11,000
B54		12		32.40				0.13		0.13	0.33		0.33	0.72		0.72	11,000
B56		12		32.40				0.13		0.13	0.33		0.33	0.72		0.72	11,000
B58																	11,000
B60		8		21.60				0.09		0.09	0.22		0.22	0.48		0.48	11,000
Total		112		302				1.23		1.23	3.06		3.06	6.74		6.74	

POPULATION DENSITY		WATER DEMAND RATES		PEAKING FACTORS		FIRE DEMANDS	
Single Family	3.4 persons/unit	Residential	350 l/cap/day	Maximum Daily		Single Family	10,000 l/min (166.7 l/s)
Semi Detached & Townhouse	2.7 persons/unit	Commercial Shopping Center	2,500 L/(1000m ²)day	Residential	2.5 x avg. day	Semi Detached & Townhouse	11,000 l/min (183.3 l/s)
Medium Density	1.8 persons/unit			Commercial	1.5 x avg. day		
				Maximum Hourly			
				Residential	2.2 x avg. day		
				Commercial	1.8 x avg. day		

Fire Flow Requirement from Fire Underwriters Survey

12 Unit Block With Firewall - 4 Unit Fire Areas

Building Floor Area

floor area (4 units)	218.0 m ²
stories	3
Area	654.0 m ²

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

C	1.5	C =	1.5 wood frame
A	654 m ²		1.0 ordinary
			0.8 non-combustible
F	8,439 l/min		0.6 fire-resistive
use	8,000 l/min		

Occupancy Adjustment

Use	-15%	-25% non-combustible
		-15% limited combustible
		0% combustible
		+15% free burning
		+25% rapid burning
Adjustment	-1200 l/min	
Fire flow	6,800 l/min	

Sprinkler Adjustment

Use	0%
Adjustment	0 l/min

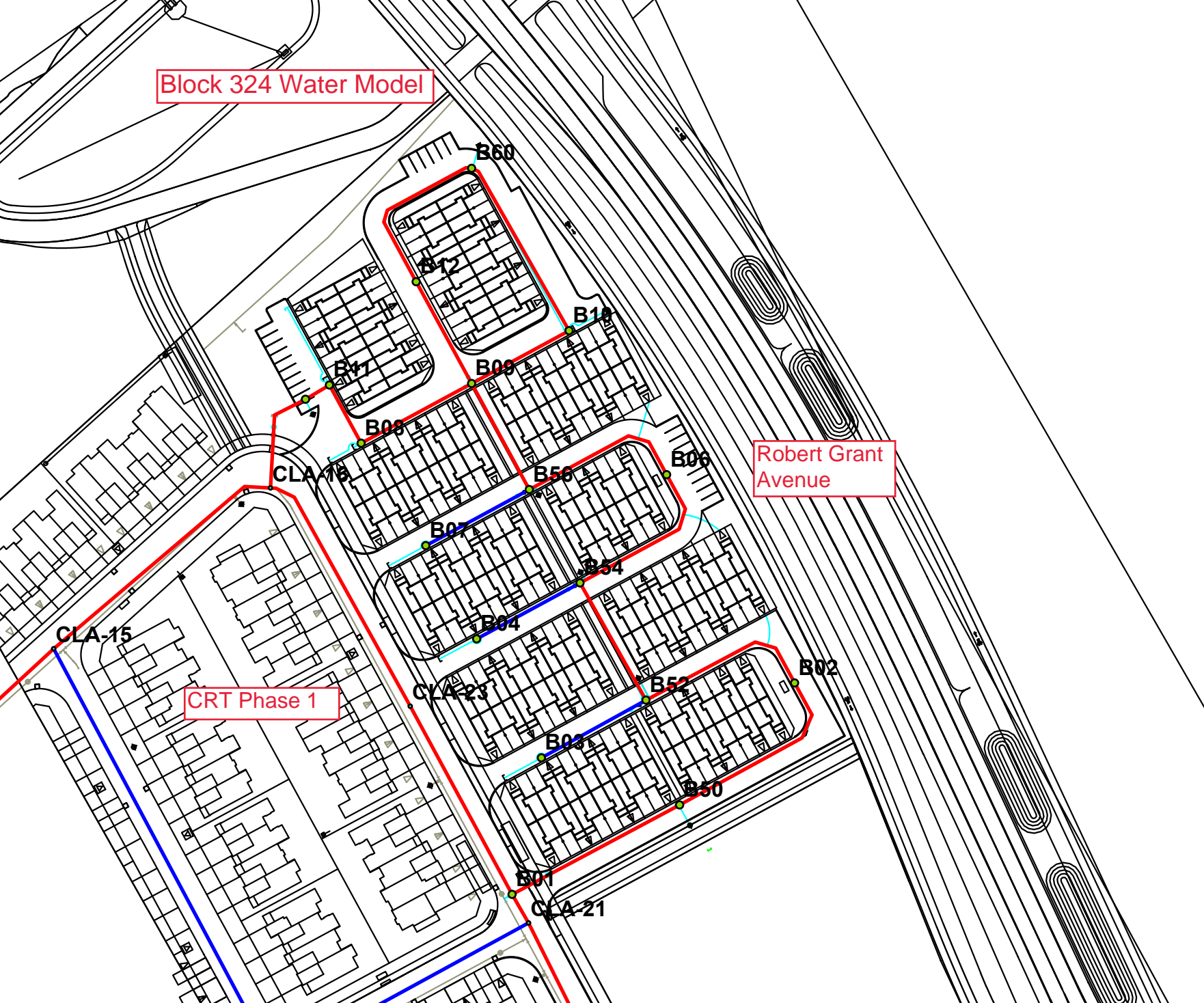
Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	13.0	39.0	3	117	15%
east	8.0	20.0	3	60	19%
south	13.0	39.0	3	117	15%
west	2 hour rated firewall				10%
Total					59%

Adjustment	4,012 l/min
Total adjustments	4,012 l/min
Fire flow	10,812 l/min
Use	11,000 l/min
	183.3 l/s

* Exposure charges from Technical Bulletin ISTB 2018-02 Appendix H (ISO Method)

Block 324 Water Model



Robert Grant Avenue

CRT Phase 1

CLA-15

CLA-16

CLA-21

CLA-23

B60

B12

B10

B09

B11

B08

B56

B06

B07

B54

B04

B02

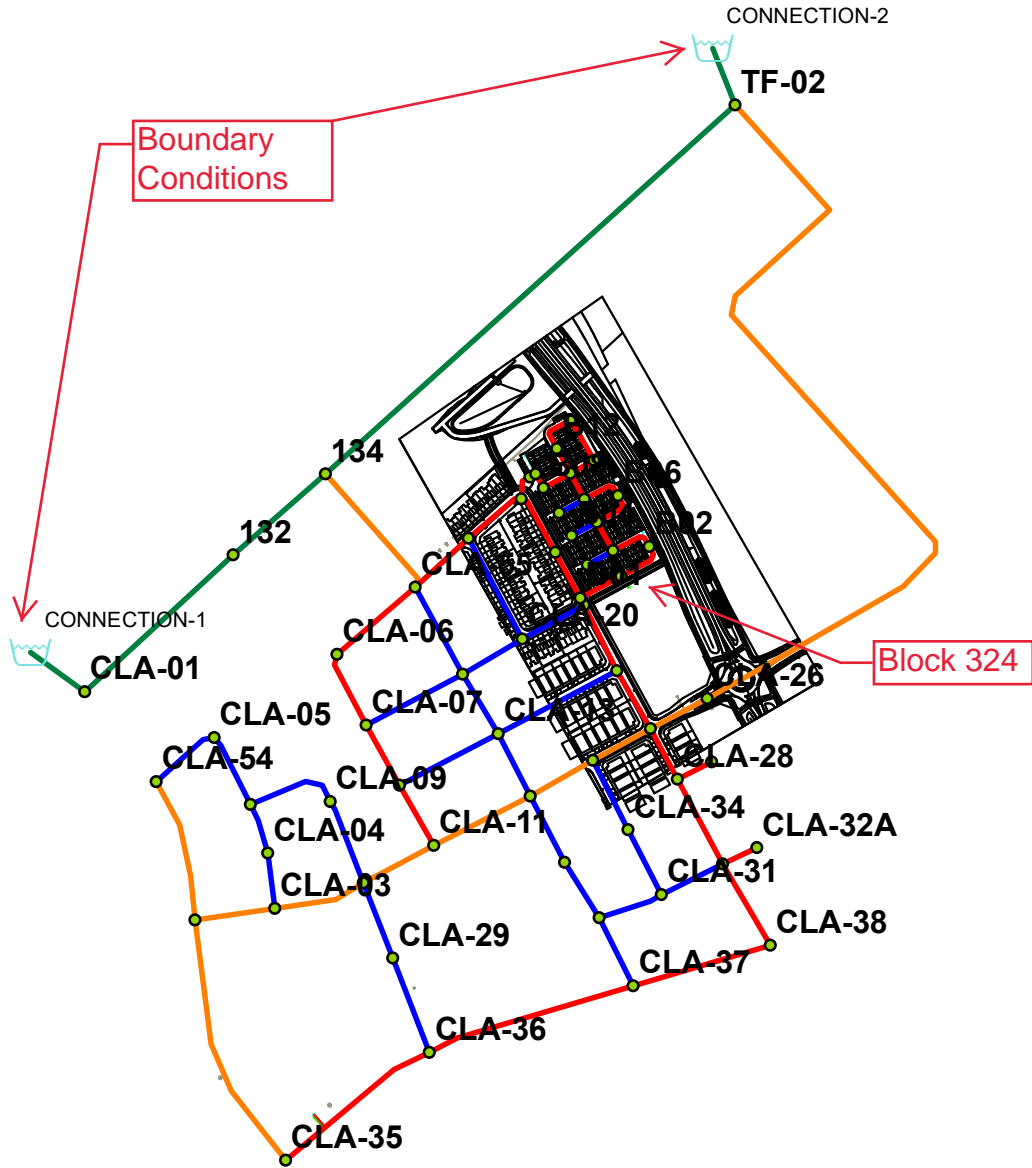
B52

B05

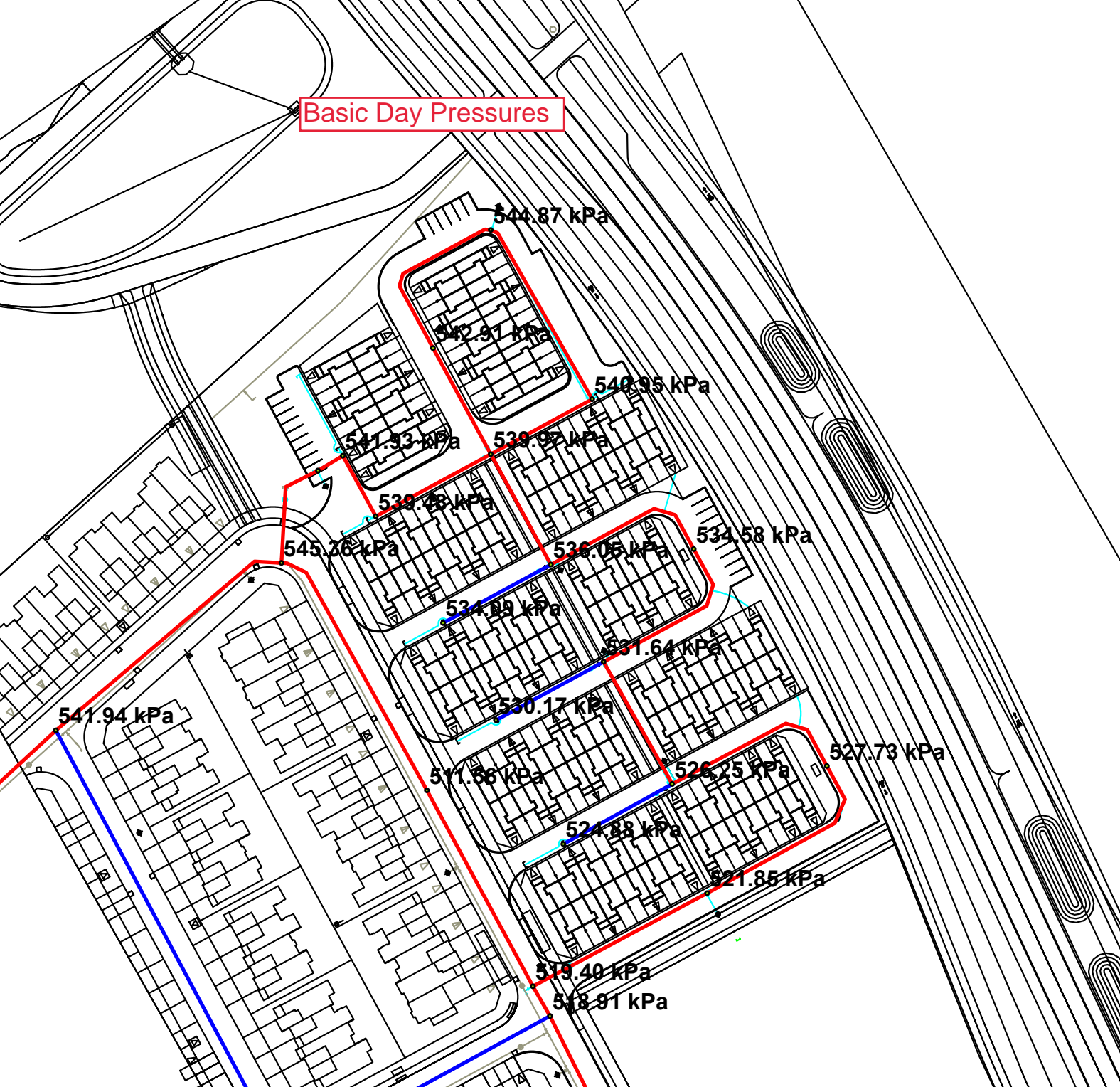
B50

B01

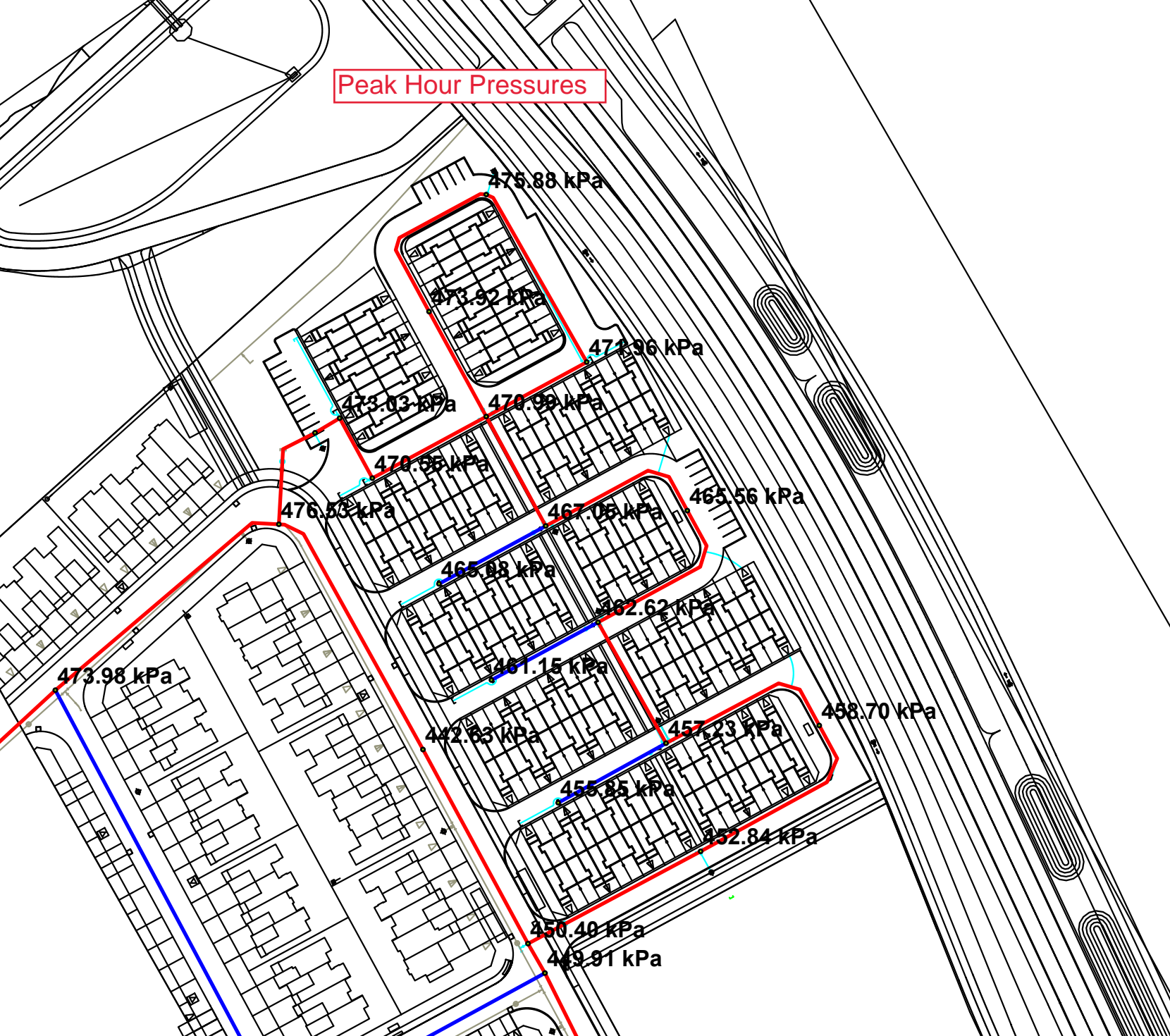
CRT Phase 1 Water Model



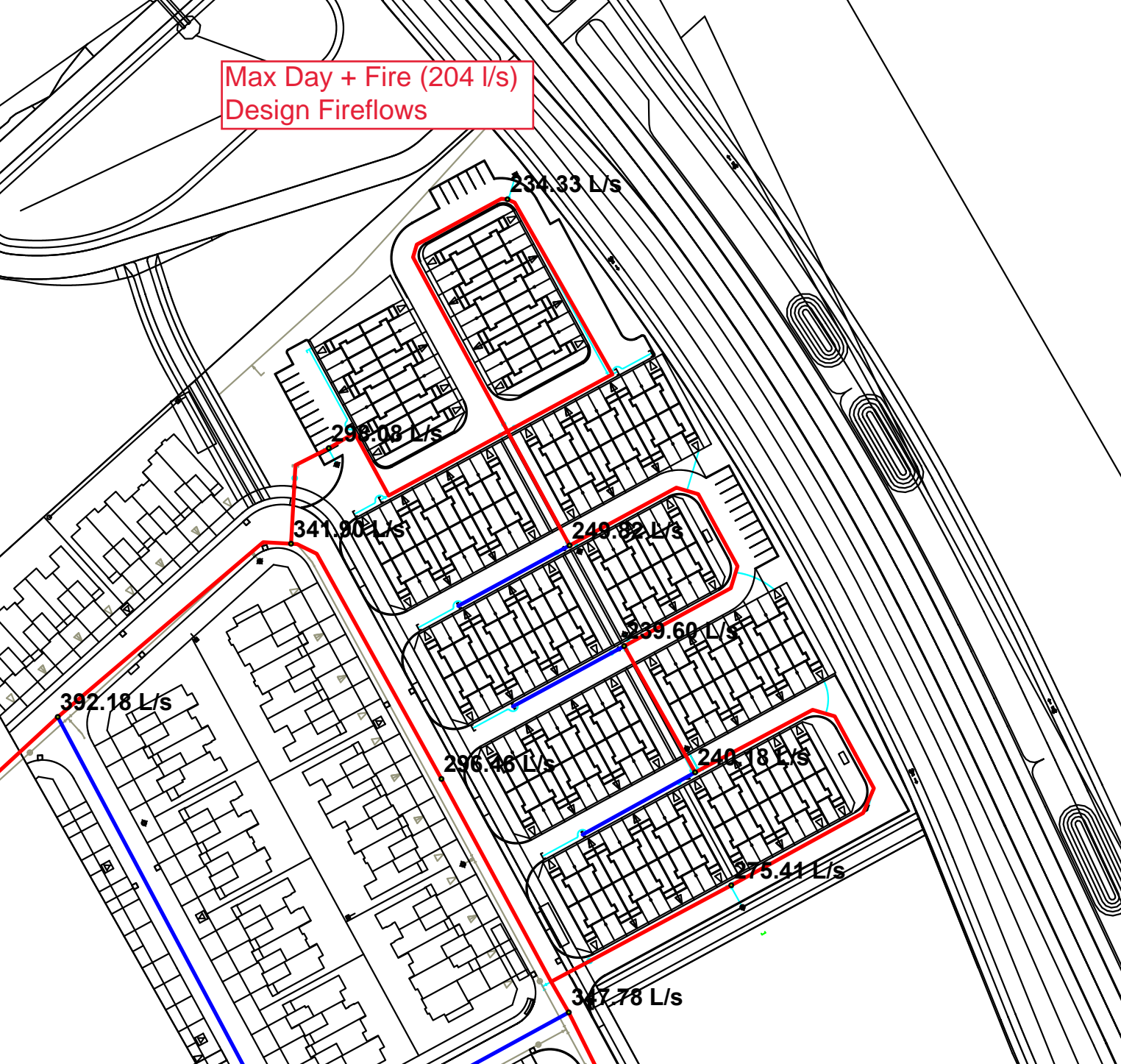
Basic Day Pressures



Peak Hour Pressures



Max Day + Fire (204 l/s)
Design Fireflows



Basic Day (Max HGL) - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	<input type="checkbox"/>	132	0.00	107.60	161.17	524.90
2	<input type="checkbox"/>	134	0.00	107.60	161.21	525.29
3	<input type="checkbox"/>	B01	0.04	108.20	161.20	519.40
4	<input type="checkbox"/>	B02	0.08	107.35	161.20	527.73
5	<input type="checkbox"/>	B03	0.07	107.64	161.20	524.88
6	<input type="checkbox"/>	B04	0.07	107.10	161.20	530.17
7	<input type="checkbox"/>	B06	0.07	106.65	161.20	534.58
8	<input type="checkbox"/>	B07	0.07	106.70	161.20	534.09
9	<input type="checkbox"/>	B08	0.03	106.15	161.20	539.48
10	<input type="checkbox"/>	B09	0.10	106.10	161.20	539.97
11	<input type="checkbox"/>	B10	0.07	106.00	161.20	540.95
12	<input type="checkbox"/>	B11	0.05	105.90	161.20	541.93
13	<input type="checkbox"/>	B12	0.04	105.80	161.20	542.91
14	<input type="checkbox"/>	B50	0.07	107.95	161.20	521.85
15	<input type="checkbox"/>	B52	0.13	107.50	161.20	526.25
16	<input type="checkbox"/>	B54	0.13	106.95	161.20	531.64
17	<input type="checkbox"/>	B56	0.13	106.50	161.20	536.05
18	<input type="checkbox"/>	B58	0.00	106.00	161.20	540.95
19	<input type="checkbox"/>	B60	0.09	105.60	161.20	544.87
20	<input type="checkbox"/>	CLA-01	0.00	107.60	161.10	524.26
21	<input type="checkbox"/>	CLA-02	0.21	107.70	161.20	524.27
22	<input type="checkbox"/>	CLA-03	0.19	107.80	161.20	523.30
23	<input type="checkbox"/>	CLA-04	0.12	107.70	161.20	524.27
24	<input type="checkbox"/>	CLA-05	0.11	108.10	161.20	520.35
25	<input type="checkbox"/>	CLA-06	0.19	107.00	161.20	531.16
26	<input type="checkbox"/>	CLA-07	0.19	108.55	161.20	515.97
27	<input type="checkbox"/>	CLA-08	0.23	108.30	161.20	518.42
28	<input type="checkbox"/>	CLA-09	0.12	108.10	161.20	520.36
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30	<input type="checkbox"/>	CLA-11	0.22	108.15	161.20	519.89
31	<input type="checkbox"/>	CLA-12	0.15	108.35	161.21	517.95
32	<input type="checkbox"/>	CLA-13	0.28	109.20	161.21	509.61
33	<input type="checkbox"/>	CLA-14	0.31	109.20	161.20	509.60
34	<input type="checkbox"/>	CLA-15	0.33	105.90	161.20	541.94
35	<input type="checkbox"/>	CLA-16	0.69	105.55	161.20	545.36
36	<input type="checkbox"/>	CLA-20	0.26	108.50	161.20	516.46
37	<input type="checkbox"/>	CLA-21	0.14	108.25	161.20	518.91
38	<input type="checkbox"/>	CLA-22	0.19	109.10	161.21	510.61
39	<input type="checkbox"/>	CLA-23	0.10	109.00	161.20	511.56
40	<input type="checkbox"/>	CLA-24	0.18	108.75	161.21	514.06
41	<input type="checkbox"/>	CLA-25	0.08	108.80	161.21	513.60
42	<input type="checkbox"/>	CLA-26	0.44	109.00	161.22	511.76
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44	<input type="checkbox"/>	CLA-28	0.25	108.60	161.21	515.50
45	<input type="checkbox"/>	CLA-28A	0.28	108.60	161.21	515.50
46	<input type="checkbox"/>	CLA-29	0.10	107.50	161.20	526.21
47	<input type="checkbox"/>	CLA-30	0.14	107.95	161.20	521.80
48	<input type="checkbox"/>	CLA-31	0.17	108.05	161.20	520.82
49	<input type="checkbox"/>	CLA-32	0.21	108.15	161.20	519.84
50	<input type="checkbox"/>	CLA-32A	0.28	108.15	161.20	519.84

Peak Hour - Junction Report

		ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (kPa)
1	<input type="checkbox"/>	132	0.00	107.60	154.69	461.46
2	<input type="checkbox"/>	134	0.00	107.60	154.69	461.41
3	<input type="checkbox"/>	B01	0.24	108.20	154.16	450.40
4	<input type="checkbox"/>	B02	0.42	107.35	154.16	458.70
5	<input type="checkbox"/>	B03	0.36	107.64	154.16	455.85
6	<input type="checkbox"/>	B04	0.36	107.10	154.16	461.15
7	<input type="checkbox"/>	B06	0.36	106.65	154.16	465.56
8	<input type="checkbox"/>	B07	0.36	106.70	154.16	465.08
9	<input type="checkbox"/>	B08	0.18	106.15	154.17	470.55
10	<input type="checkbox"/>	B09	0.54	106.10	154.16	470.99
11	<input type="checkbox"/>	B10	0.36	106.00	154.16	471.96
12	<input type="checkbox"/>	B11	0.30	105.90	154.17	473.03
13	<input type="checkbox"/>	B12	0.24	105.80	154.16	473.92
14	<input type="checkbox"/>	B50	0.36	107.95	154.16	452.84
15	<input type="checkbox"/>	B52	0.72	107.50	154.16	457.23
16	<input type="checkbox"/>	B54	0.72	106.95	154.16	462.62
17	<input type="checkbox"/>	B56	0.72	106.50	154.16	467.05
18	<input type="checkbox"/>	B58	0.00	106.00	154.17	472.07
19	<input type="checkbox"/>	B60	0.48	105.60	154.16	475.88
20	<input type="checkbox"/>	CLA-01	0.00	107.60	154.70	461.54
21	<input type="checkbox"/>	CLA-02	1.14	107.70	154.07	454.37
22	<input type="checkbox"/>	CLA-03	1.06	107.80	154.07	453.45
23	<input type="checkbox"/>	CLA-04	0.68	107.70	154.07	454.39
24	<input type="checkbox"/>	CLA-05	0.61	108.10	154.07	450.45
25	<input type="checkbox"/>	CLA-06	1.02	107.00	154.31	463.61
26	<input type="checkbox"/>	CLA-07	1.05	108.55	154.22	447.50
27	<input type="checkbox"/>	CLA-08	1.29	108.30	154.15	449.32
28	<input type="checkbox"/>	CLA-09	0.68	108.10	154.07	450.51
29	<input type="checkbox"/>	CLA-10	1.29	108.05	154.08	451.11
30	<input type="checkbox"/>	CLA-11	1.21	108.15	154.11	450.34
31	<input type="checkbox"/>	CLA-12	0.83	108.35	154.12	448.48
32	<input type="checkbox"/>	CLA-13	1.52	109.20	154.15	440.49
33	<input type="checkbox"/>	CLA-14	1.68	109.20	154.22	441.12
34	<input type="checkbox"/>	CLA-15	1.80	105.90	154.27	473.98
35	<input type="checkbox"/>	CLA-16	3.79	105.55	154.18	476.53
36	<input type="checkbox"/>	CLA-20	1.44	108.50	154.21	447.89
37	<input type="checkbox"/>	CLA-21	0.78	108.25	154.16	449.91
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44	<input type="checkbox"/>	CLA-28	1.36	108.60	154.08	445.68
45	<input type="checkbox"/>	CLA-28A	1.52	108.60	154.08	445.67
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47	<input type="checkbox"/>	CLA-30	0.76	107.95	154.03	451.55
48	<input type="checkbox"/>	CLA-31	0.91	108.05	154.03	450.58
49	<input type="checkbox"/>	CLA-32	1.14	108.15	154.02	449.51
50	<input type="checkbox"/>	CLA-32A	1.52	108.15	154.02	449.50

Max Day + Fire (204 l/s) - Fireflow Design Report

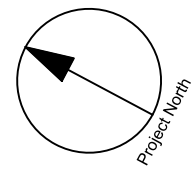
		ID	Total Demand (L/s)	Available Flow at Hydrant (L/s)	Critical Node ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Design Flow (L/s)	Design Pressure (kPa)	Design Fire Node Pressure (kPa)
1	<input type="checkbox"/>	B50	183.46	275.41	B50	139.96	122.23	275.41	139.96	140.01
2	<input type="checkbox"/>	B52	183.63	240.18	B52	139.96	121.78	240.18	139.96	139.98
3	<input type="checkbox"/>	B54	183.63	239.60	B54	139.96	121.23	239.60	139.96	139.98
4	<input type="checkbox"/>	B56	183.63	249.82	B56	139.96	120.78	249.82	139.96	139.99
5	<input type="checkbox"/>	B58	183.30	298.08	B58	139.96	120.28	298.08	139.96	139.96
6	<input type="checkbox"/>	B60	183.52	234.33	B60	139.96	119.88	234.33	139.96	139.98
7	<input type="checkbox"/>	CLA-02	167.19	310.45	CLA-54	138.83	122.07	309.79	139.96	141.10
8	<input type="checkbox"/>	CLA-03	167.15	325.34	CLA-03	139.96	122.08	325.35	139.96	139.96
9	<input type="checkbox"/>	CLA-04	166.98	190.58	CLA-04	139.96	121.98	190.58	139.96	139.97
10	<input type="checkbox"/>	CLA-05	166.95	171.50	CLA-05	139.96	122.38	171.50	139.96	139.96
11	<input type="checkbox"/>	CLA-06	167.13	347.90	CLA-06	139.96	121.28	347.90	139.96	139.96
12	<input type="checkbox"/>	CLA-07	167.15	352.62	CLA-07	139.96	122.83	352.62	139.96	139.96
13	<input type="checkbox"/>	CLA-08	167.26	358.68	CLA-08	139.96	122.58	358.68	139.96	139.96
14	<input type="checkbox"/>	CLA-09	166.98	166.01	CLA-09	139.96	122.38	166.01	139.96	139.96
15	<input type="checkbox"/>	CLA-10	167.26	352.00	CLA-09	139.83	122.37	351.91	139.96	140.10
16	<input type="checkbox"/>	CLA-11	167.22	388.47	CLA-11	139.96	122.43	388.47	139.96	139.96
17	<input type="checkbox"/>	CLA-12	167.05	406.86	CLA-12	139.96	122.63	406.86	139.96	139.96
18	<input type="checkbox"/>	CLA-13	167.36	303.12	CLA-13	139.96	123.48	303.12	139.96	139.96
19	<input type="checkbox"/>	CLA-14	167.44	320.82	CLA-14	139.96	123.48	320.82	139.96	139.96
20	<input type="checkbox"/>	CLA-15	167.49	392.18	CLA-15	139.96	120.18	392.18	139.96	139.96
21	<input type="checkbox"/>	CLA-16	168.39	341.90	CLA-16	139.96	119.83	341.90	139.96	139.96
22	<input type="checkbox"/>	CLA-20	167.33	264.94	CLA-20	139.96	122.78	264.94	139.96	140.00
23	<input type="checkbox"/>	CLA-21	167.03	347.78	CLA-21	139.96	122.53	347.78	139.96	139.96
24	<input type="checkbox"/>	CLA-22	167.15	360.57	CLA-22	139.96	123.38	360.57	139.96	139.96
25	<input type="checkbox"/>	CLA-23	166.92	296.46	CLA-23	139.96	123.28	296.46	139.96	139.96
26	<input type="checkbox"/>	CLA-24	167.12	412.19	CLA-24	139.96	123.03	412.19	139.96	139.96
27	<input type="checkbox"/>	CLA-25	166.88	429.86	CLA-25	139.96	123.08	429.86	139.96	139.96
28	<input type="checkbox"/>	CLA-26	167.77	425.55	CLA-26	139.96	123.28	425.56	139.96	139.96
29	<input type="checkbox"/>	CLA-27	166.98	195.02	CLA-27	139.96	122.28	195.02	139.96	139.97
30	<input type="checkbox"/>	CLA-28	167.29	299.70	CLA-28	139.96	122.88	299.70	139.96	139.96
31	<input type="checkbox"/>	CLA-29	166.91	176.88	CLA-29	139.96	121.78	176.88	139.96	139.96
32	<input type="checkbox"/>	CLA-30	167.01	225.16	CLA-30	139.96	122.23	225.16	139.96	140.00
33	<input type="checkbox"/>	CLA-31	167.08	226.83	CLA-31	139.96	122.33	226.83	139.96	140.00
34	<input type="checkbox"/>	CLA-32	167.19	269.10	CLA-32	139.96	122.43	269.10	139.96	139.96
35	<input type="checkbox"/>	CLA-33	167.08	191.53	CLA-33	139.96	122.28	191.53	139.96	139.97
36	<input type="checkbox"/>	CLA-34	167.22	187.92	CLA-34	139.96	122.28	187.92	139.96	139.96
37	<input type="checkbox"/>	CLA-35	166.84	275.39	CLA-35	139.96	121.68	275.39	139.96	139.96
38	<input type="checkbox"/>	CLA-36	227.95	251.04	CLA-36	139.96	121.73	251.04	139.96	139.97
39	<input type="checkbox"/>	CLA-37	225.55	246.99	CLA-37	139.96	122.13	246.99	139.96	139.97
40	<input type="checkbox"/>	CLA-38	230.94	236.84	CLA-38	139.96	122.58	236.84	139.96	139.96
41	<input type="checkbox"/>	CLA-54	167.05	273.98	CLA-54	139.96	122.18	273.98	139.96	139.96
42	<input type="checkbox"/>	CLA-55	167.49	658.31	CLA-55	139.96	120.88	658.32	139.96	139.96

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/k-m)	Status	Flow Reversal Count
36		31	CLA-14	CLA-20	77.44	155.00	100.00	1.64	0.09	0.01	0.13	Open	0
37		33	CLA-20	CLA-21	79.13	155.00	100.00	3.58	0.19	0.04	0.55	Open	0
38		35	CLA-14	CLA-13	77.51	155.00	100.00	4.51	0.24	0.07	0.84	Open	0
39		37	CLA-08	CLA-13	124.48	155.00	100.00	0.46	0.02	0.00	0.01	Open	0
40		39	CLA-11	CLA-12	121.20	297.00	120.00	-8.31	0.12	0.01	0.08	Open	0
41		41	CLA-12	CLA-13	78.38	155.00	100.00	-3.19	0.17	0.03	0.44	Open	0
42		43	CLA-12	CLA-24	80.77	297.00	120.00	-9.95	0.14	0.01	0.11	Open	0
43		45	CLA-24	CLA-25	73.62	297.00	120.00	-15.09	0.22	0.02	0.24	Open	0
44		47	CLA-25	CLA-22	75.05	204.00	110.00	-3.30	0.10	0.01	0.10	Open	0
45		49	CLA-22	CLA-13	150.36	155.00	100.00	-0.27	0.01	0.00	0.00	Open	0
46		51	CLA-21	CLA-22	82.10	204.00	110.00	4.09	0.13	0.01	0.15	Open	0
47		53	CLA-30	CLA-33	72.99	155.00	100.00	-3.09	0.16	0.03	0.42	Open	0
48		55	CLA-30	CLA-31	74.77	155.00	100.00	-0.50	0.03	0.00	0.01	Open	0
49		57	CLA-31	CLA-34	81.48	155.00	100.00	-2.95	0.16	0.03	0.38	Open	0
50		59	CLA-31	CLA-32	76.20	155.00	100.00	1.54	0.08	0.01	0.12	Open	0
51		61	CLA-25	CLA-28	64.06	204.00	110.00	11.00	0.34	0.06	0.96	Open	0
52		63	CLA-32	CLA-38	105.48	204.00	110.00	7.00	0.21	0.04	0.42	Open	0
53		67	CLA-30	CLA-37	85.27	155.00	100.00	2.83	0.15	0.03	0.35	Open	0
54		69	CLA-37	CLA-38	159.94	204.00	110.00	3.81	0.12	0.02	0.13	Open	0
55		71	CLA-37	CLA-36	240.46	204.00	110.00	-2.19	0.07	0.01	0.05	Open	0
56		73	CLA-36	CLA-29	113.49	155.00	100.00	-2.61	0.14	0.03	0.30	Open	0
57		75	CLA-02	CLA-35	296.18	297.00	120.00	5.44	0.08	0.01	0.04	Open	0
58		77	CLA-35	CLA-36	202.13	204.00	110.00	5.06	0.15	0.05	0.23	Open	0
59		P11	B01	CLA-23	58.42	204.00	110.00	-3.34	0.10	0.01	0.11	Open	0
60		P13	B01	B50	51.80	204.00	110.00	1.81	0.06	0.00	0.03	Open	0
61		P15	B50	B02	54.83	204.00	110.00	1.45	0.04	0.00	0.02	Open	0
62		P17	B52	B02	50.42	204.00	110.00	-1.03	0.03	0.00	0.01	Open	0
63		P19	B52	B03	32.61	155.00	100.00	0.36	0.02	0.00	0.01	Open	0
64		P21	B52	B54	36.75	204.00	110.00	-0.05	0.00	0.00	0.00	Open	0
65		P23	B54	B04	32.09	155.00	100.00	0.36	0.02	0.00	0.01	Open	0
66		P25	B06	B54	47.17	204.00	110.00	1.13	0.03	0.00	0.01	Open	0
67		P27	B06	B56	46.76	204.00	110.00	-1.49	0.05	0.00	0.02	Open	0
68		P29	B56	B07	32.09	155.00	100.00	0.36	0.02	0.00	0.01	Open	0
69		P31	B56	B09	33.00	204.00	110.00	-2.57	0.08	0.00	0.07	Open	0
70		P33	B10	B09	30.26	204.00	110.00	-0.57	0.02	0.00	0.00	Open	0

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/k-m)	Status	Flow Reversal Count
71	<input type="checkbox"/>	P35	B09	B08	34.26	204.00	110.00	-4.19	0.13	0.01	0.16	Open	0
72	<input type="checkbox"/>	P37	B08	B11	18.13	204.00	110.00	-4.37	0.13	0.00	0.17	Open	0
73	<input type="checkbox"/>	P39	B11	B58	7.56	204.00	110.00	-4.67	0.14	0.00	0.20	Open	0
74	<input type="checkbox"/>	P41	B58	CLA-16	29.50	204.00	110.00	-4.67	0.14	0.01	0.20	Open	0
75	<input type="checkbox"/>	P43	B09	B12	31.63	204.00	110.00	0.51	0.02	0.00	0.00	Open	0
76	<input type="checkbox"/>	P45	B12	B60	47.91	204.00	110.00	0.27	0.01	0.00	0.00	Open	0
77	<input type="checkbox"/>	P47	B10	B60	52.09	204.00	110.00	0.21	0.01	0.00	0.00	Open	0



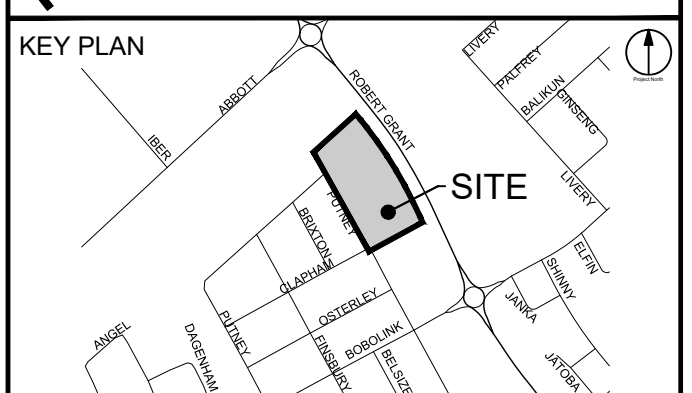
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ISSUES	No.	DESCRIPTION	DATE
	1	ISSUED TO CITY FOR REVIEW	2021-01-28

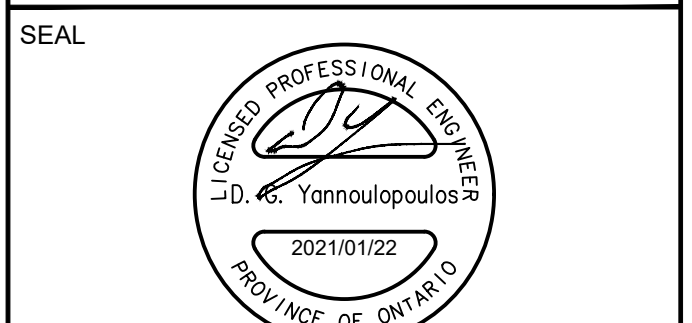
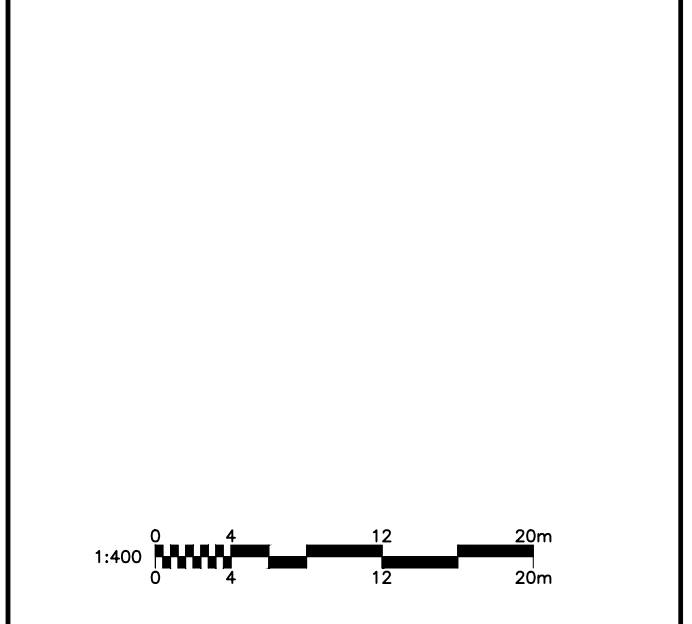
NOT FOR CONSTRUCTION

SEE PLAN NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS FOR DIMENSIONS. BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR AOV.



CONSULTANTS

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 ibigroup.com



PROJECT
 CRT
 BLOCK 324

PROJECT NO:
 126715

DRAWN BY:
 D.D. E.H.

CHECKED BY:
 DGY

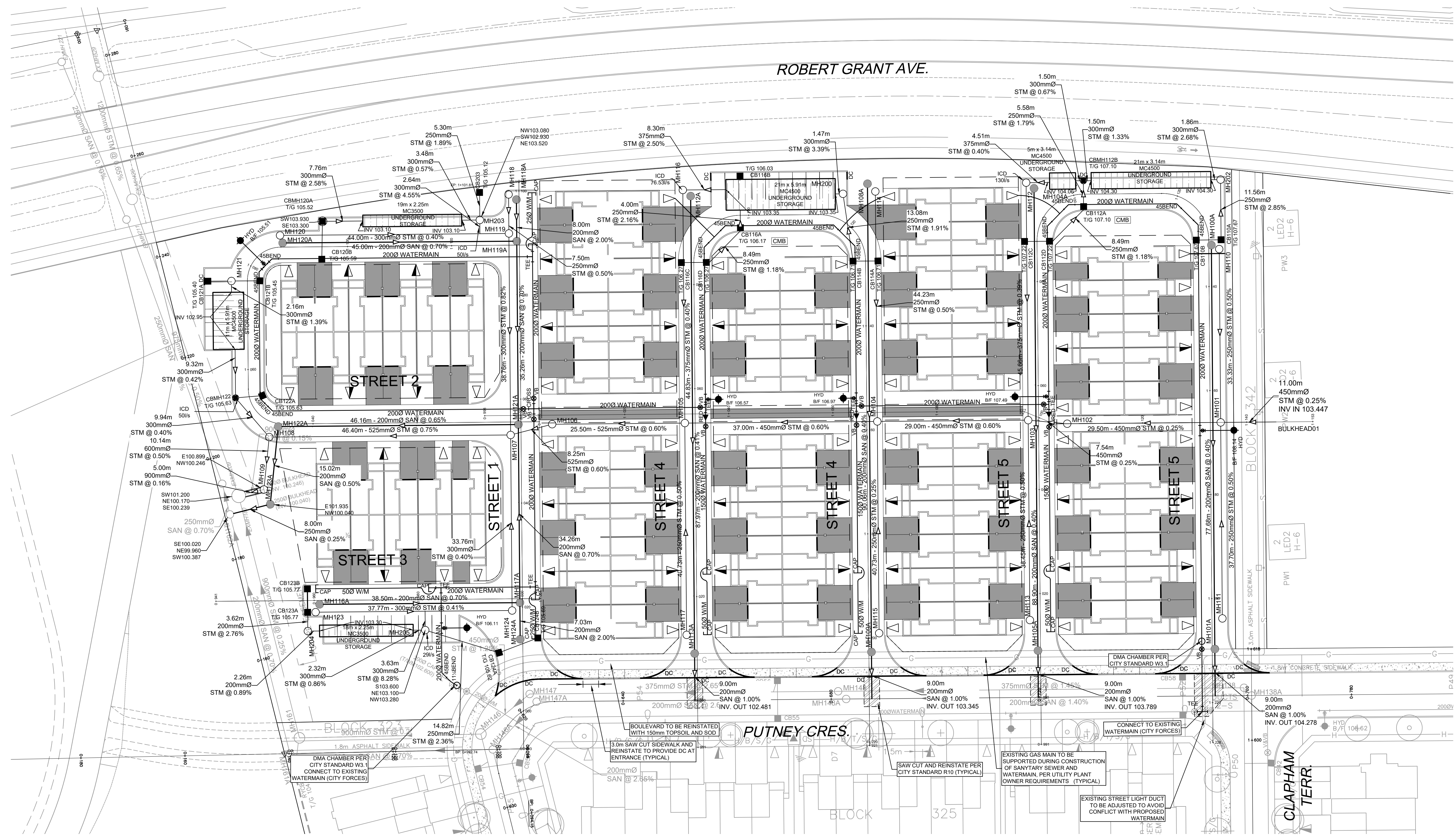
PROJECT MGR:
 DGY

APPROVED BY:
 DGY

SHEET TITLE
 GENERAL PLAN OF SERVICES

SHEET NUMBER
 001

ISSUE
 1



File Location: \\1128715_CRT_Block324\10_Production\103_Design\103_GeneralPlanOfServices.dwg Last Saved: January 22, 2021, by Elenne Pickett, Friday, January 22, 2021, 1:28:40 PM by Eric Henne

APPENDIX C

CRT Lands Phase 1 Sanitary Sewer Design Sheet (original)
CRT Lands Phase 1 Sanitary Sewer Design Sheet (updated criteria)
Blk 324 Sanitary Sewer Design Sheet
1267158-400 Blk 324 Sanitary Drainage Area Plan



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL								ICI AREAS								INFILTRATION ALLOWANCE		TOTAL FLOW	PROPOSED SEWER DESIGN									
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)			PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY						
				SF	SD	TH	APT		IND	CUM			IND	COMMERCIAL	INDUSTRIAL		IND	CUM								IND	CUM	L/s	L/s	L/s	(%)	
PUTNEY CRESCENT	141A	141A	142A			1		0.06	2.5	2.5	4.00	0.04							0.06	0.06	0.02	0.06	24.19	9.07	200	0.50	0.746	24.14	99.76			
PUTNEY CRESCENT	142A	142A	143A			11		0.35	27.5	30.0	4.00	0.49							0.35	0.41	0.11	0.60	47.16	55.56	200	1.90	1.454	46.56	98.73			
PUTNEY CRESCENT	143A	143A	144A			17		0.49	42.5	72.5	4.00	1.17							0.49	0.90	0.25	1.43	41.91	64.86	200	1.50	1.292	40.48	96.60			
FINSBURY AVENUE	136AA	136A	144A			21		0.65	52.5	52.5	4.00	0.85							0.65	0.65	0.18	1.03	53.56	110.44	200	2.45	1.652	52.52	98.07			
PUTNEY CRESCENT	144A	144A	145A			10		0.36	25.0	150.0	4.00	2.43							0.36	1.91	0.53	2.97	32.46	80.25	200	0.90	1.001	29.50	90.86			
CLAPHAM TERRACE	136AB	136A	137A			10		0.37	25.0	25.0	4.00	0.41							0.37	0.37	0.10	0.51	24.19	78.00	200	0.50	0.746	23.69	97.90			
BRIXTON WAY	137AA	137A	160A			12		0.35	30.0	55.0	4.00	0.89							0.35	0.72	0.20	1.09	41.91	50.77	200	1.50	1.292	40.81	97.39			
BRIXTON WAY	160A	160A	145A			18		0.54	45.0	100.0	4.00	1.62							0.54	1.26	0.35	1.97	52.45	78.53	200	2.35	1.617	50.48	96.24			
PUTNEY CRESCENT	145A	145A	146A			11		0.34	27.5	277.5	4.00	4.50							0.34	3.51	0.98	5.48	39.76	70.87	200	1.35	1.226	34.28	86.22			
CLAPHAM WAY	137AB	137A	138A			9		0.38	22.5	22.5	4.00	0.36							0.38	0.38	0.11	0.47	37.48	78.00	200	1.20	1.156	37.01	98.74			
PUTNEY CRESCENT	138A	138A	148A			10		0.35	25.0	47.5	4.00	0.77							0.35	0.73	0.20	0.97	40.49	77.95	200	1.40	1.248	39.51	97.59			
PUTNEY CRESCENT	148A	148A	147A			7		0.26	17.5	65.0	4.00	1.05							0.26	0.99	0.28	1.33	55.70	59.50	200	2.65	1.718	54.37	97.61			
PUTNEY CRESCENT	147A	147A	146A			0		0.03	0.0	65.0	4.00	1.05							0.03	1.02	0.29	1.34	55.70	12.47	200	2.65	1.718	54.36	97.60			
BLOCK 323	146A	146A	161A			0		0.03	0.0	342.5	4.00	5.55							0.03	4.56	1.28	6.83	28.63	38.97	200	0.70	0.883	21.80	76.15			
BLOCK 316	HYD. 2	161A	Ex.209			0		5.12	0.0	342.5	4.00	5.55							5.12	9.68	2.71	8.26	28.63	53.67	200	0.70	0.883	20.37	71.15			
BLOCK 324	RES.1	BULKHEAD	Ex.209					1.89	170.1	170.1	4.00	2.76							1.89	1.89	0.53	3.29	43.87	8.00	250	0.50	0.866	40.58	92.51			
Refer to ECA No. 9079-9LNNZC dated July 9, 2014 for description of existing sewers.																																
Design Parameters:				Notes:								Designed: J.I.M.								Revision		Date										
Residential				ICI Areas								Checked: P.K.								No.		Date										
SF	3.3	p/p/u		INST	50,000	L/Ha/day		Peak Factor	1.5																							
TH/SD	2.5	p/p/u		COM	50,000	L/Ha/day																										
APT	1.8	p/p/u		IND	35,000	L/Ha/day																										
Low	60	p/p/Ha																														
Med	75	p/p/Ha																														
High	90	p/p/Ha																														
1. Mannings coefficient (n) = 0.013												Dwg. Reference: 27970 - 501, 501A, 501B												File Reference: 27970.5.7.1		Date: 2017-07-14						
2. Demand (per capita): 350 L/day																																
3. Infiltration allowance: 0.28 L/s/Ha																																
4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = population in thousands																																



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL								ICI AREAS						INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN											
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)			PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY							
				SF	SD	TH	APT		IND	CUM			INSTITUTIONAL	COMMERCIAL	INDUSTRIAL		IND	CUM								IND	CUM	L/s	L/s	L/s	(%)		
CLAPHAM TERRACE	136AC	136A	135A			11		0.41	27.5	27.5	4.00	0.45							0.00	0.00	0.00	0.00	0.41	0.41	0.11	0.56	27.59	65.31	200	0.65	0.851	27.03	97.97
CLAPHAM TERRACE	135A	135A	134A			9		0.31	22.5	50.0	4.00	0.81							0.00	0.00	0.00	0.00	0.31	0.72	0.20	1.01	27.59	57.36	200	0.65	0.851	26.57	96.33
PUTNEY CRESCENT	141A	141A	134A			9		0.34	22.5	22.5	4.00	0.36							0.00	0.00	0.00	0.00	0.34	0.34	0.10	0.46	32.46	75.02	200	0.90	1.001	32.00	98.58
PUTNEY CRESCENT	134A	134A	140A	6				0.34	19.8	92.3	4.00	1.50							0.00	0.00	0.00	0.00	0.34	1.40	0.39	1.89	32.46	78.00	200	0.90	1.001	30.57	94.18
OSTERLEY WAY	153A	153A	152A	8				0.51	26.4	26.4	4.00	0.43							0.00	0.00	0.00	0.00	0.51	0.51	0.14	0.57	29.63	49.25	200	0.75	0.914	29.06	98.07
OSTERLEY WAY	152A	152A	151A	17				0.78	56.1	82.5	4.00	1.34							0.00	0.00	0.00	0.00	0.78	1.29	0.36	1.70	29.63	95.75	200	0.75	0.914	27.93	94.27
OSTERLEY WAY	151A	151A	150A	10				0.47	33.0	115.5	4.00	1.87							0.00	0.00	0.00	0.00	0.47	1.76	0.49	2.36	29.63	59.68	200	0.75	0.914	27.27	92.02
OSTERLEY WAY	150A	150A	140A	9				0.42	29.7	145.2	4.00	2.35							0.00	0.00	0.00	0.00	0.42	2.18	0.61	2.96	29.63	62.98	200	0.75	0.914	26.67	90.00
PUTNEY CRESCENT	140A	140A	124A	3				0.24	9.9	247.4	4.00	4.01							0.00	0.00	0.00	0.00	0.24	3.82	1.07	5.08	32.46	78.00	200	0.90	1.001	27.38	84.36
BLOCK 343	RES.2	BLKHD	129A					1.21	108.9	108.9	4.00	1.76							0.00	0.00	0.00	0.00	1.21	1.21	0.34	2.10	20.24	19.00	200	0.35	0.624	18.14	89.61
BOBOLINK RIDGE	129A	129A	128A	0				0.09	0.0	108.9	4.00	1.76							0.00	0.00	0.00	0.00	0.09	1.30	0.36	2.13	31.02	45.00	250	0.25	0.612	28.89	93.14
BOBOLINK RIDGE	128AA	128A	127A	6				0.41	19.8	128.7	4.00	2.09							0.00	0.00	0.00	0.00	0.41	1.71	0.48	2.56	31.02	78.00	250	0.25	0.612	28.46	91.73
BOBOLINK RIDGE	127AA	127A	126A	10				0.53	33.0	161.7	4.00	2.62							0.00	0.00	0.00	0.00	0.53	2.24	0.63	3.25	31.02	78.00	250	0.25	0.612	27.77	89.53
BOBOLINK RIDGE	126A	126A	125A	5				0.33	16.5	178.2	4.00	2.89							0.00	0.00	0.00	0.00	0.33	2.57	0.72	3.61	31.02	47.81	250	0.25	0.612	27.41	88.37
BOBOLINK RIDGE	125A	125A	124A	12				0.56	39.6	217.8	4.00	3.53							0.00	0.00	0.00	0.00	0.56	3.13	0.88	4.41	31.02	74.85	250	0.25	0.612	26.61	85.80
BOBOLINK RIDGE	124A	124A	123A	11				0.61	36.3	501.5	3.97	8.07							0.00	0.00	0.00	0.00	0.61	7.56	2.12	10.19	31.02	88.85	250	0.25	0.612	20.83	67.15
DAGENHAM STREET	PARK1, 131A	131A	130A	7				1.70	23.1	23.1	4.00	0.37							0.00	0.00	0.00	0.00	1.70	1.70	0.48	0.85	34.22	43.00	200	1.00	1.055	33.37	97.51
DAGENHAM STREET	130A	130A	123A	8				0.46	26.4	49.5	4.00	0.80							0.00	0.00	0.00	0.00	0.46	2.16	0.60	1.41	34.22	87.11	200	1.00	1.055	32.81	95.89
BOBOLINK RIDGE	123A	123A	122A	2				0.14	6.6	557.6	3.95	8.92							0.00	0.00	0.00	0.00	0.14	9.86	2.76	11.68	31.02	25.98	250	0.25	0.612	19.34	62.34
BOBOLINK RIDGE	122A	122A	121A	5				0.26	16.5	574.1	3.94	9.17							0.00	0.00	0.00	0.00	0.26	10.12	2.83	12.00	31.02	36.36	250	0.25	0.612	19.02	61.31
BOBOLINK RIDGE	121A	121A	120A	6				0.30	19.8	593.9	3.93	9.47							0.00	0.00	0.00	0.00	0.30	10.42	2.92	12.38	31.02	40.43	250	0.25	0.612	18.64	60.08
ANGEL HEIGHTS	111A	111A	112A	1				0.08	3.3	3.3	4.00	0.05							0.00	0.00	0.00	0.00	0.08	0.08	0.02	0.08	28.63	12.92	200	0.70	0.883	28.55	99.73
ANGEL HEIGHTS	112A	112A	113A	13				0.77	42.9	46.2	4.00	0.75							0.00	0.00	0.00	0.00	0.77	0.85	0.24	0.99	28.63	95.21	200	0.70	0.883	27.64	96.55
ANGEL HEIGHTS	113A	113A	114A	6				0.29	19.8	66.0	4.00	1.07							0.00	0.00	0.00	0.00	0.29	1.14	0.32	1.39	28.63	38.92	200	0.70	0.883	27.24	95.15
ANGEL HEIGHTS	114A	114A	120A	6				0.35	19.8	85.8	4.00	1.39							0.00	0.00	0.00	0.00	0.35	1.49	0.42	1.81	28.63	70.46	200	0.70	0.883	26.82	93.69
BOBOLINK RIDGE	120A	120A	105A	11				0.62	36.3	716.0	3.89	11.28							0.00	0.00	0.00	0.00	0.62	12.53	3.51	14.79	36.70	90.60	250	0.35	0.724	21.91	59.71

Design Parameters:				Notes:				Designed:				Revision				Date			
Residential		ICI Areas		1. Mannings coefficient (n) = 0.013		2. Demand (per capita): 350 L/day		3. Infiltration allowance: 0.28 L/s/Ha		4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+P^0.5)) where P = population in thousands		J.I.M.		No.		Date			
SF	3.3 p/p/u	INST	50,000 L/Ha/day	Peak Factor	1.5									1.	Submission No. 1 to City of Ottawa	2013-08-29			
TH/SD	2.5 p/p/u	COM	50,000 L/Ha/day											2.	Submission No. 2 to City of Ottawa	2014-01-22			
APT	1.8 p/p/u	IND	35,000 L/Ha/day											3.	Submission No. 3 to City of Ottawa	2014-08-22			
Low	60 p/p/Ha													4.	Submission No. 4 to City of Ottawa	2015-06-15			
Med	75 p/p/Ha													5.	Submission No. 5 to City of Ottawa	2016-11-10			
High	90 p/p/Ha													6.	Submission for MOE Approval	2017-02-10			
														7.	Resubmission for MOE Approval	2017-07-14			
															File Reference: 27970.5.7.1	Date: 2017-07-14			
																Sheet No: 2 of 4			



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL								ICI AREAS						INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN												
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)			PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY								
				SF	SD	TH	APT		IND	CUM			INSTITUTIONAL	COMMERCIAL	INDUSTRIAL		IND	CUM								IND	CUM	L/s	L/s	L/s	L/s			
EMBANKMENT STREET	128AB	128A	188A	16				0.74	52.8	52.8	4.00	0.86							0.74	0.74	0.21	1.06	27.59	98.00	200	0.65	0.851	26.52	96.15					
EMBANKMENT STREET	188A	188A	189A	11				0.52	36.3	89.1	4.00	1.44							0.52	1.26	0.35	1.80	27.59	74.80	200	0.65	0.851	25.79	93.49					
BLOCK 344	RES.3	192A	189A					1.52	136.8	136.8	4.00	2.22							1.52	1.52	0.43	2.64	20.24	40.00	200	0.35	0.624	17.60	86.95					
EMBANKMENT STREET	189A	189A	190A	14				0.69	46.2	272.1	4.00	4.41							0.69	3.47	0.97	5.38	20.24	92.53	200	0.35	0.624	14.86	73.42					
EMBANKMENT STREET	190A	190A	176A	0				0.00	0.0	272.1	4.00	4.41							0.00	3.47	0.97	5.38	20.24	10.78	200	0.35	0.624	14.86	73.42					
BLOCK 345	INST.2	BULKHEAD	176A	0				0.00	0.0	0.0	4.00	0.00							6.53	6.53	1.83	7.50	20.24	21.00	200	0.35	0.624	12.75	62.97					
COPE DRIVE	176A	176A	175A	3				0.63	9.9	282.0	4.00	4.57							6.53	0.00	0.00	5.67	6.53	10.63	2.98	13.21	20.24	76.03	200	0.35	0.624	7.03	34.72	
COPE DRIVE	175A	175A	174A	5				0.46	16.5	298.5	4.00	4.84							6.53	0.00	0.00	5.67	6.53	11.09	3.11	13.61	20.24	84.94	200	0.35	0.624	6.63	32.76	
BELSIZE WAY	127AB	127A	185A	11				0.53	36.3	36.3	4.00	0.59							0.00	0.00	0.00	0.00	0.53	0.53	0.15	0.74	27.59	88.50	200	0.65	0.851	26.85	97.33	
BELSIZE WAY	185A	185A	186A	13				0.59	42.9	79.2	4.00	1.28							0.00	0.00	0.00	0.00	0.59	1.12	0.31	1.60	27.59	83.61	200	0.65	0.851	25.99	94.21	
PINNER ROAD	191A	191A	186A	3				0.24	9.9	9.9	4.00	0.16							0.00	0.00	0.00	0.00	0.24	0.24	0.07	0.23	27.59	43.00	200	0.65	0.851	27.36	99.17	
PINNER ROAD	186A	186A	187A	5				0.35	16.5	105.6	4.00	1.71							0.00	0.00	0.00	0.00	0.35	1.71	0.48	2.19	20.24	70.39	200	0.35	0.624	18.05	89.18	
PINNER ROAD	187A	187A	183A	0				0.00	0.0	105.6	4.00	1.71							0.00	0.00	0.00	0.00	0.00	1.71	0.48	2.19	20.24	9.00	200	0.35	0.624	18.05	89.18	
FINSBURY AVENUE	182A	182A	183A	16				0.97	52.8	52.8	4.00	0.86							0.00	0.00	0.00	0.00	0.97	0.97	0.27	1.13	32.46	117.13	200	0.90	1.001	31.33	96.53	
FINSBURY AVENUE	183A	183A	184A	4				0.33	13.2	171.6	4.00	2.78							0.00	0.00	0.00	0.00	0.33	3.01	0.84	3.62	20.24	65.71	200	0.35	0.624	16.62	82.10	
FINSBURY AVENUE	184A	184A	174A	0				0.00	0.0	171.6	4.00	2.78							0.00	0.00	0.00	0.00	0.00	3.01	0.84	3.62	20.24	17.89	200	0.35	0.624	16.62	82.10	
COPE DRIVE	174A	174A	173A	7				0.47	23.1	493.2	3.98	7.95							6.53	0.00	0.00	5.67	0.47	14.57	4.08	17.69	31.02	82.90	250	0.25	0.612	13.33	42.96	
COPE DRIVE	173A	173A	172A	6				0.41	19.8	513.0	3.97	8.25							6.53	0.00	0.00	5.67	0.41	14.98	4.19	18.11	31.02	76.02	250	0.25	0.612	12.91	41.62	
BLOCK 313	INST.1	BULKHEAD	172A	0				0.00	0.0	0.0	4.00	0.00							2.88	2.88	0.00	0.00	2.50	2.88	2.88	0.81	3.31	20.24	16.00	200	0.35	0.624	16.94	83.67
COPE DRIVE	172A	172A	171B	3				0.23	9.9	522.9	3.96	8.40							9.41	0.00	0.00	8.17	0.23	18.09	5.07	21.63	31.02	36.96	250	0.25	0.612	9.39	30.27	
COPE DRIVE	171B	171B	171A	2				0.22	6.6	529.5	3.96	8.50							9.41	0.00	0.00	8.17	0.22	18.31	5.13	21.79	31.02	41.21	250	0.25	0.612	9.23	29.75	
DAGENHAM STREET	180A	180A	181A	7				0.50	23.1	23.1	4.00	0.37							0.00	0.00	0.00	0.00	0.50	0.50	0.14	0.51	20.24	90.00	200	0.35	0.624	19.73	97.46	
DAGENHAM STREET	181A	181A	171A	0				0.11	0.0	23.1	4.00	0.37							0.00	0.00	0.00	0.00	0.11	0.61	0.17	0.55	20.24	67.50	200	0.35	0.624	19.70	97.31	
COPE DRIVE	171A	171A	170B	1				0.17	3.3	555.9	3.95	8.90							9.41	0.00	0.00	8.17	0.17	19.09	5.35	22.41	45.12	37.91	300	0.20	0.618	22.71	50.33	
COPE DRIVE	170B	170B	170A	3				0.25	9.9	565.8	3.95	9.04							9.41	0.00	0.00	8.17	0.25	19.34	5.42	22.63	45.12	43.98	300	0.20	0.618	22.49	49.84	
BLOCK 312	RES.3A	BULKHEAD	sewer	0				3.26	195.6	195.6	4.00	3.17							0.00	0.00	0.00	0.00	3.26	3.26	0.91	4.08	20.24	16.22	200	0.35	0.624	16.16	79.83	
COPE DRIVE	170A	170A	110A	6				0.62	19.8	781.2	3.87	12.24							9.41	0.00	0.00	8.17	0.62	23.22	6.50	26.91	45.12	120.00	300	0.20	0.618	18.21	40.36	
GOLDHAWK DRIVE	306A	SOUTH	303A	31				1.83	102.3	102.3	4.00	1.66							0.00	0.00	0.00	0.00	1.83	1.83	0.51	2.17								
STREET NO. 26	304A	WEST	303A	14				0.69	46.2	46.2	4.00	0.75							0.00	0.00	0.00	0.00	0.69	0.69	0.19	0.94								
GOLDHAWK DRIVE	303A	303A	302A	10				0.62	33.0	181.5	4.00	2.94							0.00	0.00	0.00	0.00	0.62	3.14	0.88	3.82	20.24	94.58	200	0.35	0.624	16.42	81.13	
Future Street	RES.5, 5A, Park3	EAST	302A					23.97	1421.4	1421.4	3.70	21.28							0.00	0.00	0.00	0.00	23.97	23.97	6.71	28.00								
GOLDHAWK DRIVE	302A	302A	301A	10				0.56	33.0	1635.9	3.65	24.20							0.00	0.00	0.00	0.00	0.56	27.67	7.75	31.95	50.44	70.68	300	0.25	0.691	18.49	36.66	
GOLDHAWK DRIVE	301A	301A	207A	6				0.37	19.8	1655.7	3.65	24.47							0.00	0.00	0.00	0.00	0.37	28.04	7.85	32.32	50.44	70.00	300	0.25	0.691	18.12	35.93	
STREET NO. 2	RES.4	EAST	207A					13.88	832.8	832.8	3.85	12.99							0.00	0.00	0.00	0.00	13.88	13.88	3.89	16.87								
GOLDHAWK DRIVE	207A	207A	206A	17				0.86	56.1	2544.6	3.50	36.10							0.00	0.00	0.00	0.00	0.86	42.78	11.98	48.08	70.84	107.19	375	0.15	0.621	22.76	32.13	
GOLDHAWK DRIVE	206A	206A	205A	12				0.69	39.6	2584.2	3.50	36.60							0.00	0.00	0.00	0.00	0.69	43.47	12.17	48.78	70.84	106.61	375	0.15	0.621	22.07	31.15	
GOLDHAWK DRIVE	205A	205A	110A	5				0.44	16.5	2600.7	3.49	36.81							0.00	0.00	0.00	0.00	0.44	43.91	12.29	49.11	70.84	100.61	375	0.15	0.621	21.73	30.68	

Design Parameters: Residential SF 3.3 p/p/u TH/SD 2.5 p/p/u APT 1.8 p/p/u Low 60 p/p/Ha Med 75 p/p/Ha High 90 p/p/Ha ICI Areas INST 50,000 L/Ha/day COM 50,000 L/Ha/day IND 35,000 L/Ha/day MOE Chart Notes: 1. Manning's coefficient (n) = 0.013 2. Demand (per capita): 350 L/day 3. Infiltration allowance: 0.28 L/s/Ha 4. Residential Peaking Factor: Harmon Formula = $1 + (14 / (4 + P^{0.5}))$ where P = population in thousands	Designed: J.I.M. Checked: P.K. Dwg. Reference: 27970 - 501, 501A, 501B	<table border="1"> <thead> <tr> <th>No.</th> <th>Revision</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Submission No. 1 to City of Ottawa</td> <td>2013-08-29</td> </tr> <tr> <td>2.</td> <td>Submission No. 2 to City of Ottawa</td> <td>2014-01-22</td> </tr> <tr> <td>3.</td> <td>Submission No. 3 to City of Ottawa</td> <td>2014-08-22</td> </tr> <tr> <td>4.</td> <td>Submission No. 4 to City of Ottawa</td> <td>2015-06-15</td> </tr> <tr> <td>5.</td> <td>Submission No. 5 to City of Ottawa</td> <td>2016-11-10</td> </tr> <tr> <td>6.</td> <td>Submission for MOE Approval</td> <td>2017-02-10</td> </tr> <tr> <td>7.</td> <td>Resubmission for MOE Approval</td> <td>2017-07-14</td> </tr> </tbody> </table>	No.	Revision	Date	1.	Submission No. 1 to City of Ottawa	2013-08-29	2.	Submission No. 2 to City of Ottawa	2014-01-22	3.	Submission No. 3 to City of Ottawa	2014-08-22	4.	Submission No. 4 to City of Ottawa	2015-06-15	5.	Submission No. 5 to City of Ottawa	2016-11-10	6.	Submission for MOE Approval	2017-02-10	7.	Resubmission for MOE Approval	2017-07-14
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IBI Group
400-333 Preston Street
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL						ICI AREAS						INFILTRATION ALLOWANCE			TOTAL FLOW	PROPOSED SEWER DESIGN										
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)			PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY				
				SF	SD	TH	APT		IND	CUM			INSTITUTIONAL	COMMERCIAL	INDUSTRIAL		IND	CUM								IND	CUM	L/s	L/s	L/s
																			0.00											
		LSPS						0.00	0.0	0.0									108.00											
	STITTSVILLE 6 PS		110A					0.00	0.0	0.0									84.00											
Future Street	INST.3	BLKHD	110A					0.00	0.0	0.0			2.47	2.47	0.00	0.00	0.00	0.00												
	PARK4	BLKHD	110A					0.83	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
	PARK5	BLKHD	110A					1.04	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
	RES.9	BLKHD	110A					34.81	2610.8	2610.8				0.00	0.00	0.00	0.00	0.00												
	RES.7	BLKHD	110A					4.24	318.0	318.0				0.00	0.00	0.00	0.00	0.00												
	RES.13	BLKHD	110A					2.22	133.2	133.2				0.00	0.00	0.00	0.00	0.00												
	RES.12	BLKHD	110A					43.89	2633.4	2633.4				0.00	0.00	0.00	0.00	0.00												
	INST.4	BLKHD	110A					0.00	0.0	0.0			2.44	2.44	0.00	0.00	0.00	0.00												
	COMM.	BLKHD	110A					0.00	0.0	0.0				0.00	0.63	0.63	0.00	0.55												
	HYD.4	BLKHD	110A					3.06	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
	RES.8	BLKHD	110A					2.30	172.5	172.5				0.00	0.00	0.00	0.00	0.00												
	HYD.5	BLKHD	110A					5.20	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
Future Street	RES.11	BLKHD	110A					6.91	414.6	414.6				0.00	0.00	0.00	0.00	0.00												
	PARK6	BLKHD	110A					1.19	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
	RES.10	BLKHD	110A					1.92	115.2	115.2				0.00	0.00	0.00	0.00	0.00												
	HYD.3	BLKHD	110A					6.31	0.0	0.0				0.00	0.00	0.00	0.00	0.00												
	TOTAL	BLKHD	110A					113.92		6397.7	3.14	81.49		4.91		0.63	0.00	4.81	119.46	119.46	33.45	311.74	320.28	24.02	600	0.25	1.097	8.54	2.67	
GOLDHAWK DRIVE		110A	109A					0.00	0.0	9779.6	2.96	117.43		14.32		0.63	0.00	12.98	0.00	186.59	52.25	374.66	378.96	61.28	600	0.35	1.298	4.30	1.14	
GOLDHAWK DRIVE	110A	1101A	1092A	1				0.18	3.3	3.3	4.00	0.05							0.18	0.18	0.05	0.10	28.63	61.28	200	0.70	0.883	28.52	99.64	
GOLDHAWK DRIVE		109A	108A					0.00	0.0	9782.9	2.96	117.47		14.32		0.63	0.00	12.98	0.00	186.77	52.30	374.74	378.96	57.50	600	0.35	1.298	4.22	1.11	
GOLDHAWK DRIVE	109A	1091A	1082A	5				0.32	16.5	16.5	4.00	0.27						0.32	0.32	0.09	0.36	28.63	57.50	200	0.70	0.883	28.27	98.75		
GOLDHAWK DRIVE		108A	107A					0.00	0.0	9799.4	2.96	117.64		14.32		0.63	0.00	12.98	0.00	187.09	52.39	375.00	378.96	53.32	600	0.35	1.298	3.96	1.05	
GOLDHAWK DRIVE	108A	1081A	1072A	4				0.30	13.2	13.2	4.00	0.21					0.00	0.00	0.30	0.30	0.08	0.30	28.63	53.32	200	0.70	0.883	28.33	98.96	
GOLDHAWK DRIVE		107A	106A					0.00	0.0	9812.6	2.96	117.77		14.32		0.63	0.00	12.98	0.00	187.39	52.47	375.22	378.96	62.94	600	0.35	1.298	3.74	0.99	
GOLDHAWK DRIVE	107A	1071A	1062A	7				0.31	23.1	23.1	4.00	0.37		0.00	0.00	0.00	0.00	0.31	0.31	0.09	0.46	28.63	62.94	200	0.70	0.883	28.17	98.39		
GOLDHAWK DRIVE		106A	105A					0.00	0.0	9835.7	2.96	118.01		14.32		0.63	0.00	12.98	0.00	187.70	52.56	375.54	378.96	60.09	600	0.35	1.298	3.42	0.90	
GOLDHAWK DRIVE	106A	1061A	1052A	2				0.24	6.6	6.6	4.00	0.11		0.00	0.00	0.00	0.00	0.24	0.24	0.07	0.17	28.63	60.09	200	0.70	0.883	28.45	99.39		
		105A	104A					0.00	0.0	10558.3	2.93	125.37		14.32		0.63	0.00	12.98	0.00	200.47	56.13	386.48	389.64	72.85	600	0.37	1.335	3.16	0.81	
GOLDHAWK DRIVE	105A	1051A	1042A	7				0.45	23.1	23.1	4.00	0.37						0.45	0.45	0.13	0.50	27.59	72.85	200	0.65	0.851	27.09	98.19		
GOLDHAWK DRIVE		104A	103A					0.00	0.0	10581.4	2.93	125.60		14.32		0.63	0.00	12.98	0.00	200.92	56.26	386.84	389.64	48.77	600	0.37	1.335	2.80	0.72	
GOLDHAWK DRIVE	104A	1041A	1032A	9				0.47	29.7	29.7	4.00	0.48					0.00	0.00	0.47	0.47	0.13	0.61	27.59	48.77	200	0.65	0.851	26.97	97.78	
GOLDHAWK DRIVE		103A	102A					0.00	0.0	10611.1	2.93	125.90		14.32		0.63	0.00	12.98	0.00	201.39	56.39	387.27	389.64	45.00	600	0.37	1.335	2.37	0.61	
GOLDHAWK DRIVE	103A, HYD1	1031A	1021A	6				2.01	19.8	19.8	4.00	0.32					0.00	0.00	2.01	2.01	0.56	0.88	27.59	45.00	200	0.65	0.851	26.70	96.80	
GOLDHAWK DRIVE	102A	102A	FT-24 (EX)					0.12	0.0	10630.9	2.93	126.10		14.32		0.63	0.00	12.98	0.12	203.52	56.99	388.07	389.64	102.59	600	0.37	1.335	1.57	0.40	
HYDRO EASEMENT		FT-24 (EX)	FT-23 (EX)					0.00	0.0	10650.7	2.93	126.30		14.32		0.63	0.00	12.98	0.00	205.53	57.55	388.83	400.03	107.50	600	0.39	1.371	11.20	2.80	
Design Parameters:				Notes:								Designed:				No. Revision				Date										
Residential				1. Mannings coefficient (n) = 0.013								J.I.M.				1. Submission No. 1 to City of Ottawa				2013-08-29										
ICI Areas				2. Demand (per capita): 350 L/day								P.K.				2. Submission No. 2 to City of Ottawa				2014-01-22										
SF 3.3 p/p/u				3. Infiltration allowance: 0.28 L/s/Ha								Checked:				3. Submission No. 3 to City of Ottawa				2014-08-22										
TH/SD 2.5 p/p/u				4. Residential Peaking Factor:								Dwg. Reference:				4. Submission No. 4 to City of Ottawa				2015-06-15										
APT 1.8 p/p/u				Harmon Formula = 1+(14/(4+P^0.5))								27970 - 501, 501A, 501B				5. Submission No. 5 to City of Ottawa				2016-11-10										
Low 60 p/p/Ha				where P = population in thousands												6. Submission for MOE Approval				2017-02-10										
Med 75 p/p/Ha																7. Resubmission for MOE Approval				2017-07-14										
High 90 p/p/Ha																File Reference:				Date:										
																27970.5.7.1				2017-07-14										
																				Sheet No:										
																				4 of 4										



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL										ICI AREAS						INFILTRATION ALLOWANCE			PROPOSED SEWER DESIGN							
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM								L/s	(%)
PUTNEY CRESCENT	141A	141A	142A			1		0.06	2.5	2.5	4.00	0.03	0.00		0.00		0.00	0.00	0.00	0.06	0.06	0.02	0.05	24.19	9.07	200	0.50	0.746	24.14	99.78
PUTNEY CRESCENT	142A	142A	143A			11		0.35	27.5	30.0	4.00	0.39	0.00		0.00		0.00	0.00	0.35	0.41	0.14	0.52	47.16	55.56	200	1.90	1.454	46.64	98.89	
PUTNEY CRESCENT	143A	143A	144A			17		0.49	42.5	72.5	4.00	0.94	0.00		0.00		0.00	0.00	0.49	0.90	0.30	1.24	41.91	64.86	200	1.50	1.292	40.67	97.05	
FINSBURY AVENUE	136AA	136A	144A			21		0.65	52.5	52.5	4.00	0.68	0.00		0.00		0.00	0.00	0.65	0.65	0.21	0.90	53.56	110.44	200	2.45	1.652	52.66	98.33	
PUTNEY CRESCENT	144A	144A	145A			10		0.36	25.0	150.0	4.00	1.94	0.00		0.00		0.00	0.00	0.36	1.91	0.63	2.57	32.46	80.25	200	0.90	1.001	29.89	92.07	
CLAPHAM TERRACE	136AB	136A	137A			10		0.37	25.0	25.0	4.00	0.32	0.00		0.00		0.00	0.00	0.37	0.37	0.12	0.45	24.19	78.00	200	0.50	0.746	23.75	98.16	
BRIXTON WAY	137AA	137A	160A			12		0.35	30.0	55.0	4.00	0.71	0.00		0.00		0.00	0.00	0.35	0.72	0.24	0.95	41.91	50.77	200	1.50	1.292	40.96	97.73	
BRIXTON WAY	160A	160A	145A			18		0.54	45.0	100.0	4.00	1.30	0.00		0.00		0.00	0.00	0.54	1.26	0.42	1.71	52.45	78.53	200	2.35	1.617	50.74	96.74	
PUTNEY CRESCENT	145A	145A	146A			11		0.34	27.5	277.5	4.00	3.60	0.00		0.00		0.00	0.00	0.34	3.51	1.16	4.76	39.76	70.87	200	1.35	1.226	35.00	88.04	
CLAPHAM WAY	137AB	137A	138A			9		0.38	22.5	22.5	4.00	0.29	0.00		0.00		0.00	0.00	0.38	0.38	0.13	0.42	37.48	78.00	200	1.20	1.156	37.07	98.89	
PUTNEY CRESCENT	138A	138A	148A			10		0.35	25.0	47.5	4.00	0.62	0.00		0.00		0.00	0.00	0.35	0.73	0.24	0.86	40.49	77.95	200	1.40	1.248	39.63	97.88	
PUTNEY CRESCENT	148A	148A	147A			7		0.26	17.5	65.0	4.00	0.84	0.00		0.00		0.00	0.00	0.26	0.99	0.33	1.17	55.70	59.50	200	2.65	1.718	54.53	97.90	
PUTNEY CRESCENT	147A	147A	146A			0		0.03	0.0	65.0	4.00	0.84	0.00		0.00		0.00	0.00	0.03	1.02	0.34	1.18	55.70	12.47	200	2.65	1.718	54.52	97.88	
BLOCK 323	146A	146A	161A			0		0.03	0.0	342.5	4.00	4.44	0.00		0.00		0.00	0.00	0.03	4.56	1.50	5.94	28.63	38.97	200	0.70	0.883	22.68	79.23	
BLOCK 316	HYD. 2	161A	Ex. 209			0		5.12	0.0	342.5	4.00	4.44	0.00		0.00		0.00	0.00	5.12	9.68	3.19	7.63	28.63	53.67	200	0.70	0.883	20.99	73.33	
BLOCK 324	RES.1	BULKHEAD	Ex. 209			112		1.89	280.0	280.0	4.00	3.63	0.00		0.00		0.00	0.00	1.89	1.89	0.62	4.25	43.87	8.00	250	0.50	0.866	39.61	90.30	
Refer to ECA No. 9079-9LNNZC dated July 9, 2014 for description of existing sewers.																														
Design Parameters:				Notes:										Designed: J.I.M.						No. Revision			Date							
Residential				1. Manning coefficient (n) = 0.013										2. Demand (per capita): 280 L/day						1. Submission No. 1 to City of Ottawa			2013-08-29							
SF 3.3 p/p/u				3. Infiltration allowance: 0.33 L/s/Ha										Checked: P.K.						3. Submission No. 3 to City of Ottawa			2014-08-22							
TH/SD 2.5 p/p/u				4. Residential Peaking Factor:										Dwg. Reference: 27970 - 501, 501A, 501B						4. Submission No. 4 to City of Ottawa			2015-06-15							
APT 1.8 p/p/u				Harmon Formula = $1+(14/(4+P^{0.5}))$										7. Resubmission for MOE Approval						2016-11-10										
Low 60 p/p/Ha				where P = population in thousands										8. updated demand and infiltration allowance, updated population blk 324						5. Submission No. 5 to City of Ottawa			2017-02-10							
Med 75 p/p/Ha														File Reference: 27970.5.7.1						6. Resubmission for MOE Approval			2017-07-14							
High 90 p/p/Ha														Date: 2017-07-14						7. updated demand and infiltration allowance, updated population blk 324			2021-01-18							
Sheet No: 1 of 4																														



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL							ICI AREAS						INFILTRATION ALLOWANCE			TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PROPOSED SEWER DESIGN					
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)			PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)				DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY		
				SF	SD	TH	APT		IND	CUM			IND	CUM	IND		CUM	IND								CUM	IND	CUM
CLAPHAM TERRACE	136AC	136A	135A					11	0.41	27.5	27.5	4.00	0.36	0.00	0.00	0.00	0.00	0.41	0.41	0.14	0.49	27.59	65.31	200	0.65	0.851	27.09	98.22
CLAPHAM TERRACE	135A	135A	134A					9	0.31	22.5	50.0	4.00	0.65	0.00	0.00	0.00	0.31	0.72	0.24	0.89	27.59	57.36	200	0.65	0.851	26.70	96.79	
PUTNEY CRESCENT	141A	141A	134A					9	0.34	22.5	22.5	4.00	0.29	0.00	0.00	0.00	0.34	0.34	0.11	0.40	32.46	75.02	200	0.90	1.001	32.06	98.76	
PUTNEY CRESCENT	134A	134A	140A	6					0.34	19.8	92.3	4.00	1.20	0.00	0.00	0.00	0.34	1.40	0.46	1.66	32.46	78.00	200	0.90	1.001	30.80	94.89	
OSTERLEY WAY	153A	153A	152A	8					0.51	26.4	26.4	4.00	0.34	0.00	0.00	0.00	0.51	0.51	0.17	0.51	29.63	49.25	200	0.75	0.914	29.12	98.28	
OSTERLEY WAY	152A	152A	151A	17					0.78	56.1	82.5	4.00	1.07	0.00	0.00	0.00	0.78	1.29	0.43	1.50	29.63	95.75	200	0.75	0.914	28.14	94.95	
OSTERLEY WAY	151A	151A	150A	10					0.47	33.0	115.5	4.00	1.50	0.00	0.00	0.00	0.47	1.76	0.58	2.08	29.63	59.68	200	0.75	0.914	27.55	92.99	
OSTERLEY WAY	150A	150A	140A	9					0.42	29.7	145.2	4.00	1.88	0.00	0.00	0.00	0.42	2.18	0.72	2.60	29.63	62.98	200	0.75	0.914	27.03	91.22	
PUTNEY CRESCENT	140A	140A	124A	3					0.24	9.9	247.4	4.00	3.21	0.00	0.00	0.00	0.24	3.82	1.26	4.47	32.46	78.00	200	0.90	1.001	27.99	86.24	
BLOCK 343	RES.2	BLKHD	129A						1.21	108.9	108.9	4.00	1.41	0.00	0.00	0.00	1.21	1.21	0.40	1.81	20.24	19.00	200	0.35	0.624	18.43	91.05	
BOBOLINK RIDGE	129A	129A	128A	0					0.09	0.0	108.9	4.00	1.41	0.00	0.00	0.00	0.09	1.30	0.43	1.84	31.02	45.00	250	0.25	0.612	29.18	94.07	
BOBOLINK RIDGE	128AA	128A	127A	6					0.41	19.8	128.7	4.00	1.67	0.00	0.00	0.00	0.41	1.71	0.56	2.23	31.02	78.00	250	0.25	0.612	28.79	92.80	
BOBOLINK RIDGE	127AA	127A	126A	10					0.53	33.0	161.7	4.00	2.10	0.00	0.00	0.00	0.53	2.24	0.74	2.84	31.02	78.00	250	0.25	0.612	28.18	90.86	
BOBOLINK RIDGE	126A	126A	125A	5					0.33	16.5	178.2	4.00	2.31	0.00	0.00	0.00	0.33	2.57	0.85	3.16	31.02	47.81	250	0.25	0.612	27.86	89.82	
BOBOLINK RIDGE	125A	125A	124A	12					0.56	39.6	217.8	4.00	2.82	0.00	0.00	0.00	0.56	3.13	1.03	3.86	31.02	74.85	250	0.25	0.612	27.16	87.57	
BOBOLINK RIDGE	124A	124A	123A	11					0.61	36.3	501.5	3.97	6.46	0.00	0.00	0.00	0.61	7.56	2.49	8.95	31.02	88.85	250	0.25	0.612	22.07	71.14	
DAGENHAM STREET	PARK1_131A	131A	130A	7					1.70	23.1	23.1	4.00	0.30	0.00	0.00	0.00	1.70	1.70	0.56	0.86	34.22	43.00	200	1.00	1.055	33.36	97.49	
DAGENHAM STREET	130A	130A	123A	8					0.46	26.4	49.5	4.00	0.64	0.00	0.00	0.00	0.46	2.16	0.71	1.35	34.22	87.11	200	1.00	1.055	32.86	96.04	
BOBOLINK RIDGE	123A	123A	122A	2					0.14	6.6	557.6	3.95	7.14	0.00	0.00	0.00	0.14	9.86	3.25	10.39	31.02	25.98	250	0.25	0.612	20.63	66.50	
BOBOLINK RIDGE	122A	122A	121A	5					0.26	16.5	574.1	3.94	7.34	0.00	0.00	0.00	0.26	10.12	3.34	10.67	31.02	36.36	250	0.25	0.612	20.34	65.59	
BOBOLINK RIDGE	121A	121A	120A	6					0.30	19.8	593.9	3.93	7.57	0.00	0.00	0.00	0.30	10.42	3.44	11.01	31.02	40.43	250	0.25	0.612	20.01	64.50	
ANGEL HEIGHTS	111A	111A	112A	1					0.08	3.3	3.3	4.00	0.04	0.00	0.00	0.00	0.08	0.08	0.03	0.07	28.63	12.92	200	0.70	0.883	28.56	99.76	
ANGEL HEIGHTS	112A	112A	113A	13					0.77	42.9	46.2	4.00	0.60	0.00	0.00	0.00	0.77	0.85	0.28	0.88	28.63	95.21	200	0.70	0.883	27.75	96.93	
ANGEL HEIGHTS	113A	113A	114A	6					0.29	19.8	66.0	4.00	0.86	0.00	0.00	0.00	0.29	1.14	0.38	1.23	28.63	38.92	200	0.70	0.883	27.40	95.70	
ANGEL HEIGHTS	114A	114A	120A	6					0.35	19.8	85.8	4.00	1.11	0.00	0.00	0.00	0.35	1.49	0.49	1.60	28.63	70.46	200	0.70	0.883	27.02	94.40	
BOBOLINK RIDGE	120A	120A	105A	11					0.62	36.3	716.0	3.89	9.02	0.00	0.00	0.00	0.62	12.53	4.13	13.16	36.70	90.60	250	0.35	0.724	23.54	64.15	

Design Parameters:				Notes:				Designed:				No.				Revision				Date			
Residential		ICI Areas		Peak Factor		1. Mannings coefficient (n) = 0.013		3. Infiltration allowance: 0.33 L/s/Ha		J.I.M.		1.		Submission No. 1 to City of Ottawa		2013-08-29							
SF	3.3	p/p/u				Demand (per capita): 280 L/day						2.	Submission No. 2 to City of Ottawa		2014-01-22								
TH/SD	2.5	p/p/u	INST	50,000	L/Ha/day							3.	Submission No. 3 to City of Ottawa		2014-08-22								
APT	1.8	p/p/u	COM	50,000	L/Ha/day	4. Residential Peaking Factor:						4.	Submission No. 4 to City of Ottawa		2015-06-15								
Low	60	p/p/Ha	IND	35,000	L/Ha/day	Harmon Formula = 1+(14/(4+P^0.5))						5.	Submission No. 5 to City of Ottawa		2016-11-10								
Med	75	p/p/Ha				where P = population in thousands						6.	Submission for MOE Approval		2017-02-10								
High	90	p/p/Ha										7.	Resubmission for MOE Approval		2017-07-14								
												File Reference:		Date:		Sheet No:							
												27970.5.7.1		2017-07-14		2 of 4							



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

SANITARY SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

LOCATION				RESIDENTIAL								ICI AREAS						INFILTRATION ALLOWANCE			PROPOSED SEWER DESIGN									
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA (Ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	INSTITUTIONAL		COMMERCIAL		INDUSTRIAL		PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	TOTAL FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT		IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM								L/s	(%)
EMBANKMENT STREET	128AB	128A	188A	16				0.74	52.8	52.8	4.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.74	0.24	0.93	27.59	98.00	200	0.65	0.851	26.66	96.63
EMBANKMENT STREET	188A	188A	189A	11				0.52	36.3	89.1	4.00	1.16	0.00	0.00	0.00	0.00	0.00	0.00	0.52	1.26	0.42	1.57	27.59	74.80	200	0.65	0.851	26.02	94.31	
BLOCK 344	RES.3	192A	189A					1.52	136.8	136.8	4.00	1.77	0.00	0.00	0.00	0.00	0.00	0.00	1.52	1.52	0.50	2.27	20.24	40.00	200	0.35	0.624	17.97	88.76	
EMBANKMENT STREET	189A	189A	190A	14				0.69	46.2	272.1	4.00	3.53	0.00	0.00	0.00	0.00	0.00	0.00	0.69	3.47	1.15	4.67	20.24	92.53	200	0.35	0.624	15.57	76.92	
EMBANKMENT STREET	190A	190A	176A	0				0.00	0.0	272.1	4.00	3.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.47	1.15	4.67	20.24	10.78	200	0.35	0.624	15.57	76.92	
BLOCK 345	INST.2	BULKHEAD	176A	0				0.00	0.0	0.0	4.00	0.00	6.53	6.53	0.00	0.00	0.00	0.00	6.53	6.53	2.15	7.82	20.24	21.00	200	0.35	0.624	12.42	61.35	
COPE DRIVE	176A	176A	175A	3				0.63	9.9	282.0	4.00	3.66	0.00	0.00	0.00	0.00	0.00	0.00	0.63	10.63	3.51	12.83	20.24	76.03	200	0.35	0.624	7.41	36.61	
COPE DRIVE	175A	175A	174A	5				0.46	16.5	298.5	4.00	3.87	0.00	0.00	0.00	0.00	0.00	0.00	0.46	11.09	3.66	13.20	20.24	84.94	200	0.35	0.624	7.05	34.80	
BELSIZE WAY	127AB	127A	185A	11				0.53	36.3	36.3	4.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.53	0.17	0.65	27.59	88.50	200	0.65	0.851	26.94	97.66	
BELSIZE WAY	185A	185A	186A	13				0.59	42.9	79.2	4.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.59	1.12	0.37	1.40	27.59	83.61	200	0.65	0.851	26.19	94.94	
PINNER ROAD	191A	191A	186A	3				0.24	9.9	9.9	4.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.24	0.08	0.21	27.59	43.00	200	0.65	0.851	27.38	99.25	
PINNER ROAD	186A	186A	187A	5				0.35	16.5	105.6	4.00	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.71	0.56	1.93	20.24	70.39	200	0.35	0.624	18.31	90.45	
PINNER ROAD	187A	187A	183A	0				0.00	0.0	105.6	4.00	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71	0.56	1.93	20.24	9.00	200	0.35	0.624	18.31	90.45	
FINSBURY AVENUE	182A	182A	183A	16				0.97	52.8	52.8	4.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.97	0.32	1.00	32.46	117.13	200	0.90	1.001	31.46	96.91	
FINSBURY AVENUE	183A	183A	184A	4				0.33	13.2	171.6	4.00	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.33	3.01	0.99	3.22	20.24	65.71	200	0.35	0.624	17.03	84.10	
FINSBURY AVENUE	184A	184A	174A	0				0.00	0.0	171.6	4.00	2.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.01	0.99	3.22	20.24	17.89	200	0.35	0.624	17.03	84.10	
COPE DRIVE	174A	174A	173A	7				0.47	23.1	493.2	3.98	6.36	6.53	0.00	0.00	0.00	0.00	0.00	0.47	14.57	4.81	16.83	31.02	82.90	250	0.25	0.612	14.19	45.73	
COPE DRIVE	173A	173A	172A	6				0.41	19.8	513.0	3.97	6.60	6.53	0.00	0.00	0.00	0.00	0.00	0.41	14.98	4.94	17.21	31.02	76.02	250	0.25	0.612	13.81	44.52	
COPE DRIVE	172A	172A	171B	3				0.23	9.9	522.9	3.96	6.72	6.53	0.00	0.00	0.00	0.00	0.00	0.23	15.21	5.02	17.41	31.02	36.96	250	0.25	0.612	13.61	43.89	
COPE DRIVE	171B	171B	171A	2				0.22	6.6	529.5	3.96	6.80	6.53	0.00	0.00	0.00	0.00	0.00	0.22	15.43	5.09	17.56	31.02	41.21	250	0.25	0.612	13.46	43.40	
DAGENHAM STREET	180A	180A	181A	7				0.50	23.1	23.1	4.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.50	0.17	0.46	20.24	90.00	200	0.35	0.624	19.78	97.71	
BLOCK 313	INST.1	BULKHEAD	181A	0				0.00	0.0	0.0	4.00	0.00	2.88	2.88	0.00	0.00	0.00	0.00	2.88	2.88	0.95	3.45	20.24	16.00	200	0.35	0.624	16.79	82.95	
DAGENHAM STREET	181A	181A	171A	0				0.11	0.0	23.1	4.00	0.30	2.88	0.00	0.00	0.00	0.00	0.00	0.11	3.49	1.15	3.95	20.24	67.50	200	0.35	0.624	16.29	80.48	
COPE DRIVE	171A	171A	170B	1				0.17	3.3	555.9	3.95	7.12	9.41	0.00	0.00	0.00	0.00	0.00	0.17	19.09	6.30	21.58	45.12	37.91	300	0.20	0.618	23.53	52.16	
COPE DRIVE	170B	170B	170A	3				0.25	9.9	565.8	3.95	7.24	9.41	0.00	0.00	0.00	0.00	0.00	0.25	19.34	6.38	21.79	45.12	43.98	300	0.20	0.618	23.33	51.71	
BLOCK 312	RES.3A	BULKHEAD	sewer	0				3.26	195.6	195.6	4.00	2.54	0.00	0.00	0.00	0.00	0.00	0.00	3.26	3.26	1.08	3.61	20.24	16.22	200	0.35	0.624	16.63	82.16	
COPE DRIVE	170A	170A	110A	6				0.62	19.8	781.2	3.87	9.79	9.41	0.00	0.00	0.00	0.00	0.00	0.62	23.22	7.66	25.62	45.12	120.00	300	0.20	0.618	19.50	43.21	
GOLDHAWK DRIVE	306A	SOUTH	303A	31				1.83	102.3	102.3	4.00	1.33	0.00	0.00	0.00	0.00	0.00	0.00	1.83	1.83	0.60	1.93								
STREET NO. 26	304A	WEST	303A	14				0.69	46.2	46.2	4.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.69	0.23	0.83								
GOLDHAWK DRIVE	303A	303A	302A	10				0.62	33.0	181.5	4.00	2.35	0.00	0.00	0.00	0.00	0.00	0.00	0.62	3.14	1.04	3.39	20.24	94.58	200	0.35	0.624	16.85	83.26	
Future Street	RES.5, 5A, Park3	EAST	302A					23.97	1421.4	1421.4	3.70	17.03	0.00	0.00	0.00	0.00	0.00	0.00	23.97	23.97	7.91	24.94								
GOLDHAWK DRIVE	302A	302A	301A	10				0.56	33.0	1635.9	3.65	19.36	0.00	0.00	0.00	0.00	0.00	0.00	0.56	27.67	9.13	28.49	50.44	70.68	300	0.25	0.691	21.95	43.51	
GOLDHAWK DRIVE	301A	301A	207A	6				0.37	19.8	1695.7	3.65	19.57	0.00	0.00	0.00	0.00	0.00	0.00	0.37	28.04	9.25	28.83	50.44	70.00	300	0.25	0.691	21.61	42.85	
STREET NO. 2	RES.4	EAST	207A					13.88	832.8	832.8	3.85	10.39	0.00	0.00	0.00	0.00	0.00	0.00	13.88	13.88	4.58	14.97								
GOLDHAWK DRIVE	207A	207A	206A	17				0.86	56.1	2544.6	3.50	28.88	0.00	0.00	0.00	0.00	0.00	0.00	0.86	42.78	14.12	43.00	70.84	107.19	375	0.15	0.621	27.84	39.30	
GOLDHAWK DRIVE	206A	206A	205A	12				0.69	39.6	2584.2	3.50	29.28	0.00	0.00	0.00	0.00	0.00	0.00	0.69	43.47	14.35	43.63	70.84	106.61	375	0.15	0.621	27.21	38.41	
GOLDHAWK DRIVE	205A	205A	110A	5				0.44	16.5	2600.7	3.49	29.45	0.00	0.00	0.00	0.00	0.00	0.00	0.44	43.91	14.49	43.94	70.84	100.61	375	0.15	0.621	26.90	37.97	

Design Parameters:

Residential	ICI Areas	Peak Factor
SF 3.3 p/p/u		1.5
TH/SD 2.5 p/p/u	INST 50,000 L/Ha/day	1.5
APT 1.8 p/p/u	COM 50,000 L/Ha/day	1.5
Low 60 p/p/Ha	IND 35,000 L/Ha/day	MOE Chart
Med 75 p/p/Ha		
High 90 p/p/Ha		

Notes:

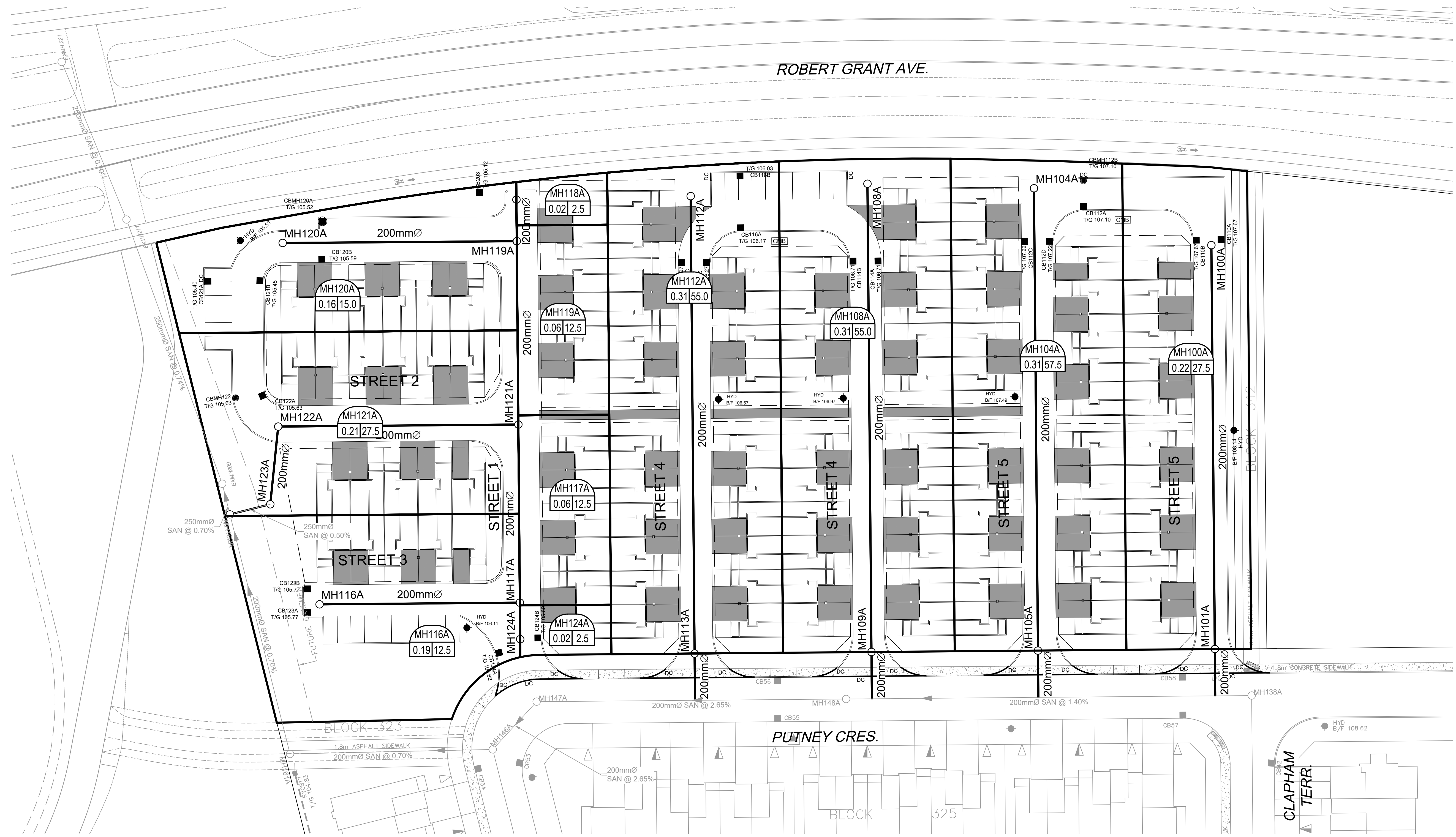
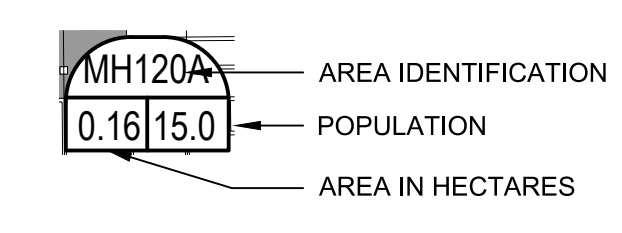
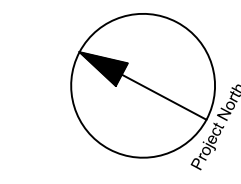
- Mannings coefficient (n) = 0.013
- Demand (per capita): 280 L/day
- Infiltration allowance: 0.33 L/s/Ha
- Residential Peaking Factor: Harmon Formula = $1 + \{14 / (4 + P^{0.5})\}$ where P = population in thousands

Designed: J.I.M.

Checked: P.K.

Dwg. Reference: 27970 - 501, 501A, 501B

No.	Revision	Date
1.	Submission No. 1 to City of Ottawa	2013-08-29
2.	Submission No. 2 to City of Ottawa	2014-01-22
3.	Submission No. 3 to City of Ottawa	2014-08-22
4.	Submission No. 4 to City of Ottawa	2015-06-15
5.	Submission No. 5 to City of Ottawa	2016-11-10
6.	Submission for MOE Approval	2



CLIENT

CLARIDGE
HOMES

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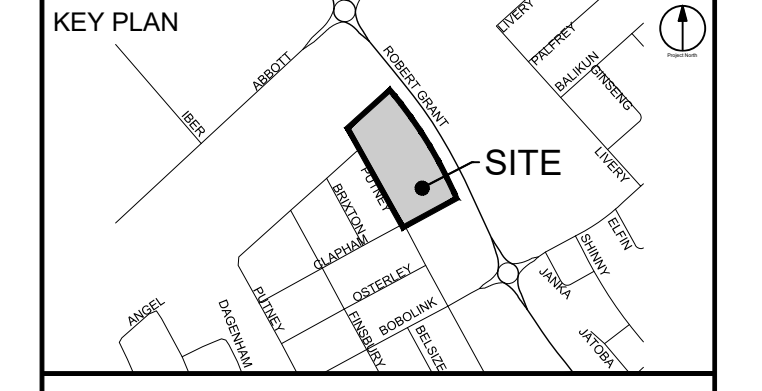
IBI Group Professional Services (Canada) Inc.
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ISSUES

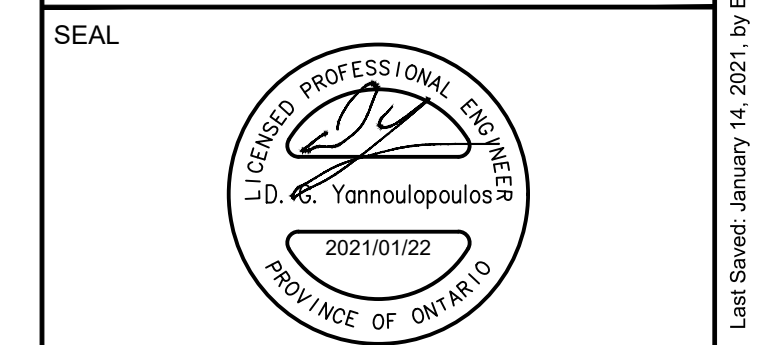
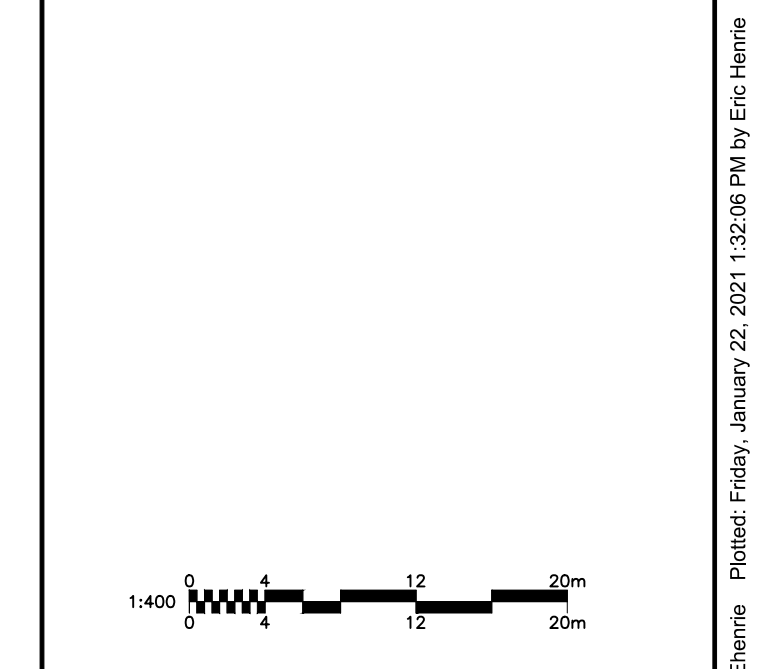
No.	DESCRIPTION	DATE
1	ISSUED TO CITY FOR REVIEW	2021-01-26

NOT FOR CONSTRUCTION

SEE PLAN NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS
BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR AOV.



CONSULTANTS



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PROJECT

CRT
BLOCK 324

PROJECT NO:
126715

DRAWN BY: D.D. E.H.
CHECKED BY: DGY

PROJECT MGR: DGY
APPROVED BY: DGY

SHEET TITLE

SANITARY DRAINAGE
AREA PLAN

SHEET NUMBER 400
ISSUE 1

APPENDIX D

CRT Lands Phase 1 Storm Drainage Area Plan
CRT Lands Phase 1 Storm Sewer Design Sheet
Storm Sewer Design Sheet
126715-500 Storm Drainage Area Plan
SC 3500 Stormtech info sheet
SC 4500 Stormtech info sheet
Modified Rational Method design sheet
Storage calculations



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

STORM SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
LOCATION: CITY OF OTTAWA
CLIENT: CRT DEVELOPMENT INC.

STREET	LOCATION			AREA (Ha)										RATIONAL DESIGN FLOW										SEWER DATA											
	AREA ID	FROM MH	TO MH	C= 0.20	C= 0.55	C= 0.65	C= 0.66	C= 0.75	C= 0.80	C= 0.90	C=	C=	C=	C=	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)
																												DIA	W	H			(L/s)	(%)	
PUTNEY CRESCENT	---	141	142					0.00						0.00	0.00	10.00	0.12	10.12	104.19	122.14	178.56	0.00				0.00	62.04	8.84	250			1.00	1.224	62.04	100.00%
PUTNEY CRESCENT	R142A, B	142	143		0.33									0.50	0.50	10.12	0.48	10.60	103.56	121.40	177.47	52.25				52.25	139.06	54.71	300			1.90	1.906	86.80	62.42%
PUTNEY CRESCENT	S143	143	144					0.32						0.67	1.17	10.60	0.68	11.28	101.13	118.54	173.26	118.50				118.50	266.03	65.86	450			0.80	1.620	147.53	55.45%
FINSBURY AVENUE	S136B, E, R136A	136	144		0.27			0.44						1.33	1.33	10.00	0.87	10.87	104.19	122.14	178.56	138.60				138.60	154.65	110.07	300			2.35	2.119	16.05	10.38%
PUTNEY CRESCENT	S144, R144A, B, C	144	145		0.57			0.25						1.39	3.89	11.28	0.74	12.02	97.90	114.73	167.68	381.31				381.31	401.29	80.25	525			0.80	1.796	19.98	4.98%
CLAPHAM TERRACE	S136C, D, R136B	136	137		0.23			0.18						0.73	0.73	10.00	0.94	10.94	104.19	122.14	178.56	75.75				75.75	100.88	77.99	300			1.00	1.383	25.14	24.92%
BRIXTON WAY	R137A	137	160		0.11									0.17	0.90	10.94	0.42	11.36	99.48	116.59	170.40	89.05				89.05	224.02	50.00	375			1.50	1.965	134.97	60.25%
BRIXTON WAY	S160A, B	160	145					0.43						0.90	1.79	11.36	0.54	11.90	97.50	114.26	166.98	174.69				174.69	280.40	78.98	375			2.35	2.459	105.71	37.70%
PUTNEY CRESCENT	S145A, B, R145	145	146		0.30			0.55						1.61	7.29	12.02	0.70	12.72	94.61	110.85	161.98	689.86				689.86	821.24	75.47	750			0.50	1.801	131.38	16.00%
CLAPHAM TERRACE	S137A, B, R137B	137	138		0.30			0.27						1.02	1.02	10.00	1.19	11.19	104.19	122.14	178.56	106.45				106.45	129.34	81.01	375			0.50	1.134	22.89	17.70%
PUTNEY CRESCENT	S138, R138	138	148		0.14			0.15						0.53	1.55	11.19	0.67	11.86	98.30	115.20	168.37	152.21				152.21	220.25	78.01	375			1.45	1.932	68.04	30.89%
PUTNEY CRESCENT	S148	148	147					0.22						0.46	2.01	11.86	0.38	12.24	95.28	111.65	163.15	191.25				191.25	297.76	59.30	375			2.65	2.612	106.51	35.77%
PUTNEY CRESCENT	---	147	146					0.00						0.00	2.01	12.24	0.10	12.34	93.68	109.76	160.37	188.02				188.02	332.54	12.13	450			1.25	2.026	144.52	43.46%
BLOCK 324		146	161											0.00	9.30	12.72	0.40	13.12	91.73	107.47	157.01	853.01				853.01	944.29	34.88	900			0.25	1.438	91.28	9.67%
BLOCK 324	R146	161	Ex. 180		0.14									0.21	9.51	13.12	0.56	13.68	90.15	105.61	154.28	857.65				857.65	944.29	48.00	900			0.25	1.438	86.65	9.18%
BLOCK 324	RES.1, RES. 2B	BULKHEAD	Ex. 180					2.45						5.45	5.45	13.00	0.07	13.07	90.63	106.17	155.11	493.82				493.82	731.45	5.00	900			0.15	1.114	237.62	32.49%
				Refer to ECA No. 9079-9LNNZC dated July 9, 2014 for description of existing sewers.																															
Definitions:				Notes:										Designed:										Revision						Date					
Q = 2.78CIA, where:				1. Mannings coefficient (n) = 0.013										J.I.M.										No.						Date					
Q = Peak Flow in Litres per Second (L/s)																								1.						2013-08-29					
A = Area in Hectares (Ha)																								2.						2014-01-22					
i = Rainfall intensity in millimeters per hour (mm/hr)																								3.						2014-08-22					
[i = 998.071 / (TC+6.053)^0.814]																								4.						2015-06-15					
[i = 1174.184 / (TC+6.014)^0.816]																								5.						2016-11-10					
[i = 1735.688 / (TC+6.014)^0.820]																								6.						2017-02-10					
																								7.						2017-07-14					
																								File Reference:						Date:					
																								27970.5.7.1						2017-07-14					
																														Sheet No:					
																														1 of 3					

STORM SEWER DESIGN SHEET

PROJECT: CRT DEVELOPMENT
 LOCATION: CITY OF OTTAWA
 CLIENT: CRT DEVELOPMENT INC.

STREET	LOCATION AREA ID	FROM MH	TO MH	AREA (Ha)										RATIONAL DESIGN FLOW										SEWER DATA													
				C=0.20	C=0.55	C=0.65	C=0.66	C=0.75	C=0.80	C=0.90	C=	C=	C=	C=	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	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)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)		
																								DIA	W	H											
CLAPHAM TERRACE	S136A	136	135						0.17								0.35	0.35	10.00	1.03	11.03	104.19	122.14	178.56	36.93			36.93	50.02	61.00	250			0.65	0.987	13.09	26.16%
CLAPHAM TERRACE	S135A, B	135	134						0.26								0.54	0.90	11.03	1.08	12.11	99.05	116.08	169.66	88.80			88.80	108.21	61.66	375			0.35	0.949	19.41	17.94%
PUTNEY CRESCENT	---	141	134		0.00												0.00	0.00	10.00	1.31	11.31	104.19	122.14	178.56	0.00			0.00	108.21	74.74	375			0.35	0.949	108.21	100.00%
PUTNEY CRESCENT	S134A, B, C, R134	134	140		0.21				0.39								1.13	2.03	12.11	1.10	13.21	94.22	110.39	161.31	191.34			191.34	265.43	78.10	525			0.35	1.188	74.09	27.91%
OSTERLEY WAY	S153	153	152						0.12								0.25	0.25	10.00	1.04	11.04	104.19	122.14	178.56	26.07			26.07	43.87	53.80	250			0.50	0.866	17.80	40.57%
OSTERLEY WAY	S152A, B	152	151						0.40								0.83	1.08	11.04	1.82	12.85	99.02	116.05	169.61	107.36			107.36	148.72	98.72	450			0.25	0.906	41.36	27.81%
OSTERLEY WAY	S151A, R151A	151	150		0.18				0.10								0.48	1.57	12.85	0.96	13.81	91.21	106.85	156.10	143.00			143.00	170.86	59.71	450			0.33	1.041	27.86	16.30%
OSTERLEY WAY	S150A, B	150	140						0.32								0.67	2.24	13.81	0.91	14.72	87.62	102.63	149.90	195.83			195.83	257.73	63.00	525			0.33	1.153	61.90	24.02%
PUTNEY CRESCENT	S140, R140	140	124		0.21				0.25								0.84	5.11	14.72	0.91	15.63	84.48	98.93	144.48	431.53			431.53	636.13	76.57	750			0.30	1.395	204.60	32.16%
PUTNEY CRESCENT	S149A, B, S129C	149	128						0.22								0.46	0.46	10.00	0.61	10.61	104.19	122.14	178.56	47.79			47.79	62.04	45.00	250			1.00	1.224	14.25	22.96%
BLOCK 343	RES.2A	BULKHEAD	129							0.65							1.45	1.45	13.00	0.27	13.27	90.63	106.17	155.11	131.01			131.01	303.78	13.50	675			0.12	0.822	172.76	56.87%
BOBOLINK RIDGE		129	128						0.00								0.00	1.45	13.00	0.91	13.91	90.63	106.17	155.11	131.01			131.01	303.78	45.00	675			0.12	0.822	172.76	56.87%
BOBOLINK RIDGE	S128A, R128A	128	127		0.14				0.18								0.59	2.49	13.91	1.57	15.49	87.25	102.19	149.26	217.56			217.56	473.55	81.00	825			0.10	0.858	255.99	54.06%
BOBOLINK RIDGE	S127A, R127A	127	126		0.19				0.17								0.64	3.14	15.49	1.51	17.00	82.02	96.05	140.25	257.44			257.44	473.55	78.00	825			0.10	0.858	216.11	45.64%
FINSBURY AVENUE	S151B, C, R151B	151	126		0.20				0.25								0.83	0.83	10.00	0.79	10.79	104.19	122.14	178.56	86.17			86.17	117.21	76.50	300			1.35	1.606	31.04	26.48%
BOBOLINK RIDGE	---	126	125						0.00								0.00	3.97	17.00	0.81	17.81	77.61	90.86	132.63	307.77			307.77	597.22	44.30	900			0.10	0.909	289.46	48.47%
BOBOLINK RIDGE	S125, R125A, B	125	124		0.35				0.39								1.35	5.31	17.81	1.39	19.20	75.45	88.32	128.91	400.95			400.95	739.33	80.07	975			0.10	0.959	338.38	45.77%
BOBOLINK RIDGE	S124, R124A, B	124	123		0.32				0.26								1.03	11.45	19.20	1.23	20.44	72.05	84.32	123.05	825.24			825.24	1,760.81	88.10	1350			0.10	1.192	935.57	53.13%
DAGENHAM STREET	R131	131	130		0.20												0.31	0.31	10.00	0.84	10.84	104.19	122.14	178.56	31.86			31.86	59.68	41.39	300			0.35	0.818	27.82	46.61%
DAGENHAM STREET	S130, R130A, B	130	123		0.33				0.36								1.26	1.56	10.84	1.75	12.59	99.94	117.13	171.20	156.00			156.00	179.46	84.37	525			0.16	0.803	23.46	13.07%
BOBOLINK RIDGE	---	123	122		0.00												0.00	13.01	20.44	0.30	20.74	69.31	81.11	118.33	902.05			902.05	1,760.81	21.46	1350			0.10	1.192	858.77	48.77%
BOBOLINK RIDGE	S122, R122	122	121		0.17				0.31								0.91	13.92	20.74	0.39	21.13	68.68	80.36	117.24	956.05			956.05	3,040.59	39.49	1500			0.17	1.667	2084.54	68.56%
BOBOLINK RIDGE	R121	121	120		0.13												0.20	14.12	21.13	0.37	21.50	67.86	79.41	115.84	958.22			958.22	3,040.59	36.84	1500			0.17	1.667	2082.37	68.49%
ANGEL HEIGHTS	---	111	112		0.00												0.00	0.00	10.00	0.27	10.27	104.19	122.14	178.56	0.00			0.00	42.08	13.58	250			0.46	0.830	42.08	100.00%
ANGEL HEIGHTS	S112, R112A, B	112	113		0.20				0.27								0.87	0.87	10.27	1.68	11.95	102.77	120.47	176.10	89.29			89.29	139.51	85.60	450			0.22	0.850	50.22	36.00%
DAGENHAM STREET	PARK1	DICB	132	1.27													0.71	0.71	12.00	0.29	12.29	94.70	110.96	162.13	66.87			66.87	100.88	23.70	300			1.00	1.383	34.02	33.72%
DAGENHAM STREET	S132	132	113						0.24								0.50	1.21	12.29	0.55	12.83	93.49	109.54	160.05	112.80			112.80	210.32	42.00	450			0.50	1.281	97.52	46.37%
ANGEL HEIGHTS	S113	113	114						0.30								0.63	1.49	12.83	0.85	13.68	91.29	106.94	156.24	136.40			136.40	248.09	43.13	600			0.15	0.850	111.69	45.02%
ANGEL HEIGHTS	S114, R114	114	120		0.50				0.24								1.26	2.76	13.68	1.43	15.11	88.09	103.18	150.72	243.05			243.05	367.27	69.17	750			0.10	0.805	124.22	33.82%
BOBOLINK RIDGE	S120	120	105						0.28								0.58	17.46	21.50	0.96	22.45	67.13	78.54	114.57	1,172.18			1,172.18	3,040.59	95.64	1500			0.17	1.667	1868.41	61.45%
ANGEL HEIGHTS	S101	101	102						0.20								0.42	0.42	10.00	0.52	10.52	104.19	122.14	178.56	43.45			43.45	129.34	35.48	375			0.50	1.134	85.89	66.41%
GOLDHAWK DRIVE	R102	102	103		0.21												0.32	0.74	10.52	0.83	11.35	101.52	118.99	173.93	74.93			74.93	126.19	38.36	450			0.18	0.769	51.26	40.62%
GOLDHAWK DRIVE	S103, R103A, B	103	104		0.50				0.34								1.47	2.21	11.35	1.01	12.36	97.55	114.32	167.07	215.73			215.73	303.78	49.62	675			0.12	0.822	88.05	28.98%
GOLDHAWK DRIVE	S104, R104A, B, C	104	105		0.59				0.30								1.53	3.74	12.36	1.35	13.71	93.19	109.19	159.53	348.45			348.45	473.55	69.59	825			0.10	0.858	125.10	26.42%
GOLDHAWK DRIVE	S105A, S105B, R105	105	107		0.13	0.90											1.83	23.03	22.45	1.31	23.77	65.29	76.38	111.40	1,503.33			1,503.33	5,720.16	126.10	2100			0.10	1.600	4216.82	73.72%
GOLDHAWK DRIVE	S107	107	109			0.61											1.10	24.13	23.77	1.17	24.94	62.94	73.62	107.36	1,518.58			1,518.58	5,720.16	112.64	2100			0.10	1.600	4201.58	73.45%
GOLDHAWK DRIVE	S109	109	110			0.52											0.94	25.07	24.94	0.67	25.62	60.99	71.33	104.01	1,528.92			1,528.92	5,720.16	64.64	2100			0.10	1.600	4191.24	73.27%

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 = 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: J.I.M.

Checked: P.K.

Dwg. Reference: 27970 - 500, 500A, 500B

No.	Revision	Date
1.	Submission No. 1 to City of Ottawa	2013-08-29
2.	Submission No. 2 to City of Ottawa	2014-01-22
3.	Submission No. 3 to City of Ottawa	2014-08-22
4.	Submission No. 4 to City of Ottawa	2015-06-15
5.	Submission No. 5 to City of Ottawa	2016-11-10
6.	Submission for MOE Approval	2017-02-10
7.	Resubmission for MOE Approval	2017-07-14

File Reference: 2



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STORM SEWER DESIGN SHEET

CRT Bk 324
 City of Ottawa
 Clardige Homes

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW										SEWER DATA													
STREET	AREA ID	FROM	TO	C=	C=	C=	C=	C=	C=	C=	IND	CUM	INLET	TIME	TOTAL	I (2)	I (5)	I (10)	I (100)	2yr PEAK	5yr PEAK	10yr PEAK	100yr PEAK	FIXED	DESIGN	CAPACITY	LENGTH	PIPE SIZE (mm)			SLOPE	VELOCITY	AVAIL CAP (2yr)				
				0.61	0.77	0.78	0.79	0.80	0.81	0.80	2.78AC	2.78AC	(min)	(min)	(mm/hr)	(mm/hr)	(mm/hr)	(mm/hr)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(m)	DIA	W	H	(%)	(m/s)	(L/s)	(%)
OUTLET TO EASEMENT																																					
	ext	shub	101									1.25	1.25	11.00	0.20	11.20	73.17	99.19	116.25	169.91	91.13	123.54	144.78	211.61	0.00	91.13	148.72	11.00	450				0.25	0.906	57.59	38.73%	
		110	101								0.00	0.00	10.00	0.64	10.64	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	33.33	250				0.50	0.866	43.87	100.00%		
		111	101								0.00	0.00	10.00	0.73	10.73	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	37.70	250				0.50	0.866	43.87	100.00%		
		101	102								0.00	1.25	11.20	0.54	11.75	72.48	98.24	115.14	168.27	90.27	122.36	143.39	209.57	0.00	90.27	148.72	29.50	450				0.25	0.906	58.45	39.30%		
		102	103								0.00	1.25	11.75	0.14	11.88	70.70	95.80	112.26	164.04	88.05	119.31	139.81	204.30	0.00	88.05	148.72	7.54	450				0.25	0.906	60.67	40.79%		
	MH112	112B	112			0.47					1.01	1.01	10.00	0.18	10.18	76.81	104.19	122.14	178.56	77.27	104.83	122.88	179.65	0.00	77.27	114.23	11.02	375				0.39	1.002	36.96	32.35%		
		112	103								0.00	1.01	10.19	0.75	10.93	76.11	103.23	121.01	176.90	76.57	103.86	121.75	177.98	0.00	76.57	115.68	45.66	375				0.40	1.015	39.11	33.81%		
		113	103								0.00	0.00	10.00	0.74	10.74	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	38.54	250				0.50	0.866	43.87	100.00%		
		103	104								0.00	2.25	11.88	0.34	12.23	70.26	95.19	111.54	163.00	158.18	214.33	251.15	366.99	0.00	158.18	230.39	29.00	450				0.60	1.403	72.21	31.34%		
		114	104								0.00	0.00	10.00	0.85	10.85	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	44.23	250				0.50	0.866	43.87	100.00%		
		115	104								0.00	0.00	10.00	0.78	10.78	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	40.73	250				0.50	0.866	43.87	100.00%		
		104	105								0.00	2.25	12.23	0.44	12.67	69.19	93.73	109.82	160.47	155.79	211.04	247.27	361.30	0.00	155.79	230.39	37.00	450				0.60	1.403	74.61	32.38%		
	MH116	201	116			0.54					1.17	1.17	10.00	0.17	10.17	76.81	104.19	122.14	178.56	89.93	122.00	143.02	209.08	0.00	89.93	122.70	11.05	375				0.45	1.076	32.77	26.70%		
		116	105								0.00	1.17	10.17	0.74	10.91	76.15	103.30	121.09	177.01	89.17	120.95	141.79	207.27	0.00	89.17	115.68	44.83	375				0.40	1.015	26.51	22.92%		
		117	105								0.00	0.00	10.00	0.78	10.78	76.81	104.19	122.14	178.56	0.00	0.00	0.00	0.00	0.00	0.00	43.87	40.73	250				0.50	0.866	43.87	100.00%		
		105	106								0.00	3.42	12.67	0.27	12.94	67.88	91.94	107.71	157.37	232.33	314.65	368.64	538.58	0.00	232.33	347.53	25.50	525				0.60	1.555	115.20	33.15%		
		106	107								0.00	3.42	12.94	0.09	13.03	67.10	90.86	106.44	159.50	229.64	310.96	364.29	532.20	0.00	229.64	347.53	8.25	525				0.60	1.555	117.89	33.92%		
	123	123	124								0.29	0.29	10.00	0.72	10.72	76.81	104.19	122.14	178.56	22.48	30.50	35.76	52.27	0.00	22.48	64.60	38.50	300				0.41	0.885	42.11	65.19%		
		124	107								0.00	0.29	10.72	0.64	11.37	74.13	100.51	117.81	172.19	21.70	29.42	34.49	50.41	0.00	21.70	63.80	33.76	300				0.40	0.874	42.10	65.99%		
	120	120	119			0.22					0.37	0.37	10.00	0.84	10.84	76.81	104.19	122.14	178.56	28.65	38.87	45.57	66.62	0.00	28.65	63.80	44.00	300				0.40	0.874	35.15	55.09%		
		119	107								0.00	0.37	10.84	0.74	11.58	73.73	99.96	117.16	171.24	27.51	37.29	43.71	63.89	0.00	27.51	63.80	38.76	300				0.40	0.874	36.30	56.89%		
		107	108								0.00	4.09	13.03	0.44	13.47	66.85	90.52	106.04	154.91	273.29	370.05	433.51	633.32	0.00	273.29	388.55	46.40	525				0.75	1.739	115.26	29.66%		
	121	122	108								0.59	0.59	10.00	0.19	10.19	76.81	104.19	122.14	178.56	45.54	61.78	72.43	105.88	0.00	45.54	63.80	9.94	300				0.40	0.874	18.26	28.62%		
		108	109								0.00	4.68	13.47	0.11	13.58	65.62	88.83	104.06	152.01	307.18	415.86	487.13	711.57	0.00	307.18	452.94	10.14	600				0.50	1.552	145.76	32.18%		
		109	EX								0.00	4.68	13.56	0.08	13.66	65.33	88.43	103.59	151.31	305.81	413.89	484.92	708.33	0.00	305.81	452.94	5.20	900				0.15	1.114	426.63	58.19%		
						0.22	0.47	0.54	0.27	0.56	0.13	0.00	4.68	Total A																							
											2.19	Avg. C																									
											0.77																										
Definitions:				Notes:				Designed:				Checked:				Dwg. Reference:				Revision				Date													
Q = 2.78CIA, where:				1. Mannings coefficient (n) =				RM				DY				126715-500				No. 1.				Servicing Brief - Submission No. 1				2021-01-18									
Q = Peak Flow in Litres per Second (L/s)																																					
A = Area in Hectares (Ha)																																					
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I = 732.951 / (TC+6.199)^0.810] 2 YEAR																																					
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I = 1735.688 / (TC+6.014)^0.820] 100 YEAR																																					

STORMTECH MC-3500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH MC-3500 CHAMBER (not to scale)

Nominal Chamber Specifications

Size (L x W x H)
90" x 77" x 45"
2,286 mm x 1,956 mm x 1,143 mm

Chamber Storage
109.9 ft³ (3.11 m³)

Min. Installed Storage*
175.0 ft³ (4.96 m³)

Weight
134 lbs (60.8 kg)

Shipping
15 chambers/pallet
7 end caps/pallet
7 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-3500 END CAP (not to scale)

Nominal End Cap Specifications

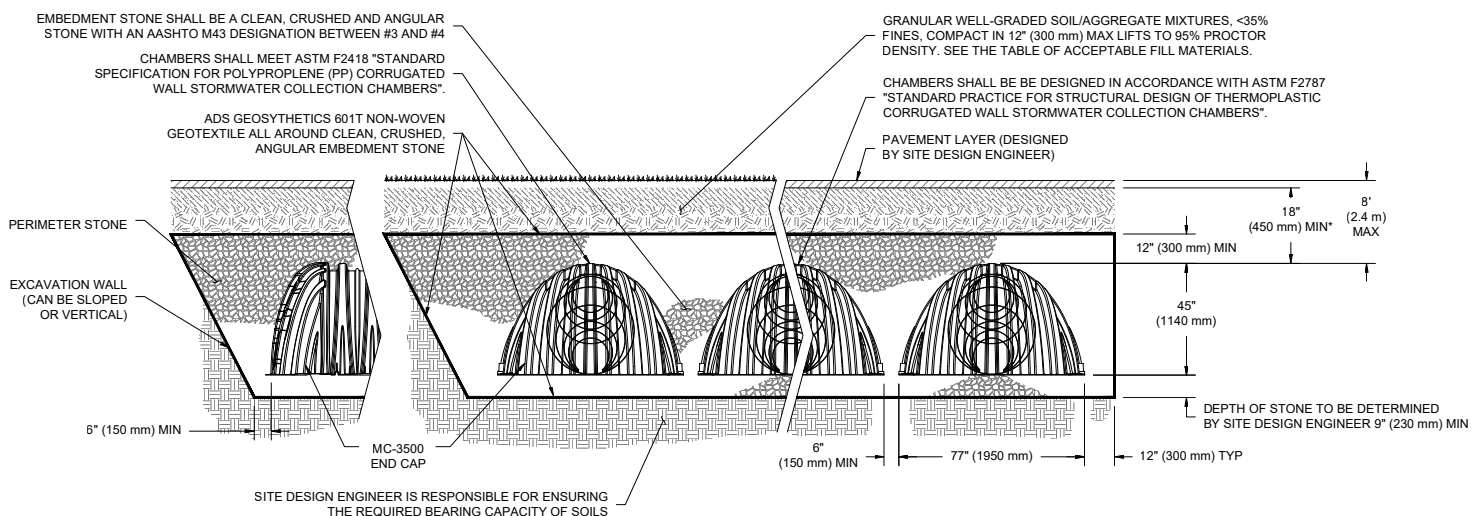
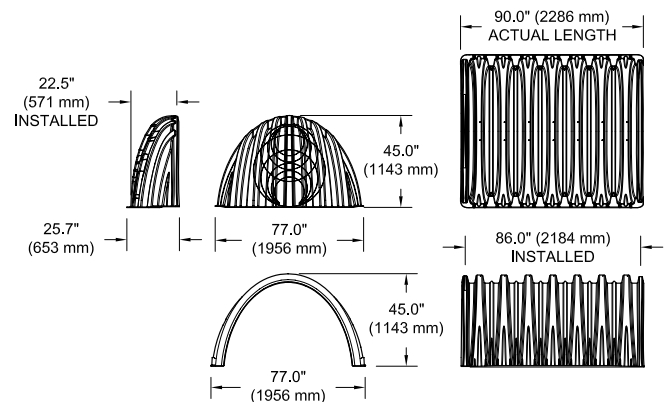
Size (L x W x H)
26.5" x 71" x 45.1"
673 mm x 1,803 mm x 1,145 mm

End Cap Storage
14.9 ft³ (0.42 m³)

Min. Installed Storage*
45.1 ft³ (1.28 m³)

Weight
49 lbs (22.2 kg)

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 6" (150 mm) of stone between chambers, 6" (150 mm) of stone between chambers/end caps and 40% stone porosity.



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

MC-3500 CHAMBER SPECIFICATION

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft ³ (m ³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-3500 Chamber	109.9 (3.11)	175.0 (4.96)	179.9 (5.09)	184.9 (5.24)	189.9 (5.38)
MC-3500 End Cap	14.9 (.42)	45.1 (1.28)	46.6 (1.32)	48.3 (1.37)	49.9 (1.41)

Note: Assumes 6" (150 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds ³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-3500 Chamber	8.5 (6.0)	9.1 (6.5)	9.7 (6.9)	10.4 (7.4)
MC-3500 End Cap	3.9 (2.8)	4.1 (2.9)	4.3 (3.1)	4.5 (3.2)
METRIC KILOGRAMS (m ³)	230 mm	300 mm	375 mm	450 mm
MC-3500 Chamber	7711 (4.6)	8255 (5.0)	8800 (5.3)	9435 (5.7)
MC-3500 End Cap	3538 (2.1)	3719 (2.2)	3901 (2.4)	4082 (2.5)

Note: Assumes 12" (300 mm) of stone above and 6" (150 mm) row spacing and 6" (150 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-3500 Chamber	11.9 (9.1)	12.4 (9.5)	12.8(9.8)	13.3 (10.2)
MC-3500 End Cap	4.0 (3.1)	4.1 (3.2)	4.3 (3.3)	4.4 (3.4)

Note: Assumes 6" (150 mm) of separation between chamber rows and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.



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For more information on the StormTech MC-3500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

MC-4500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.

STORMTECH MC-4500 CHAMBER (not to scale)

Nominal Chamber Specifications

Size (L x W x H)
52" x 100" x 60"
1321 mm x 2540 mm x 1524 mm

Chamber Storage
106.5 ft³ (3.01 m³)

Min. Installed Storage*
162.6 ft³ (4.60 m³)

Weight
Nominal 125 lbs (56.7 kg)

Shipping
7 chambers/pallet
5 end caps/pallet
11 pallets/truck

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below chambers, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-4500 END CAP (not to scale)

Nominal End Cap Specifications

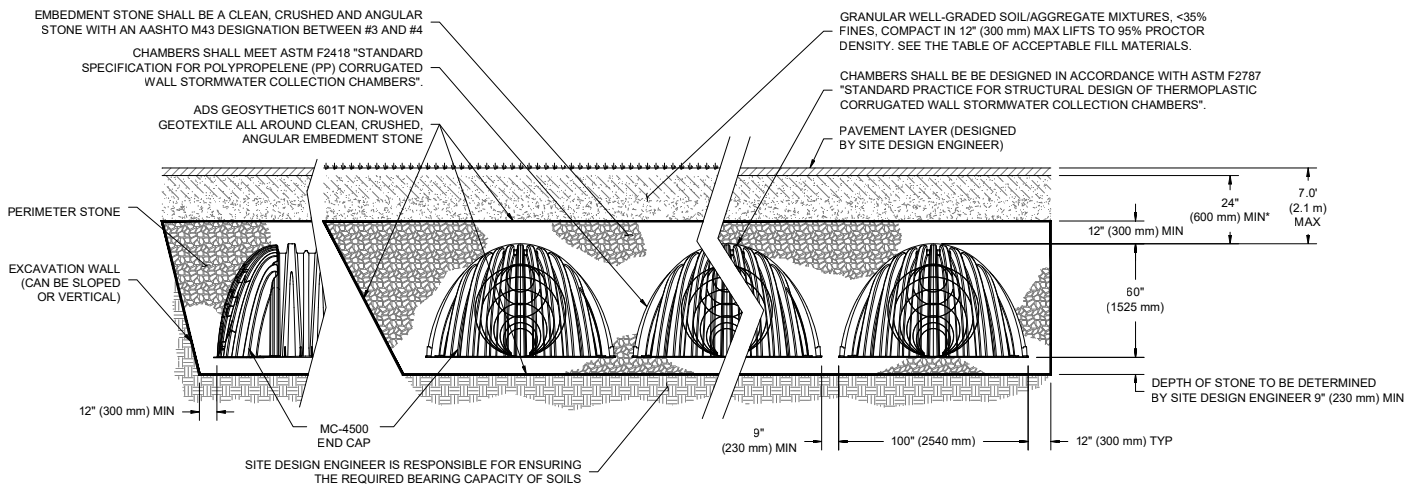
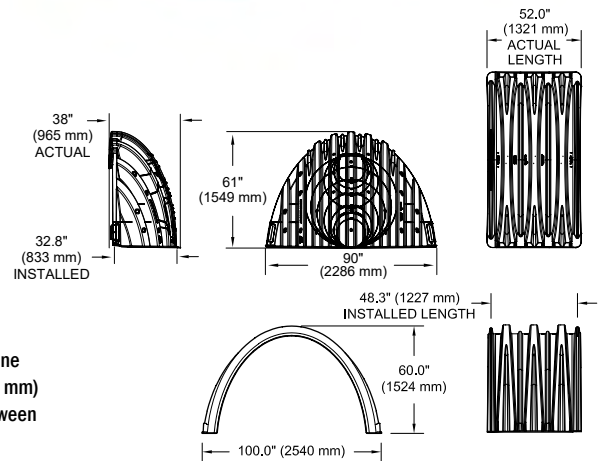
Size (L x W x H)
38" x 90" x 61"
965 mm x 2286 mm x 1549 mm

End Cap Storage
39.5 ft³ (1.12 m³)

Min. Installed Storage*
115.3 ft³ (3.26 m³)

Weight
Nominal 90.0 lbs (40.8 kg)

*Assumes a minimum of 12" (300 mm) of stone above, 9" (230 mm) of stone below, 12" (300 mm) of stone perimeter, 9" (230 mm) of stone between chambers/end caps and 40% stone porosity.



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

MC-4500 CHAMBER SPECIFICATIONS

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft ³ (m ³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-4500 Chamber	106.5 (3.01)	162.6 (4.60)	166.3 (4.71)	169.9 (4.81)	173.6 (4.91)
MC-4500 End Cap	39.5 (1.12)	115.3 (3.26)	118.6 (3.36)	121.9 (3.45)	125.2 (3.54)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter in front of end cap.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds ³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500 Chamber	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
MC-4500 End Cap	9.8 (7.0)	10.2 (7.3)	10.6 (7.6)	11.1 (7.9)
METRIC KILOGRAMS (m ³)	230 mm	300 mm	375 mm	450 mm
MC-4500 Chamber	6713 (4.0)	7076 (4.2)	7529 (4.5)	7983 (4.7)
MC-4500 End Cap	8890 (5.3)	9253 (5.5)	9616 (5.8)	10069 (6.0)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-4500 Chamber	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
MC-4500 End Cap	9.7 (7.4)	10.0 (7.6)	10.3 (7.9)	10.6 (8.1)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.



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PROJECT: BLK 324
DATE: 2021-01-18
FILE: 126715-6.4
REV #: -
DESIGNED BY: R.M.
CHECKED BY: D.G.Y.

STORMWATER MANAGEMENT

Maximum Allowable Release Rate

Restricted Flowrate (based on 27970 Design Brief)

$Q_{restricted} = 380.95 \text{ L/s}$

unrestricted flow to boulevards	Area (Ha)	C (C*1.25)	100yr Q (l/s)	5yr Q (l/s)
area 1	0.0800	0.76	30.18	13.95
			0.00	0.00
			0.00	0.00
	0.0800		30.18	13.95

$i_{100yr} = 1:100 \text{ year Intensity} = 1735.688 / (T_c + 6.014)^{0.820}$ $t_c = 10$

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

$Q_{max\ allowable} = 350.77 \text{ L/s}$

Formulas and Descriptions

$i_{2yr} = 1:2 \text{ year Intensity} = 732.951 / (T_c + 6.199)^{0.810}$

$i_{5yr} = 1:5 \text{ year Intensity} = 998.071 / (T_c + 6.053)^{0.814}$

$i_{100yr} = 1:100 \text{ year Intensity} = 1735.688 / (T_c + 6.014)^{0.820}$

T_c = Time of Concentration (min)

C = Average Runoff Coefficient

A = Area (Ha)

Q = Flow = $2.78CiA$ (L/s)

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

Drainage Area MH112		100-Year Ponding			
Area (Ha)	0.470	Restricted Flow Q_r (L/s)=	130.00		
C =	0.92	Restricted Flow reduced 50% =	65.000		
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)
12	162.13	194.90	65.00	129.90	93.52
14	148.72	178.78	65.00	113.78	95.57
16	137.55	165.34	65.00	100.34	96.33
18	128.08	153.96	65.00	88.96	96.08
20	119.95	144.19	65.00	79.19	95.03

Drainage Area MH112		5-Year Ponding				
Area (Ha)	0.470	Restricted Flow Q_r (L/s)=	65.000			
C =	0.77	Restricted Flow Q_r (L/s)=	65.000			
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)	
3	166.09	167.10	65.00	102.10	18.38	
5	141.18	142.04	65.00	77.04	23.11	
7	123.30	124.05	65.00	59.05	24.80	
9	109.79	110.46	65.00	45.46	24.55	
11	99.19	99.80	65.00	34.80	22.96	

Drainage Area MH112		2-Year Ponding				
Area (Ha)	0.470	Restricted Flow Q_r (L/s)=	65.000			
C =	0.77	Restricted Flow Q_r (L/s)=	65.000			
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)	
1	148.14	149.05	65.00	84.05	5.04	
3	121.46	122.20	65.00	57.20	10.30	
5	103.57	104.20	65.00	39.20	11.76	
7	90.66	91.22	65.00	26.22	11.01	
9	80.87	81.37	65.00	16.37	8.84	

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	96.33	0.00	98.04464	0.00

Overflows to: Parking Lot

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	24.80	0.00	98.04464	0.00

Overflows to: Parking Lot

Storage (m^3)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	11.76	0.00	98.04464	0.00

Overflows to: Parking Lot

Drainage Area		MH116	
Area (Ha)	0.540	Restricted Flow Q _r (L/s)=	90.00
C =	0.94	Restricted Flow reduced 50% =	45.000

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)
24	106.68	150.53	45.00	105.53	151.97
26	101.18	142.78	45.00	97.78	152.53
28	96.27	135.86	45.00	90.86	152.64
30	91.87	129.64	45.00	84.64	152.35
32	87.89	124.02	45.00	79.02	151.71

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	152.64	0.00	158.01264	0.00	

Overflows to: Parking Lot

Drainage Area		MH116	
Area (Ha)	0.540	Restricted Flow Q _r (L/s)=	45.000
C =	0.78	Restricted Flow reduced 50% =	45.000

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)
7	123.30	144.38	45.00	99.38	41.74
9	109.79	128.56	45.00	83.56	45.12
11	99.19	116.15	45.00	71.15	46.96
13	90.63	106.12	45.00	61.12	47.67
15	83.56	97.84	45.00	52.84	47.56

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	46.96	0.00	158.01264	0.00	

Overflows to: Parking Lot

Drainage Area		MH116	
Area (Ha)	0.540	Restricted Flow Q _r (L/s)=	45.000
C =	0.78	Restricted Flow reduced 50% =	45.000

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)
3	121.46	142.23	45.00	97.23	17.50
5	103.57	121.28	45.00	76.28	22.88
7	90.66	106.16	45.00	61.16	25.69
9	80.87	94.70	45.00	49.70	26.84
11	73.17	85.67	45.00	40.67	26.85

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	25.69	0.00	158.01264	0.00	

Overflows to: Parking Lot

Drainage Area		MH 120	
Area (Ha)	0.220	Restricted Flow Q _r (L/s)=	50.00
C =	0.73	Restricted Flow reduced 50% =	25.000

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)
12	162.13	72.39	25.00	47.39	34.12
14	148.72	66.40	25.00	41.40	34.78
16	137.55	61.41	25.00	36.41	34.95
18	128.08	57.18	25.00	32.18	34.76
20	119.95	53.55	25.00	28.55	34.26

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	34.95	0.00	43.09766	0.00	

Overflows to: Parking Lot

Drainage Area		MH 120	
Area (Ha)	0.220	Restricted Flow Q _r (L/s)=	25.000
C =	0.61	Restricted Flow reduced 50% =	25.000

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)
7	123.30	46.00	25.00	21.00	8.82
9	109.79	40.96	25.00	15.96	8.62
11	99.19	37.01	25.00	12.01	7.92
13	90.63	33.81	25.00	8.81	6.87
15	83.56	31.17	25.00	6.17	5.56

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	7.92	0.00	43.09766	0.00	

Overflows to: Parking Lot

Drainage Area		MH 120	
Area (Ha)	0.220	Restricted Flow Q _r (L/s)=	25.000
C =	0.61	Restricted Flow reduced 50% =	25.000

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)
3	121.46	45.32	25.00	20.32	3.66
5	103.57	38.64	25.00	13.64	4.09
7	90.66	33.82	25.00	8.82	3.71
9	80.87	30.17	25.00	5.17	2.79
11	73.17	27.30	25.00	2.30	1.52

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	3.71	0.00	43.09766	0.00	

Overflows to: Parking Lot

Drainage Area		MH 121	
Area (Ha)	0.270	Restricted Flow Q _r (L/s)=	50.00
C =	0.95	Restricted Flow reduced 50% =	25.000

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	80.49	25.00	55.49	73.25
24	106.68	76.07	25.00	51.07	73.54
26	101.18	72.15	25.00	47.15	73.55
28	96.27	68.65	25.00	43.65	73.33
30	91.87	65.51	25.00	40.51	72.92

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	73.55	0.00	83.05264	0.00	

Overflows to: Parking Lot

Drainage Area		MH 121	
Area (Ha)	0.270	Restricted Flow Q _r (L/s)=	25.000
C =	0.79	Restricted Flow reduced 50% =	25.000

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)
7	123.30	73.12	25.00	48.12	20.21
9	109.79	65.10	25.00	40.10	21.66
11	99.19	58.82	25.00	33.82	22.32
13	90.63	53.74	25.00	28.74	22.42
15	83.56	49.55	25.00	24.55	22.09

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	22.32	0.00	83.05264	0.00	

Overflows to: Parking Lot

Drainage Area		MH 121	
Area (Ha)	0.270	Restricted Flow Q _r (L/s)=	25.000
C =	0.79	Restricted Flow reduced 50% =	25.000

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)
3	121.46	72.02	25.00	47.02	8.46
5	103.57	61.42	25.00	36.42	10.92
7	90.66	53.76	25.00	28.76	12.08
9	80.87	47.96	25.00	22.96	12.40
11	73.17	43.39	25.00	18.39	12.13

Storage (m ³)					
Overflow	Required	Surface	Sub-surface	Balance	
0.00	12.08	0.00	83.05264	0.00	

Overflows to: Parking Lot

Drainage Area		MH123	
Area (Ha)	0.130	Restricted Flow Q _r (L/s)=	29.00
C =	0.97	Restricted Flow reduced 50% =	14.500

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)
17	132.63	46.49	14.50	31.99	32.63
19	123.87	43.42	14.50	28.92	32.97
21	116.30	40.77	14.50	26.27	33.10
23	109.68	38.45	14.50	23.95	33.05
25	103.85	36.40	14.50	21.90	32.86

Storage (m ³)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	33.10	0.00	40.82766	0.00

Overflows to: Parking Lot

Drainage Area		MH123	
Area (Ha)	0.130	Restricted Flow Q _r (L/s)=	14.500
C =	0.81	Restricted Flow Q _r (L/s)=	14.500

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)
7	123.30	36.09	14.50	21.59	9.07
9	109.79	32.14	14.50	17.64	9.53
11	99.19	29.04	14.50	14.54	9.59
13	90.63	26.53	14.50	12.03	9.38
15	83.56	24.46	14.50	9.96	8.96

Storage (m ³)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	9.59	0.00	40.82766	0.00

Overflows to: Parking Lot

Drainage Area		MH123	
Area (Ha)	0.130	Restricted Flow Q _r (L/s)=	14.500
C =	0.81	Restricted Flow Q _r (L/s)=	14.500

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)
3	121.46	35.56	14.50	21.06	3.79
5	103.57	30.32	14.50	15.82	4.75
7	90.66	26.54	14.50	12.04	5.06
9	80.87	23.67	14.50	9.17	4.95
11	73.17	21.42	14.50	6.92	4.57

Storage (m ³)				
Overflow	Required	Surface	Sub-surface	Balance
0.00	5.06	0.00	40.82766	0.00

Overflows to: Parking Lot



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PROJECT: BLK 324
DATE: 2021-01-18
FILE: 126715-6.4
REV #: -
DESIGNED BY: R.M.
CHECKED BY: D.G.Y.

STORMWATER MANAGEMENT

	storage cm/m	storage/end cap	length of end cap
MC 3500	2.27	1.28	0.571
MC 4500	3.748	3.26	0.83

Cell 112, 5m and 21m of 4500 units				
	5	12.51832	6.52	19.03832
	21	72.48632	6.52	79.00632
Total		85.00464	13.04	98.04464
required storage				96.33

Cell 120, twin 19m 4500 units				
	21	72.48632	6.52	79.00632
	21	72.48632	6.52	79.00632
		144.97264	13.04	158.01264
required storage				152.64

Cell 120, 19m 3500 unit				
	19	40.53766	2.56	43.09766
required storage				34.95

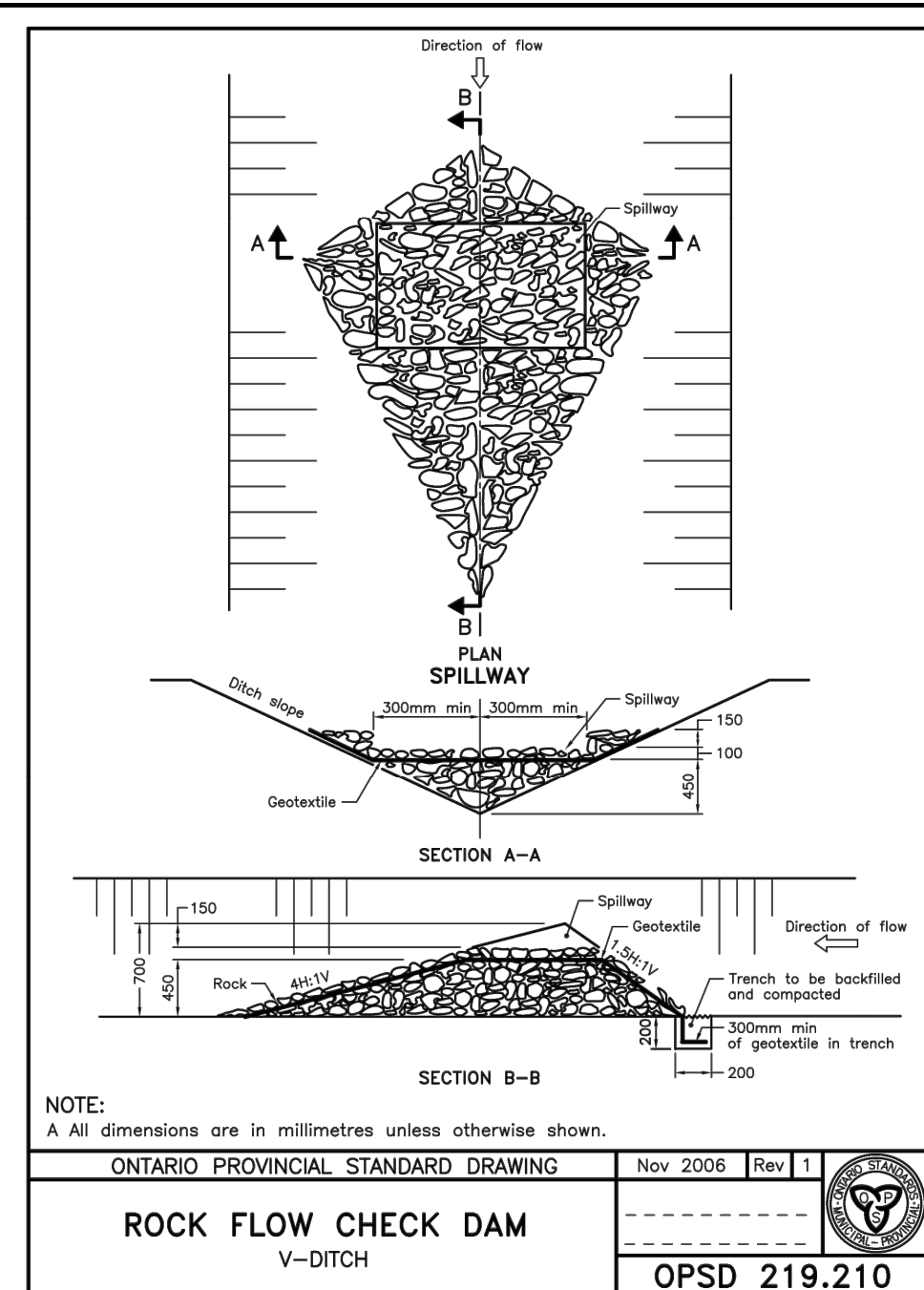
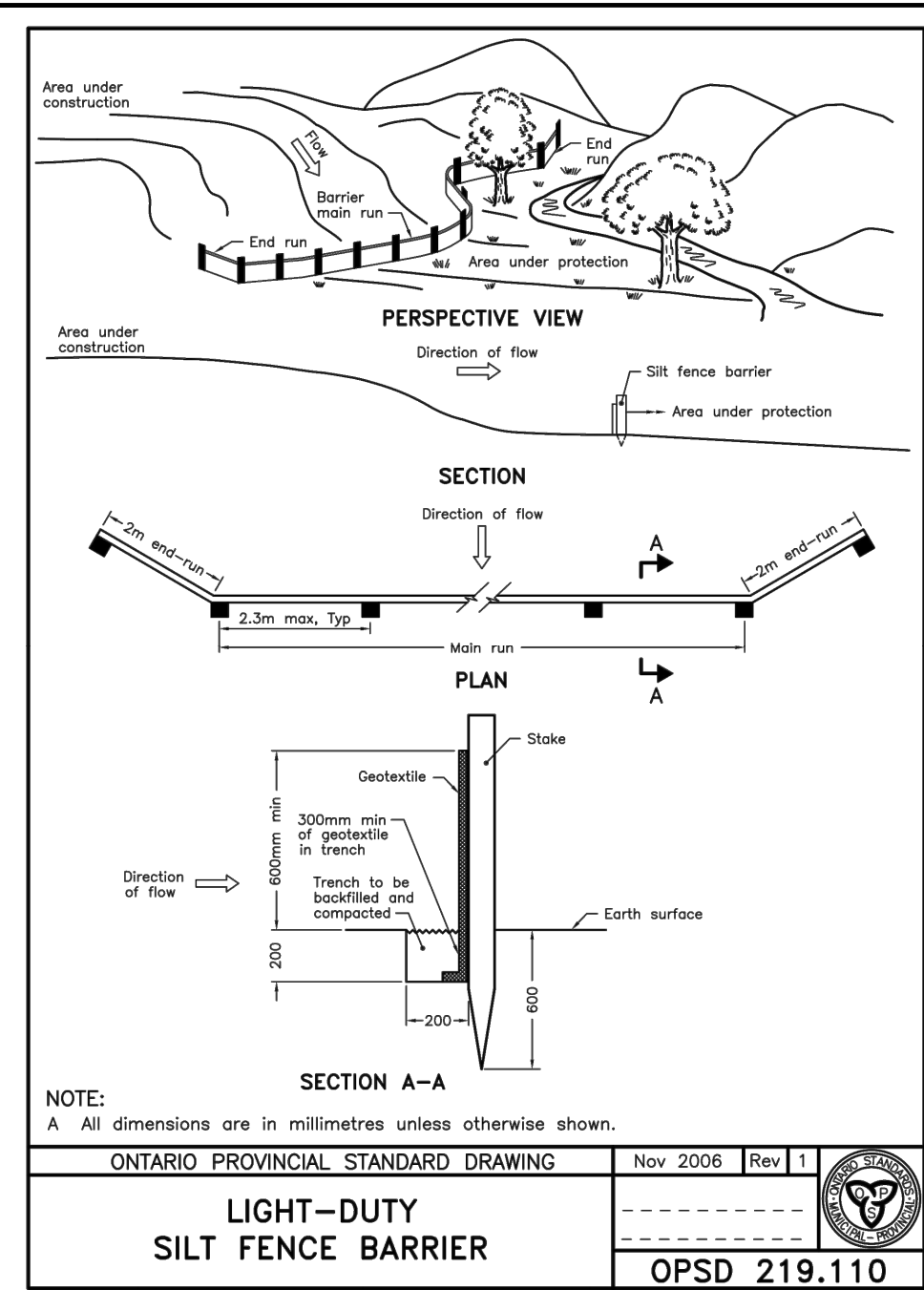
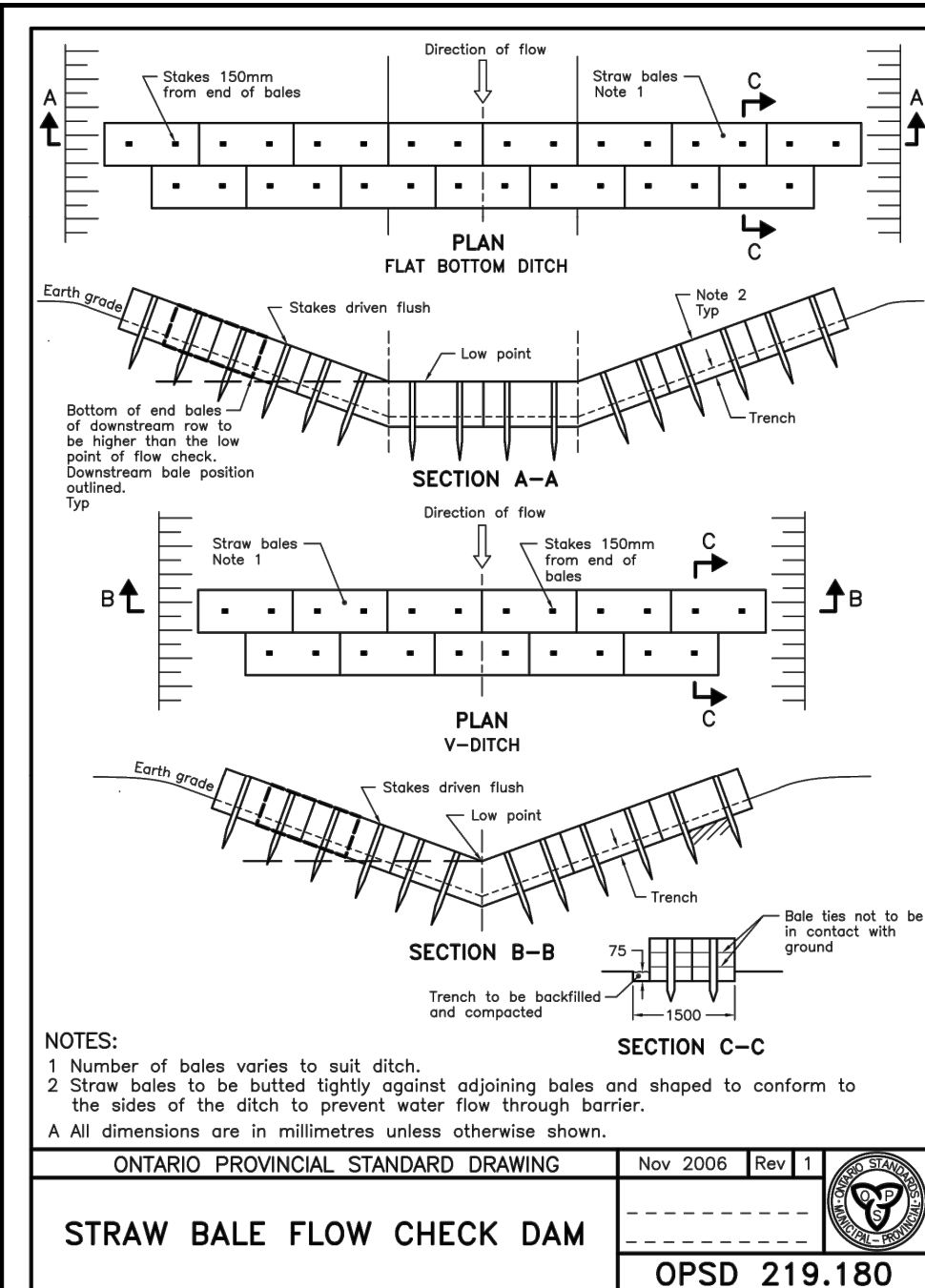
Cell 121, twin 11m 4500 units				
	11	35.00632	6.52	41.52632
	11	35.00632	6.52	41.52632
		70.01264	13.04	83.05264
required storage				73.55

Cell 123, 18m 3500 unit				
	18	38.26766	2.56	40.82766
required storage				33.10

Cell	required storage	provided storage
MH112	96.330	98.04464
MH116	152.638	158.01264
MH120	34.955	43.09766
MH121	73.551	83.05264
MH123	33.099	40.82766
total	390.573	423.035

APPENDIX E

126715-900 Erosion and Sediment Control Plan



- NOTES:**
- SILT FENCE TO BE ERRECTED PRIOR TO EARTH WORKS BEING COMMENCED. SILT FENCE TO BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED OR UNTIL START OF SUBSEQUENT PHASE.
 - STRAW BALE SEDIMENT TRAPS TO BE CONSTRUCTED IN EXISTING ROAD SIDE DITCHES. TRAPS TO REMAIN AND BE MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
 - SILT SACK TO BE PLACED AND MAINTAINED UNDER COVER OF ALL CATCHBASINS. GEOTEXTILE SILT SACK IN STREET C&B TO REMAIN UNTIL ALL WORKS ARE COMPLETED. 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.
 - 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.
 - CONTRACTOR TO PROTECT EXISTING CATCHBASINS WITH FILTER CLOTH UNDER THE COVERS TO TRAP SEDIMENTATION. REFER TO IDENTIFIED STRUCTURES.
 - WORKS NOTED ABOVE ARE TO BE INSTALLED, INSPECTED, MAINTAINED AND ULTIMATELY REMOVED BY SERVICING CONTRACTOR.
 - THIS IS A "LIVING DOCUMENT" AND MAY BE MODIFIED IN THE EVENT THE PROPOSED CONTROL MEASURES ARE INSUFFICIENT.

- LEGEND:**
- LIGHT DUTY SILT FENCE AS PER OPSD-219.110
 - SNOW FENCE
 - STRAW BALE CHECK DAM AS PER OPSD-219.180
 - ROCK CHECK DAM AS PER OPSD-219.210
 - SILT SACK PLACED UNDER EXISTING CB COVER
 - TEMPORARY MUD MAT 0.15m THICK 50mm CLEAR STONE ON NON WOVEN FILTER CLOTH

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

ONTARIO PROVINCIAL STANDARD DRAWING Nov 2006 Rev 1
LIGHT-DUTY SILTY FENCE BARRIER
 OPSD 219.110

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

CLIENT

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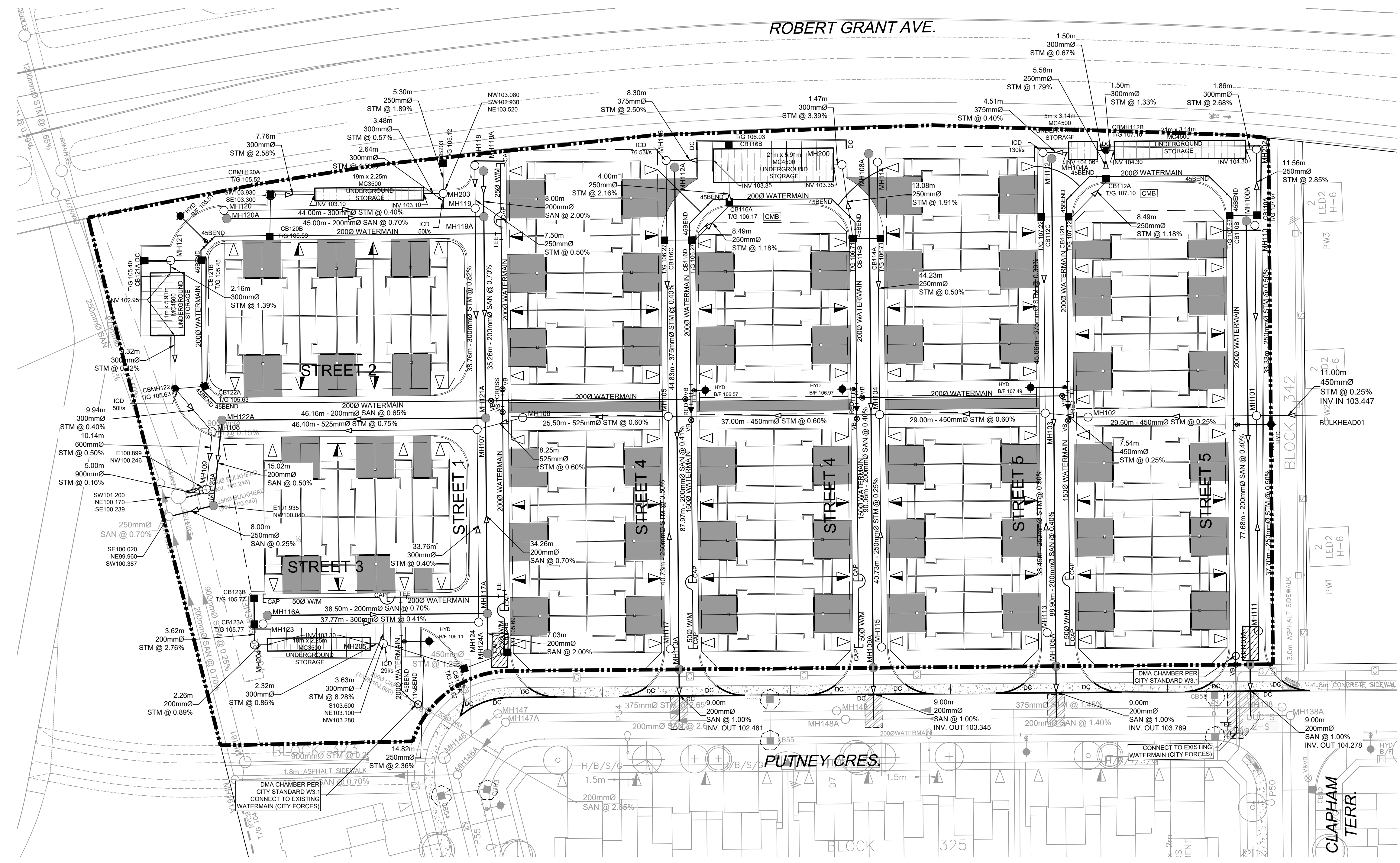
No.	DESCRIPTION	DATE
1	ISSUED TO CITY FOR REVIEW	2021-01-26

NOT FOR CONSTRUCTION

SEE PLAN NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS.
 BENCHMARK TO BE OBTAINED FROM LEGAL SURVEYOR AOV.

KEY PLAN

CONSULTANTS



SCALE

SEAL

PROJECT
 CRT
 BLOCK 324

PROJECT NO:
 126715

DRAWN BY:
 D.D. E.H.

CHECKED BY:
 DGY

PROJECT MGR:
 DGY

APPROVED BY:
 DGY

SHEET TITLE
 EROSION AND SEDIMENTATION CONTROL PLAN

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SHEET NUMBER
 900

ISSUE
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