



Excellence Reliance Innovation

953 Maplevue Drive E – Block 193 Site Plan

Maplevue South (Innisfil) Ltd.
Detailed Stormwater Management Report

June 2024

The Jones Consulting Group Ltd.
229 Maplevue Drive East, Barrie ON L4N 0W5

REI-17055 (70)



Distribution List

No. Of Hard Copies	PDF	Email	Organization
	Y		City of Barrie
	Y		Lake Simcoe Conservation Authority
	Y		Client

Record of Revisions

Rev. No.	Date	Description
0	June 2024	First Detailed Design Submission

Report Prepared By:

Kyle Ransom, B.Eng.
Engineering Designer

Report Approved By:



Michael Flis, P. Eng.
Project Manager



Table of Contents

	Page
1. Introduction	6
1.1. Appointment	6
1.2. Property Description	6
1.3. Existing and Proposed Land Use	7
1.4. Supporting Documents	8
2. Approval Agencies & Design Criteria	10
2.1. City of Barrie	10
2.2. Lake Simcoe Region Conservation Authority (LSRCA)	10
2.3. Ministry of the Environment, Conservation and Parks (MECP)	11
2.4. Ministry of Natural Resources & Forestry (MNRF)	11
2.5. Ministry of Transportation (MTO)	12
2.6. Stormwater Management, Flood & Erosion Protection Design Criteria	12
3. Site Physiography & Background Studies	15
3.1. Subwatershed Impact Study	15
3.2. Site Soils and Geotechnical Considerations	17
3.2.1. Soil Survey of Simcoe County	17
3.2.2. Geotechnical Investigation	18
3.3. Existing Drainage Conditions	19
3.4. Proposed Drainage Conditions	20
4. Hydrology	22
4.1. OTTHYMO Modeling Overview	22
4.1.1. Discrete Event Modeling – LID Model	22
4.1.2. Continuous Simulation Modeling – LID Model	22
4.1.3. Modeling Approach & Rationale	22
4.2. Post-Development Modeling	23
5. Stormwater Management Plan	25
5.1. Introduction	25
5.2. Low Impact Development & Pre-Treatment Devices	25
5.2.1. Lot Level Controls	26
5.2.2. Infiltration Gallery	26
5.2.3. Oil Grit Separator Unit	27
5.3. Stormwater Quantity Control	27
5.3.1. Peak Flow Control	27
5.3.2. Runoff Volume Control	28
5.3.3. Minor-Major System Conveyance	30
5.4. Stormwater Quality Control	30
5.4.1. TSS Removal	31



5.4.2. Phosphorus Budget	32
5.5. Stream Erosion Control	34
5.6. Water Balance	34
5.7. Erosion & Sediment Control	36
6. Conclusions	38

List of Appendices

Appendix A	Engineering Drawings
Appendix B	Supporting Calculations
Appendix C	OTTHYMO Modeling
Appendix D	Supporting Information



Disclaimer

This Report was prepared by **The Jones Consulting Group Ltd.** for **Mapleview South (Innisfil) LTD.** The material in the Report reflects **The Jones Consulting Group Ltd.**'s best judgment in light of the information available at the time of the Report preparation. Any use which a third party makes of this Report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **The Jones Consulting Group Ltd.** accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Report. This report has been prepared, in part based on the Subwatershed Impact Study (SIS) prepared by R.J. Burnside & Associates Ltd., dated September 2016.



Detailed Stormwater Management Report

Mapleview South (Innisfil) Ltd. – Block 193 Site Plan

953 Mapleview Drive East, City of Barrie

1. Introduction

1.1. Appointment

The Jones Consulting Group Ltd. (TJCG) was retained by Mapleview South (Innisfil) LTD. (Client) to provide engineering services for a proposed residential subdivision development located in the Hewitt's Secondary Plan Area (HSPA) southeast of Mapleview Drive and Prince William Way in the City of Barrie (City). The subdivision is to be known as the Mapleview South Subdivision. This Report pertains to the Block 193 Site Plan located in the northeast corner of the overall subdivision, east of Dallaire Street.

This *Detailed Stormwater Management Report* (DSWMR) has been prepared in support of the 953 *Mapleview Drive – Block-193 Site Plan* prepared by S&C Architects Inc., dated June 6th, 2024, and demonstrates how the lands will be serviced in regard to stormwater management. Block 193 is part of the overall *Mapleview South Draft Plan of Subdivision* prepared by TJCG, dated December 22, 2022.

1.2. Property Description

Block 193 is generally rectangular in shape and is comprised of approximately 0.63 hectares (ha) of land. The subject property is legally described as Part of Lot 19, Concession 11, Geographic Township of Innisfil, in the City of Barrie, County of Simcoe. A copy of the 953 *Mapleview Drive – Block-193 Site Plan* prepared by S&C Architects Inc. and the proposed *Draft Plan of Subdivision* prepared by The Jones Consulting Group for the overall subdivision lands have been attached in **Appendix D**.

The site is situated southeast of the intersection of Mapleview Drive East and Prince William Way. It is bound to the north by Mapleview Drive East, to the east by a Future Residential Subdivision (Sandy Creek Subdivision), and to the south and west by a Future Residential Subdivision (Mapleview South Subdivision). The location of the subject property is shown in **Figure 1**.



Figure 1 - Site Location

The existing site topography ranges in elevation from a maximum elevation of 261 meters at the northeast corner of the site adjacent to the Mapleview Drive East to a minimum elevation of 259 meters near the southern boundary of the block. Sandy Cove Creek generally drains from southwest to northeast, with the subject lands draining from the north and south towards the creek. Existing slopes range from 1% to 7%.

1.3. Existing and Proposed Land Use

The lands were previously used for agricultural practices comprised of mainly pasture and seasonal crops. There was a single detached dwelling unit and agricultural storage structures fronting onto Mapleview Drive East which were demolished in 2019. The branch of Sandy Cove Creek/Redfern Channel traverses the Mapleview South Subdivision from southwest to northeast. Drainage of the subject lands in its previous condition was directed southerly to these watercourses.



The site is designated as residential per the City of Barrie Official Plan 2051, Council adopted Version February 15, 2022. A Zoning By-Law Amendment was executed under By-Law Number 2022-054 and the site is currently zoned as Neighbourhood Mixed Use (NMU). The Block 193 Site Plan proposes the development of a 100-unit, 5 storey apartment building with a commercial area dedication, above and below ground surface parking, an outdoor amenity area, and internal roadway/fire route.

1.4. Supporting Documents

The following documents have been referenced in the preparation of this report:

- Maplevue South (Innisfil) Ltd. Functional Servicing Report, The Jones Consulting Group, June 2023;
- Maplevue South (Innisfil) Ltd. Detailed Stormwater Management Report, The Jones Consulting Group, June 2023;
- 969,979 & 989 Maplevue Drive East Stormwater Management Report, Tatham Engineering, November 2023;
- Hewitt's Secondary Plan Area Subwatershed Impact Study, Lover's, Hewitt's and Sandy Cove Creeks, R.J. Burnside & Associates Ltd., September 2016;
- Maplevue South (Innisfil) Ltd. 953 Maplevue Drive, Barrie, Ontario, Proposed Draft Plan of Subdivision, The Jones Consulting Group, Dec. 22, 2022;
- 953 Maplevue Drive – Block-193 Site Plan, S&C Architects Inc., June 6, 2024;
- City of Barrie, Stormwater Infrastructure Design Standard, D700 June 2023;
- City of Barrie, Hewitt's Secondary Plan Transportation Improvements Municipal Class Environmental Assessment, Phases 3 & 4, adopted by council June 19, 2017;
- City of Barrie, Secondary Plan, Background Studies & Infrastructure Master Plan, Intensification and Annexed Lands, AMEC, October 2013;
- Lake Simcoe Region Conservation Authority, Watershed Development Guidelines, April 2015;
- Lake Simcoe Region Conservation Authority, Barrie Creeks, Lovers Creek and Hewitt's Creek Subwatershed Plan, 2012;
- Lake Simcoe Region Conservation Authority, Technical Guidelines for Stormwater Management Submissions, September 2016;



- Lake Simcoe Region Conservation Authority Phosphorus Offsetting Policy, July 2021;
- Credit Valley Conservation Authority & Toronto Region Conservation Authority, Low Impact Development Stormwater Management Planning and Design Guide, 2010;
- Sustainable Technologies Evaluation Program (Step), Evaluation of Residential Lot Level Stormwater Management Practices, 2013;
- Ministry of the Environment, Lake Simcoe Protection Plan, July 2009;
- Ministry of the Environment, Stormwater Management Planning and Design Manual, March 2003;
- Ministry of Transportation, Drainage Management Manual, February 2008;
- Geotechnical Investigation Report, Mapleview South Development, Cambium Inc., December 2018;
- Hydrogeological Assessment, Mapleview South (Innisfil) Ltd., R.J. Burnside & Associates Limited, May 2023;
- Geotechnical Investigation Report – Mapleview South Development Block A (193), Barrie, Ontario, Cambium Inc., June 2024;
- Hydrogeological Brief – Block 193 953 Mapleview Drive, R.J. Burnside & Associates Limited, June 2024;
- Functional Servicing & Stormwater Management Report, 969, 979 & 989 Mapleview Drive East Phase 1, Tatham Engineering Ltd, February 2022;
- Stormwater Management Report, 883 Mapleview Drive East Proposed Residential Subdivision, Schaeffers Consulting Engineers, April 2022.



2. Approval Agencies & Design Criteria

The proposed development is subject to the policies and requirements of the City of Barrie (City), the Lake Simcoe Region Conservation Authority (LSRCA), and the Ministry of the Environment Conservation and Parks (MOE) with respect to drainage and stormwater management.

2.1. City of Barrie

The stormwater drainage recommendations for the proposed development have been designed to adhere to the City of Barrie's *Storm Drainage and Stormwater Management Policies and Design Guidelines* (March 2023).



The City's document was prepared to reflect current accepted design practices and is intended as a guide to provide a solid engineering basis for storm drainage and stormwater management design, to establish uniform guidelines of minimum standards, and to improve the processing of site plan and plan of subdivision applications for approval in the City. The document provides legal and technical requirements specific to stormwater drainage systems, stormwater management systems, site grading, minimum requirements for erosion & sediment control, guidelines for hydrologic and hydraulic analysis, and stormwater quantity & quality control techniques, among other topics.

2.2. Lake Simcoe Region Conservation Authority (LSRCA)

The subject site is located within the Hewitt's Creek Subwatershed, which is part of the larger Lake Simcoe Watershed, located within the Lake Simcoe Region Conservation Authority's (LSRCA) jurisdiction. Parts of the site are located within Regulated Areas Pursuant to *Ontario Regulations 179/06*. As such, it is expected that the LSRCA will require the stormwater management plan to adhere to the LSRCA *Technical Guidelines for Stormwater Management Submissions* (September 2016) as well as conform to the recommendations of the MOE *Stormwater Management Planning and Design Manual* (March 2003).



The goal of Stormwater Management is to mitigate the effects of urbanization on the hydrologic cycle including increased runoff and decreased infiltration, of rain and snowmelt. The LSRCA *Watershed Development Policies and Stormwater Management Technical Guidelines* provide a framework for the planning and design of major development projects adjacent to naturalized



areas as well as the design of stormwater management infrastructure to address flooding, water quality, erosion, water balance, and natural heritage.

The LSRCA Technical Guidelines no longer follow a traditional approach to the development of stormwater management infrastructure. The Technical Guidelines provide guidance in developing an effective approach to stormwater management which follows Better Site Design Techniques developed by the Minnesota Pollution Control Agency's *Minnesota Stormwater Manual* (2016). Better Site Design involves techniques applied early in the planning and design process to preserve natural areas, reduce impervious cover, redistribute runoff and use pervious areas to more effectively treat stormwater runoff. A major difference between the traditional development process and Better Site Design process is the implementation of Low Impact Development (LID) measures. The focus of design has shifted to treating and utilizing rainfall as soon as it hits the ground, reducing and controlling runoff volume and mimicking natural hydrology rather than simply conveying runoff.

2.3. Ministry of the Environment, Conservation and Parks (MECP)

Stormwater management proposals for developments are to be consistent with the guidelines of the MECP's *Stormwater Management Planning and Design Manual* (March 2003), in an effort to mitigate against any negative effects on the receiving waters of Sandy Cove Creek resulting from increased urbanization.



2.4. Ministry of Natural Resources & Forestry (MNRF)

The Ministry of Natural Resources and Forestry (MNRF) is the authority having jurisdiction on a provincial level with regards to development adjacent to and within floodplains. Through a series of provincial policy statements and Technical Guideline publications on Natural Hazards, Flooding, and Official Plan Flood Limit Policies, the MNRF through its water management program aims to support development applications which are sustainable and do not create an additional public threat.



According to the provincial policy statement on public health and safety issued under the *Planning Act*, the "province's long-term economic prosperity, environmental health, and social well-being depend on reducing the potential for public costs and risk to Ontario's residents by directing development away from areas where there is a risk to public health and safety or a risk



of property damage". The policy generally states that development will be diverted to areas outside of hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards.

2.5. Ministry of Transportation (MTO)

The Ministry of Transportation (MTO) provides design guidance through a series of publications including the *Drainage Management Manual* and the Ministry's *Drainage Directives*.



These documents provide users with tools and guidance for the hydrologic and hydraulic analysis of systems to analyze the potential hazards to the travelling public and ensure the longevity of critical infrastructure such as bridges and culverts.

2.6. Stormwater Management, Flood & Erosion Protection Design Criteria

The Flood & Erosion Protection and the Drainage & Conveyance design criteria within the City of Barrie are established by the Lake Simcoe Region Conservation Authority (LSRCA), Ministry of Transportation (MTO), Ministry of Environment Conservation and Parks (MECP), Ministry of Natural Resources & Forestry (MNRF) and the City of Barrie (City) engineering design standards. This section outlines the key design criteria as follows:

- City of Barrie *Storm Drainage & Stormwater Management Policies & Design Guidelines* (March 2023) as follows:
 - *Water Quality & Erosion Control* including:
 - Developments ≥ 5 Ha shall implement measures to detain and store the runoff from the 25mm event and release it over a minimum of 24 hours, and;
 - Phosphorus loadings projected under post-development conditions shall be minimized to limit the impacts on receiving watercourses and Lake Simcoe;
 - *Quantity Control (Flood Protection)* requires the control of post-development peak flow rates to pre-development levels;
 - *Water Balance* is required for all new developments ≥ 5 Ha where infiltration and recharge is promoted on-site to match pre-development annual infiltration volumes in the post-development condition;



- Receiving Watercourses are required in general to be maintained in their natural state, keeping with pre-development base flows and velocities;
- Stormwater Management Facilities cannot be constructed within the 100 year floodplain, and may only be constructed within the Regional floodplain if permitted by the City and Conservation Authority;
- Erosion & Sediment Control measures shall be implemented to minimize the impact of erosion and sediments leaving disturbed sites to receiving systems.
- LSRCA Technical Guidelines for Stormwater Management Submissions (April 2022) – Sections 3, 4 & 5 as follows:
 - Stormwater Quantity Control including:
 - Peak Flow Control – post-development peak flow rates are not to exceed the corresponding pre-development peak flow rate for the 2, 5, 10, 25, 50 and 100 year storm events;
 - Runoff Volume Control – New developments that create more than 0.5 Ha of new impervious surface shall capture, treat and retain the runoff volume generated from the 25mm storm event from the total impervious area to be developed. Note 'Sites with Restrictions' – Section 3.2.6.;
 - Major-Minor System Conveyance – The minor system is designed to convey more frequent events (1:5 Year Storm) while the major system conveys runoff from infrequent events (1:100 Year Storm) when the minor system's capacity is exceeded, and;
 - Regulatory Storm Conveyance – Where there is an external drainage area flowing through a site, the developer must demonstrate safe conveyance of the Regulatory Storm (Hurricane Hazel or 100-year storm, which ever produces a greater peak flow) to a sufficient outlet.
 - Stormwater Quality Control including:
 - MOE Enhanced Level of Protection corresponding to an 80% long term average removal of Total Suspended Solids (TSS);
 - An 80% reduction of Total Phosphorus load anticipated on an annual basis under Post-Development conditions;
 - Protection of fresh water sources (surface and ground-based) from Winter Salts;
 - Thermal mitigation where required to provide cooling of SWM Facility discharge to limit the impacts to receiving streams, and;



- A screening against any additional contaminants which may be generated from proposed land uses beyond what has been described earlier.
- *Stream Erosion Control* typically requires the detention of the runoff produced from the 25mm storm event and release over a period of at least 24 hours. In general, *Stream Erosion Control* is achieved by meeting the SWM Quality Control design criteria for the drawdown time from the end-of-pipe SWMF.
- *Water Balance / Groundwater Recharge* is to be maintained to the maximum extent possible where post-development annual infiltration volumes should meet pre-development levels.
- *Erosion & Sediment Control* measures should be instituted prior to site disturbance and should remain in place and in good working order until the subject lands have been re-stabilized.
- MTO Drainage Management Manual (1997)
- MTO Drainage Design Standards (2008)
- MOE Stormwater Management Planning and Design Manual (2003)



3. Site Physiography & Background Studies

3.1. Subwatershed Impact Study

The *Hewitt's Secondary Plan Area Subwatershed Impact Study* (September 2016, Rev. 2017) prepared by RJ Burnside & Associates Ltd. detailed the preliminary approach to stormwater management for each of the subwatersheds and subcatchments within the *Hewitt's Secondary Plan*. The subject lands are identified under the SIS as part of *Post Development Catchment 12*. The following is a summary of the recommended approach established in the SIS for Catchment 12:

SWMF#12 is proposed to be located in the Phase 3 lands of the Finger Lake Development between the south side of Mapleview Drive and Sandy Cove Creek in an area of relatively steep grades sloping away from Mapleview Drive. The intent of the facility is to provide treatment for Phase 1 portions of the non-participating landowner to the west of Finger Lakes property and for the Phase 1 and Phase 3 lands (north of Sandy Cove Creek) Finger Lakes property.

The entirety of the catchment area consists of residential development and there may be an opportunity to collect drainage from Mapleview Drive ROW and direct the flow into the SWMF, however additional P removal and infiltration to meet LSRCA guideline should be provided within the ROW. We have not included any part of the external ROW runoff in the digital model to SWMF#12 at this time as the majority of this area receives quality control treatment from the existing OGS at Hewitt's Creek.

The preliminary design for this facility is provided by the Finger Lakes consultant and is currently proposed to be oriented in a east-west direction, and meets all the requirements for the length to width ratio's recommended by the MOECC. The SWMF is proposed to have a wet forebay at the west end, with a main cell extending to either side of the north south collector road proposed. The two portions of the main cell are to be connected with an equalization pipe.

The SWMF and block are adequately sized for the drainage area but there is currently not a significant opportunity to reduce the facility size within the block or to reconfigure the shape to allow for more development lots due to the selected location and grading.

As the portion of Sandy Cove Creek which sits immediately south of the proposed SWMF location is currently part of the Redfern Municipal Drain, there is an opportunity to



relocate the watercourse channel to a location which may provide a more advantageous development configuration. The current SWMF location results in some grading and servicing challenges which could be avoided by relocating the Creek. A portion of the Creek on the adjacent Dorsay Lands is to be relocated south, and coordination will be required to ensure a proper transition is provided.

Furthermore, based on preliminary investigations and background data, the SIS identifies the following opportunities and constraints for implementing LID's within Catchment 12:

Although the catchment is dominated by sandy loam soils, the area also contains high groundwater levels on the southern, lower half of the site. The entire catchment is within the SGRA and there are no park or school blocks to utilize for LID. As such, the following are the LID recommendations for the catchment:

- *5 mm target should be pursued at detailed design for the implementation of infiltration LID measures.*
- *The remainder of the target is to be achieved through filtration and attenuation measures.*
- *Due to the presence of the SGRA, infiltration LIDs within ROW must consider water quality issues including the potential for pre-treatment. Use of CB inserts and deepened sumps where ROW infiltration measures are to be implemented.*
- *Use of shallow LID options (located all or partially above the frost line) to increase opportunities.*
- *Placement of LID measures where feasible within Sandy Cove Creek stream corridor.*
- *Consider the use of a 3rd pipe roof drainage clean water exfiltration in SGRA areas where pre-treatment is not feasible or cost prohibitive.*
- *LIDs are to be provided to achieve groundwater balance volumes as outlined in Section 4.6.3. to the extent possible.*
- *Additional topsoil depths of 300mm, as outlined in Section 5.5.2.1., on all of the proposed lots within this area could provide some level of infiltration and peak flow reduction, however there is currently no credit for this method.*



The S/S final recommendations for Catchment 12:

- a) Provide an end-of-pipe SWMF within Catchment 12 to provide quality and quantity controls as per the LSRCA and City Standards. Specific SWMF characteristics and precise location to be determined at Draft Plan and detailed design stage.
- b) A 5 mm infiltration target should be pursued at detailed design with an additional 20 mm filtration target.
- c) Infiltration/Filtration LID to be provided within the ROW, NHS buffer and on pervious areas of private lots where possible.
- d) The assumed Sandy Cove Creek road crossing location to be confirmed by the non-group participating landowner and detailed design of the crossing including confirmation of the potential impact on the floodplain to be completed.

The SIS recommendations have been confirmed through the completion of further geotechnical & hydrogeological investigations, as well as a groundwater monitoring program and a detailed review of available background studies.

3.2. Site Soils and Geotechnical Considerations

3.2.1. Soil Survey of Simcoe County

The Soil Map of Simcoe County, South Sheet, Report No. 29 prepared by the Canada Department of Agriculture shows the site being comprised of Bondhead Sandy Loam (Bs) Soil. This soil type is noted to have good to imperfect drainage characteristics and belongs to Group B of the SCS Hydrological Soils Group Classification System. A copy of the Soil Map of Simcoe County, South Sheet, Report No. 29 has been attached in **Appendix D**.

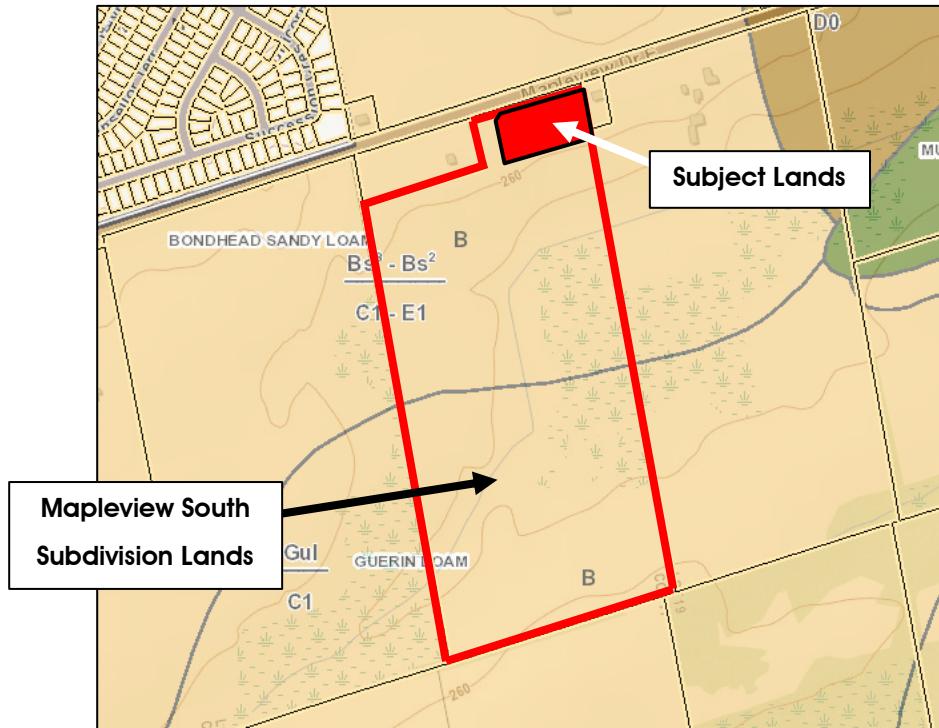


Figure 2 - Site Soils Identification

Table 1 - Soil Type Distribution

Soil Type	Soil Name	HSG Group	Total Area (ha)	Percentage Area (%)
Bs	Bondhead Sandy Loam	Group B	0.63	100.00

3.2.2. Geotechnical Investigation

An initial analysis of the site's subsurface soils and groundwater conditions for the overall Mapleview South Subdivision Lands was completed by Cambium Inc. (Cambium) in May 2018 to provide geotechnical recommendations for the site's construction requirements based on observed borehole (BH) and groundwater monitoring data. The investigation included the advancement of sixteen (16) boreholes (BH No. 101 to 115) to a depth ranging from approx. 5 to 8 meters below the existing ground surface and each outfitted with a monitoring well.

The borehole logs show that the site is covered in a layer of topsoil (300-900 mm thick, average depth of 600 mm) over layers of clay, till, sand and silty sand. Over the course of the investigation



and monitoring, evidence of groundwater in all of the sixteen (16) boreholes was observed. Based on water level recordings, the stabilized ground water table appears to reflect a subdued expression of the ground profile, with downward gradient from west to east in the general direction of Sandy Cove Creek. The presence of a confined aquifer has also been identified in locations where groundwater level readings were recorded at or above the existing surface. The site's observed and predicted groundwater elevations have been utilized to establish the proposed grading design, for the Maplevue South Subdivision's future buried infrastructure, road bedding and dwellings. Refer to the *Geotechnical Investigation Report - Maplevue South Development, Maplevue Drive East*, prepared by Cambium Inc., dated December 2018, under separate cover.

A block specific geotechnical investigation was conducted by Cambium in May of 2024 for Block 193 which advanced four (4) boreholes to depths ranging from 5.1m to 8.2m below the existing ground surface. Groundwater and caving conditions were noted in the open boreholes during and upon completion of drilling. The subsurface investigation generally produced findings of a surficial layer of engineered fill followed by non-cohesive silty sand to sand soils. Bedrock was not encountered. Groundwater was observed in all boreholes at depths ranging from 5.8m to 7.6m below ground surface. For further information regarding subsurface soil characteristics and groundwater levels, refer to the *Geotechnical Investigation Report - Maplevue South Development Block A (193), Barrie, Ontario*, prepared by Cambium Inc. dated June 2024 under separate cover.

3.3. Existing Drainage Conditions

The subject lands consist of approximately 0.63 hectares of land which has historically been used for agricultural purposes. The land's topography contains slopes ranging from 1 – 7%, generally draining from north to south toward the Sandy Cove Creek/Redfern Municipal Drain. The property is part of pre-development drainage area 128, as described in the SIS.

There are no existing stormwater management facilities on the subject lands and all flows are released uncontrolled to the Sandy Cove Creek/Redfern Municipal Drain.



3.4. Proposed Drainage Conditions

Development of the subject lands will consist of a 100-unit, 5 storey apartment building with a portion of commercial dedication, complete with above and below ground surface parking, an outdoor amenity area, landscaped areas, and internal roadway/fire route. The site is part of post-development drainage area 12, as described in the SIS, and is designated as catchment 110 on **Drawing STM-1** of the *Mapleview South Subdivision – Phase 1 Registration Drawings* dated June 2023.

The grading of the subject lands will direct stormwater runoff to the internal road network, which will contain a proposed storm sewer system to convey minor flow (up to the 5 Year event) to an underground infiltration gallery. Major event flow (> 5 year event) and minor flows that are not infiltrated within the underground facility will be conveyed to the downstream Stormwater Management Facility #12 (SWMF12) located within the adjacent Sandy Creek Estates lands (previously Finger Lakes), southeast of the Block 193 Site Plan. The internal roads of Block 193 and the overall Mapleview South Subdivision have been designed to convey the major overland flow within the right-of-way and prevent flooding of adjacent properties.

The end-of-pipe SWMF12 located on the Sandy Creek Estates lands is understood to be proposed as a wet pond complete with a forebay and filtration cell, aiming to provide extended detention and flood control, along with quantity and quality control functions. Details on that facility would be submitted by others (Tatham Engineering) in support of the Sandy Creek Estates development design approvals. Design coordination has been undertaken in accordance with the *Mapleview South Subdivision – Phase 1 Registration Drawings* to ensure adequate sizing of the downstream SWMF12 to provide the required quantity and quality control. At the time of this writing, SWMF12 and the Sandy Creek Estates development are in the Detailed Design phase.

The storm sewer subcatchment plans **Drawings STM-1** for Block 193 and the overall Mapleview South Subdivision have been included in **Appendix A** and **Appendix D** respectively. Furthermore, the Post-Development Stormwater Management Plan, **Drawing SWM-1** for Block 193 has been included in **Appendix A**.

The proposed drainage system will also include a Low Impact Development (LID) source and a conveyance control measure with the aim to deliver upstream treatment for contaminants, promote groundwater recharge and assist in maintaining water balance to pre-development levels as per regulatory stormwater management design criteria. The SIS had identified a preliminary list of LID measures deemed suitable for implementation within the subject lands,



which has been further refined through consultations with the City of Barrie and LSRCA during the *Design Charrette* process for the Mapleview South Subdivision. The LID measures proposed within Block 193 include an underground infiltration gallery complete with an upstream Oil Grit Separator (OGS) unit to achieve the LSRCA and City of Barrie targets for infiltration, filtration, water balance and total phosphorus removal. The proposed LID location and footprint is shown on **Drawing SWM-1** in **Appendix A**. Further design details regarding LID measures are provided in **Section 5.2.2**.

The proposed works require an Erosion and Sediment Control Plan in order to provide the appropriate protection of downstream receiving systems during construction. The proposed ESC works are outlined within **Section 5.7** of this Report and outline the construction and staging requirements at various phases of the development. The proposed erosion and sediment control techniques are illustrated on **Drawings ESC-1** and **ESC-2**.



4. Hydrology

4.1. OTTHYMO Modeling Overview

4.1.1. Discrete Event Modeling – LID Model

The development was hydrologically modeled using the latest version of Visual OTTHYMO modeling software (version 6.2). Discrete event modeling was completed for the 25mm 4-hour Chicago (Water Quality) rainfall event, in accordance with the City of Barrie's *Storm Drainage and Stormwater Management Policies and Design Guidelines* (March 2023). LID sizing was determined based on the results of the 25mm Event modeling to ensure total volumetric capture on a discrete event basis and confirm adequate drawdown time (minimum 24hr period) of the facility.

4.1.2. Continuous Simulation Modeling – LID Model

In addition to discrete event modeling, a continuous modeling simulation was developed to assess the drawdown characteristics of the LID, as well as assess Runoff Volume Capture, SWM Quality Control, and Post-Development Water Balance for the proposed site on an annual basis. The continuous modeling simulation uses a data set of hourly precipitation obtained in the City of Barrie for a 12-month period from June 1st, 2005 to May 31st, 2006, representing a typical year. To support the continuous model simulation, the corresponding set of climatic data consisting of maximum and minimum daily temperatures for the annual period was coded into the OTTHYMO model to simulate evapotranspiration processes. Inputs to the continuous modeling simulation mimic the model setup for the proposed condition continuous modeling completed as part of the S/S.

4.1.3. Modeling Approach & Rationale

As described above, the hydrologic modeling pertaining to this Report includes two scenarios under post-development conditions. Pre-to-post development peak flow event modeling for the 2 to 100-year, 25mm Event, and Regional Event storms were completed as part of the detailed design of the Sandy Creek Estates lands and includes the proposed condition of the Mapleview South Subdivision Lands. Refer to the 969, 979 & 989 *Mapleview Drive East Stormwater Management Report* prepared by Tatham Engineering, dated November 3rd 2023. To ensure proper functionality of the receiving SWMF12 in relation to quantity and quality control, an



allowable runoff coefficient for Block 193 has been imposed as part of design coordination. Quantity and quality control target achievements for Block 193 are further described in **Section 5.3** and **Section 5.4** of this Report, respectively.

The post-development models evaluated are listed below:

- *Post-Dev-LID*: Post Development LID Model 25mm 4hr Chicago Event
- *Post-Dev-LID*: Post Development LID Model Continuous Event

The 25mm water quality event and continuous event simulations were completed to assess a number of LID facility characteristics, including:

- *the drawdown time during a typical 25mm event;*
- *the drawdown time between storm events producing runoff;*
- *sufficient redundant volume available if inter-event window is short (<48 hours);*
- *overflow of the LID;*
- *total infiltration volume on a single event and annual basis; and*
- *total capture volume on a single event and annual basis.*

After running the models, with respect to the area draining to the LID (catchment 301), the proposed infiltration gallery captured and infiltrated 100% of the total runoff water volume during the 25mm Event and **91.6%** of the annual runoff water on the continuous event. For more details and reference, the *detailed OTTHYMO outputs* can be found in **Appendix C**.

4.2. Post-Development Modeling

The post-development condition of the development lands has been broken down into three (3) catchments. The post-development catchments are outlined on **Drawing SWM-1** provided in **Appendix A**.

Catchment 301 encompasses the majority of Block 193 and includes the proposed building, a portion of landscaped area, parking space, part of the internal roadway, and the LID feature. Runoff generated by this catchment during minor events (< 5-year storm) will be conveyed via the proposed subsurface storm sewer network to the LID feature before discharging off site to the downstream SWMF12. Site grading has been designed to direct runoff generated by this catchment during major events (> 5-year storm) to the proposed internal roadway network within the Mapleview South Subdivision lands, which drain overland through Block 199 to SWMF12.



Catchment 302 represents a large portion of lawn covered sloping around the perimeter of the block, landscaped areas, and a portion of the internal roadway. Due to grading constraints, drainage generated by this catchment is not able to be directed to the proposed LID. Minor event runoff (< 5-year storm) is captured by the subsurface storm sewer system at Dallaire Street and directed to SWMF12, while major event runoff (> 5-year storm) is conveyed overland to SWMF12.

Catchment 303 represents a small portion of landscaped area along the northern boundary of the site. Due to grading constraints, drainage generated by this catchment is not able to be directed to the proposed LID. Minor event runoff (< 5-year storm) from this catchment is conveyed through the subsurface storm sewer system at Mapleview Drive East and directed to the proposed SWMF11 (by Schaffers Consulting Engineers) located southwest of the development. Major event runoff (> 5-year storm) from this catchment is conveyed to Dallaire Street and directed overland to SWMF12.

The following **Table 2** illustrates the parameters coded into the post-development OTTHYMO models for Block 193. The post-development catchment properties are illustrated on **Drawing SWM-1** in **Appendix A** of this Report.

Table 2: Post-Development OTTHYMO Model Parameters

NASHYD Catchments	Area (ha)	L (m)	S (%)	RC	CN*	Ia (mm)	Tp (hr)	DT (min)
303	0.02	3	12	0.20	55	4.64	0.02	1
STANDHYD Catchments	Area (ha)	XIMP (%)	TIMP (%)	SLPP (%)	LGP (m)	SLPI (%)	LGI (m)	DT (min)
*301	0.42	94	94	2.00	25	2.00	52.92	1
302	0.17	40	24	25.00	10	2.00	34.06	1
Storage Chamber	Manufacturer	Model	Number of Chambers	Depth of Stone Above Chamber (mm)	Depth of Stone Below Chamber (mm)	System Footprint (m ²)	Voids in Stone (Porosity)	Max Storage Volume (m ³)
1	StormTech	SC-740	42	305	305	165.2	0.4	123.41

*Runoff from this catchment is conveyed to the Site's proposed LID



5. Stormwater Management Plan

5.1. Introduction

The stormwater management plan is intended to provide an environmentally sound approach to stormwater issues. The issues can be divided into four main categories: stormwater quality control, stormwater quantity control, water balance, and erosion and sediment control.

In accordance with the S/S, the subject lands do not include any end-of-pipe stormwater management facilities. Primarily all quality and quantity control is provided off-site. All flows are directed to SWMF12 located on the Sandy Creek Estates Lands to the southeast of the subject lands. Any development adjacent to the re-aligned Sandy Cove Creek/Redfern Municipal Drain will drain uncontrolled to the 60m wide Natural Heritage System corridor which crosses the Mapleview South subdivision from southwest to northeast.

A Low Impact Development (LID) infiltration gallery has been proposed to provide additional stormwater quality control and water balance mitigation on site. In addition, the proposed infiltration gallery has been sized to accommodate the required erosion control volume for the development.

5.2. Low Impact Development & Pre-Treatment Devices

As per the recommendations of the S/S, the City of Barrie, LSRCA and MOE, a suite of Low Impact Development measures is being proposed throughout the subject lands in an effort to reduce the reliance on end-of-pipe facilities and better mimic the natural hydrologic cycle. The Mapleview South Subdivision will include both inline and offline practices associated with the stormwater management plan, all designed in accordance with the *Credit Valley Conservation Authority & Toronto and Region Conservation Authority – Low Impact Development Stormwater Management Planning and Design Guide (2010)*.

Infiltration rates used throughout the design and modeling utilize a factor of safety of 2.5 as per recommendations of the Geotechnical Consultant and Hydrogeologist.

Further description of the LID proposed for the site is provided in the subsections below. Plan, sections and detail drawings have been provided for the infiltration gallery. Refer to **Drawings LID-1** and **LID-2** in **Appendix A**.



5.2.1. Lot Level Controls

In accordance with the *SIS*, it is recommended that all catchments should incorporate an increased depth of absorbent topsoil of at least 300mm thick to promote at-source infiltration of pervious surfaces on lots. It is further recommended that any absorbent topsoil be amended with organic content (compost) as recommended in the CVC *Design Guidelines* while scarifying subsoils and remaining as unconsolidated as reasonably possible to maintain void spaces. A study conducted in BC has asserted reductions in runoff volume and peak flows up to 50% from the placement of 300mm of absorbent landscaping (British Columbia Ministry of Land, Water and Air Protection, May 2002). Another study conducted in Ontario through the *Sustainable Technologies Evaluation Program (STEP)* has confirmed similar findings with a reduction in runoff of up to 27% (STEP, Residential Lot Level SWM Practices, 2013).

Other recommendations include downspout disconnection, where roof leaders are directed away from impervious surfaces. Though not explicitly quantified, sub-area routing can be applied throughout all hydrologic modelling to capture the benefit of re-routing runoff produced from rooftops to pervious surfaces. Additionally, it is recommended to incorporate rain barrels at the lot level where possible, to further reduce runoff volumes to downstream systems.

Although the above lot level controls are recommended, they are not specifically quantified in the detailed design calculations as the provision of these controls cannot be enforced at the lot level.

5.2.2. Infiltration Gallery

An infiltration gallery is proposed in series with the storm sewer network where stormwater runoff is collected from the site's internal roadway, parking and landscaped areas, and building rooftop. The facility has been designed to have a maximized footprint to capture and infiltrate as much stormwater runoff as possible before overflowing into the next downstream segment of storm pipe. Runoff generated from the upstream catchment area will be collected by a conventional storm sewer network and directed to a proposed oil grit separator (OGS) unit for pre-treatment before entering the infiltration gallery.

The infiltration gallery is located within the parking lot of Block 193 and will be comprised of Stormtech SC-740 chambers surrounded by a clear stone media (void ratio of 0.4) and wrapped in a non-woven filter fabric. This LID will feature an ETV verified isolator row at the first run of chambers to provide additional removal of pollutants upon entry to the facility. The infiltration



gallery will have an open bottom to allow the entire footprint area to be utilized for infiltration and has been designed to provide greater than 1m of separation to the recorded high-groundwater level. Inlet and outlet pipes to the system have been configured to allow for the maximum amount of storage to be achieved in the facility, which was determined to be 123.4m³. This exceeds the volume of rainfall produced by the 25mm Water Quality Event within the LID's upstream drainage area; 105m³ (0.42ha x 25mm x 10). In addition, discrete event modelling of the LID determined a 45.3hr drawdown period over the course of this simulation, falling within the desired 24-48hr period. For further details, a detailed cross section of the LID is displayed on **Drawings LID-1** and **LID-2** in **Appendix A**, and ADS design drawings have been included in **Appendix B**.

5.2.3. Oil Grit Separator Unit

An oil grit separator (OGS) unit has been proposed immediately upstream of the LID to act as a pre-treatment device for flows entering the facility. An ADS FD-4HC unit has been sized to accept minor event runoff generated by 0.24ha of the development block. ADS detailed sizing reports have been provided in **Appendix B** of this Report. Equivalent OGS units may also be explored.

5.3. Stormwater Quantity Control

5.3.1. Peak Flow Control

The SWMF12 designed by others will provide necessary stormwater quantity control for the development. This facility will be designed to attenuate post development peak runoff generated by the north portion of the Mapleview South Subdivision lands for storm events up to and including the 100-year event.

The design of the Mapleview South Subdivision (and corresponding downstream SWMF12 by Tatham) developed allowable runoff coefficients and imperviousness values for medium density blocks within the Mapleview South Lands. Block 193 is located within catchment area 12-A of the overall Mapleview South subdivision lands. It is further defined as part of Catchment 1202 on Drawing SWM-3 of the *Mapleview South Subdivision, Phase 1 Registration Drawings*, which has been included in **Appendix D** of this Report. Area 1202 of this drawing generates drainage from both Block 193 and an additional medium density Site Plan Block known as Block 192 to the south of the proposed lands. In the proposed grading condition, 1.23ha of drainage area is directed to



SWMF12 from these Blocks combined. Refer to the *953 Maplevue Dr E – Block 192 Site Plan, Detailed Stormwater Management Report*, prepared by TJCG under separate cover.

The allowable and proposed runoff coefficients for Catchment 1202 have been illustrated in **Table 3** below.

Table 3 – Allowable vs Proposed Hydrologic Characteristics

Catchment 1202 Hydrologic Properties		
	Allowable	Proposed
Drainage Area to SWMF12 (ha)	1.30 ha	1.23 ha
Runoff Coefficient	0.75	0.73
Total Imperviousness (TIMP %)	75%	74%

Given the proposed condition of the combined site plan blocks are within the allowable limits for the hydrologic properties outlined in **Table 3** (above), it is not anticipated that the development of the Block 193 Site Plan per the *953 Maplevue Drive – Block 193 Site Plan* prepared by S&C Architects Inc. dated June 6th, 2024, will have negative hydraulic impacts on the quantity control function of the downstream SWMF12. Refer to the *969, 979, & 989 Maplevue Drive East Stormwater Management Report* prepared by Tatham Engineering, dated November 3rd 2023, and the *Maplevue South Subdivision (953 Maplevue Dr. E) Detailed Stormwater Management Report* prepared by TJCG, dated June 2023 under separate cover for further information regarding how the overall development plan achieves the required quantity control targets.

5.3.2. Runoff Volume Control

The LSRCA's *Technical Guidelines for Stormwater Management* offers guidance in determining the appropriate volumetric control targets for subject sites as a function of the site characteristics. The overall Maplevue South Subdivision lands are deemed to be a *Major Development* under the *Lake Simcoe Protection Plan* and are required to provide runoff volume control. Several constraints have been identified within the Maplevue South Subdivision lands which limit the implementation of LID measures, therefore the targets for the development were established under Section 3.2.6. *Flexible Treatment Alternative for Sites with Restrictions*. The S/S as well as various background investigations and studies, identified the following constraints:



Table 4 – Runoff Volume Control Target Factors & Constraints

Factor	Site Specific Constraint
v. Areas with high chloride concentrations	<ul style="list-style-type: none"> Infiltration of surface water from Mixed Use & High Density Residential, Collector and Arterial roadways discouraged (permitted with conditions) per City of Barrie <i>Infiltration Low Impact Development Screening Process</i>.
vi. Zoning, Setbacks, Land Use Requirements	<ul style="list-style-type: none"> Limited land use (Parks, Open Space, Institutional Blocks) given drainage area size available for centralized infiltration-based LID practices. No dedicated SWMF facilities on the subject lands
vii. Property/Infrastructure Restrictions	<ul style="list-style-type: none"> Blocks available for centralized facility are located at upstream portions of catchment or in locations where limited flow can be routed to. Limited opportunities within ROW due to servicing constraints (depth vs. groundwater)

The factors identified above limit the location and effectiveness of infiltration-based LID practices throughout the subject lands applicable to this report. Therefore, Alternative #2 was selected as the target for the overall subdivision as this is the maximum practical amount achievable (best efforts for 5mm infiltration) given the constraints.

Although Alternative #2 was established for the overall subdivision lands due to the above noted constraints, the proposed LID for Block 193 is able to exceed this target by providing a means of capturing and retaining / treating direct runoff volume from 25mm of rainfall from all impervious surfaces on site. **Therefore, meeting initial runoff volume control requirements per the LSRCA without the need for a flexible treatment alternative.** The following is a summary of calculations used to determine the LID performance outlined herein.

LID Storage Capacity: **123.41m³**

Total Block Impervious Area: 0.47m²

25mm of Rainfall Across Impervious Surfaces: $0.47\text{m}^2 \times 25\text{mm} \times 10 = 117.5\text{m}^3$



It should be noted that there is additional provided volume within the downstream SWMF12 that is not accounted for in this design.

5.3.3. Minor-Major System Conveyance

The Storm Sewer system (minor system) is designed for the 5-year event, with rainfall intensities calculated using the A, B, C parameters listed in Table 3.1 of the *City of Barrie Storm Drainage and Stormwater Management Policies and Design Guidelines*.

All storm sewers throughout the subject lands have been designed to maintain a minimum depth of cover of 1.5m.

There are no crossing conflicts anticipated with the Sanitary Sewers, Watermain, or Utility Ducts. The *Storm Drainage Area Plan*, referenced as **Drawing STM-1** in **Appendix A**, is to be reviewed in conjunction with the *Storm Sewer Design Sheet* in **Appendix B**.

Major System flows (flow > 5-year event) will be conveyed through Dallaire Street, which directs runoff to SWMF12 through a proposed overland spillway in accordance with City of Barrie Standards. For right-of-way conveyance calculations, refer to Section 5.3.3. of the *Mapleview South (Innisfil) Ltd. Detailed Stormwater Management Report*, prepared by The Jones Consulting Group, dated June 2023.

5.4. Stormwater Quality Control

As per the City, LSRCA and MOE requirements, Enhanced (Level 1) stormwater quality control for Total Suspended Solids (TSS) is required for the subject lands. Thus, an integrated treatment train approach is proposed, comprised of an oil grit separator, LID infiltration gallery and external SWM wet pond facility.

The incorporation of LID measures will also provide phosphorus removal benefits to ensure that best efforts are taken to reduce post-development phosphorus loadings to pre-development levels (or a minimum 80% removal of TP from post-development). Phosphorus Loading calculations are detailed within **Section 5.4.2**.

A summary of the proposed LID practices and their corresponding removal efficiencies is provided below in **Table 5**. Concentration-based removal efficiency values are taken from the Low Impact Development Treatment Train Tool (LIDTTT), Version 1.2.1., April 2018.



Table 5 – LID Practice for TSS and TP removal efficiency

LID BMP Concentration Based Removal Efficiencies		
LID Practice	TSS Removal Efficiency (%)	TP Removal Efficiency (%)
Oil Grit Separator	60%	20%
Infiltration Gallery	75%	60%
Wet Retention Pond	80%	63%

The total removal efficiency of a series of BMP devices in a treatment train can be expressed as follows:

$$R = 1 - (1 - A_1) * (1 - A_2) * \dots * (1 - A_n)$$

Where: R = Total Treatment Train Removal Efficiency

A_1 = Removal Efficiency of 1st (Upstream) BMP

A_2 = Removal Efficiency of 2nd (Upstream) BMP

A_n = Removal Efficiency of nth (Last downstream) BMP

An overview of the treatment trains and catchment-based performance on TSS and TP removal efficiency are provided in **Sections 5.4.1. and 5.4.2.** below.

5.4.1. TSS Removal

In terms of the quality control requirements for stormwater runoff, the “Enhanced” level of protection as stipulated by the Ministry of Environment is to be provided, i.e. 80% removal of Total Suspended Solids (TSS) on an annual basis. These requirements are to be achieved through a combination of LID practices on site and the proposed off-site stormwater management facilities on the Bulut and Sandy Creek Estates lands (SWMF11 and SWMF 12, respectively).

As demonstrated in **Section 5.3.1.**, there is no anticipated increase in peak flow or runoff volume to the respective SWMF’s beyond their intended design and as such, no impact is expected to the facilities’ ability to achieve the water quality criteria they are designed for.

There are four (4) distinct treatment trains established within the site in relation to TSS removal, as described below:



Table 6 - TSS Concentration Removal Efficiency

Treatment Train	Catchment Areas	Area (ha)	TSS Removal
OGS > Infiltration Gallery > Wet Pond (SWMF12)	202, 203, 204	0.24	98.0 %
Infiltration Gallery > Wet Pond (SWMF12)	**201	0.18	95.0 %
Wet Pond (SWMF12)	205	0.17	80.0 %
Wet Pond (SWMF11)	206	0.02	80.0 %
Sanitary Collection System	N/A	0.02	100 %
Total		0.63	91.8 %

Note: *Runoff from this catchment consists of rooftop drainage and does not produce pollutants.

Catchment Areas 201-206 are illustrated on **Drawing STM-1**.

As the results show, a **net reduction in total suspended solids of 91.8%** is achieved when implementing BMPs in the post-development condition for the Maplevue South Block 193 lands.

5.4.2. Phosphorus Budget

Similar to the Total Suspended Solids calculation, LID BMP on site and SWM facilities off-site are utilized to reduce the total phosphorus amount leaving the property. A series of treatment train approaches, their removal efficiency rate, respective subcatchment description and area are summarized below.

There are four (4) distinct treatment trains established within the site in relation to TP removal, as described below:

Table 7 - TP Concentration Removal Efficiency

Treatment Train	Catchment Areas	Area (ha)	TP Removal
Infiltration Gallery > Wet Pond (SWMF12)	*201, 202, 203, 204	0.42	85.0 %
Wet Pond (SWMF12)	205	0.17	63.0 %
Wet Pond (SWMF11)	206	0.02	63.0 %
Sanitary Collection System	N/A	0.02	100 %
Total		0.63	78.8 %

Note: *Runoff from this catchment consists of rooftop drainage and does not produce pollutants.

Catchment Areas 201-206 are illustrated on **Drawing STM-1**.



As the results show, the overall TP removal rate achieved in the post-development condition when implementing BMPs is **78.8%**. The remaining phosphorus amount not managed within the property will be addressed by the Phosphorus Offsetting Policy as described below.

Under the Lake Simcoe Protection Plan (LSPP), a stormwater management plan must demonstrate how phosphorus loadings are minimized between the existing and proposed development scenarios. Thus, a Phosphorus Budget Tool spreadsheet was prepared to reflect all parameters and calculations presented in the MECP P-Budget tool, and to determine the increase and mitigation of phosphorus load after the development and BMP adoption.

Further, the pre-development and post-development total phosphorous loading was estimated using a mass balance approach, utilizing land use breakdown statistics provided in **Appendix C**. The *MECP Pre- and Post-Development Phosphorous Loading* calculations have been provided in **Appendix B**.

Supporting calculations are provided below:

Pre-Development Annual TP Estimate

Drainage Area:	0.63ha
Annual Load:	0.12 kg/yr – from MECP Pre-Development Phosphorous Load

Post-Development Annual TP Estimate (without mitigation)

Drainage Area:	0.63 ha
Annual Load:	0.83 kg/yr – from MECP Post-Development Phosphorous Load

Post-Development Annual TP Estimate (with mitigation)

Drainage Area:	0.63 ha
Annual Load:	0.18 kg/yr – from MECP Post-Development Phosphorous Load

Pre- and post-development annual loading of **0.12 kg/yr** and **0.18 kg/yr** were respectively estimated, indicating the site has **increased** the annual total phosphorous load in the post-development condition by **0.71 kg/yr** without the implementation of BMPs. The addition of BMPs will reduce the post-development annual total phosphorous load to **0.18 kg/yr**. A net **increase** of **0.06 kg/yr** has been estimated between pre- and post-development conditions.

This development will be subject to the *Lake Simcoe Phosphorous Offsetting Policy* and as such, will pay a phosphorous offsetting fee to the LSRCA. The Phosphorous offsetting Fee, including a 15% administration fee, is calculated as follows:



Offsetting Calculation = $1.15 \times (2.5 \times \text{TP deficit in kg/yr} \times \$35,770)$

The developer is required to pay an estimated **\$6,170.33** in offsetting costs.

5.5. Stream Erosion Control

In terms of the erosion control requirements for stormwater runoff, the Ministry of Environment has stipulated that in the absence of an erosion assessment of the receiver, the 25mm post-development peak flow is to be released over a 24-hour period. These requirements are intended to be achieved through the proposed off-site stormwater management facilities on the Bulut and Sandy Creek Estates lands.

As demonstrated in **Section 5.3.1.**, there is no anticipated increase in peak flow or runoff volume to the respective SWMF's beyond their intended design and as such, no impact is expected to the facilities ability to achieve the erosion control criteria they are required to be designed for.

5.6. Water Balance

The primary objective of the LSRCA's water balance target is to capture and manage annual rainfall on the development site to preserve the pre-development hydrology (water balance) through a combination of infiltration, evapotranspiration, absorbent landscaping, rainwater reuse and/or other LID practices. Various site-specific characteristics contribute to the ability to achieve water balance. They include, but are not limited to: soil permeability, the ability to collect and direct drainage into the ground, groundwater table elevations and seasonal fluctuations. Best efforts will be made via the SWM Plan to maintain groundwater recharge while considering site specific characteristics.

A site-specific water balance in accordance with the SIS recommendations has been completed for Site Plan Block 193 by R.J. Burnside & Associates Ltd. and is included in **Appendix D** of this Report. RJB completed a pre- to post-development water balance to estimate the infiltration volume deficit that would need to be mitigated via the proposed SWM Plan. The infiltration and runoff volume as calculated in the RJB Water Balance Assessment are presented in **Table 8** below.



Table 8 - Summary of Water Balance Calculations by RJB

Water Balance Runoff & Infiltration Volumes – RJB Table G-3			
	Pre-Development	Post-Development	Difference
Impervious Area Runoff Volume (m ³ /a)	333	3,886	3,553
Pervious Area Runoff Volume (m ³ /a)	795	185	-610
Total Runoff Volume (m ³ /a)	1,127	4,071	2,944
Total Infiltration Volume from Pervious Surfaces (m ³ /a)	1,251	344	-907

The results summarized in the table above indicate that there is an increase in total runoff volume and a deficit in infiltration volume from pre- to post-development without accounting for LID's. The SWM Plan herein is intended to mitigate or reduce the water balance deficit as outlined above. Runoff generated from this development is directed to the proposed Low Impact Development (LID) infiltration gallery. The infiltration gallery and its contributing drainage area is shown on **Drawing LID-1 in Appendix A**.

Upon review of the *Environment Canada Daily Climate Normals* for the Barrie WPCC from the years 1979 to 2008, a statistical analysis of rainfall data was completed and it is noted that on an annual average over that time period, this gauge has received **928.1mm** of total precipitation, comparable to the mean average annual precipitation of 939 mm for Hewitts Creek, published in the *LSRCA Climate Data Set, April 2017* and comparable to average annual precipitation of 933 mm used by RJB in their water balance calculations.

A continuous data set of precipitation and temperature for a one-year period (June 2005-May 2006) was used for the continuous model simulation in the PCSWMM hydrologic model to estimate the annual infiltration capability of the proposed LID's. The continuous data set has a total annual precipitation of **984.3mm**, comparable to the average annual precipitations noted above.

Reviewing the results of the Post-Dev-LID (Continuous) model simulation, it is estimated that approximately **72.3%** of the annual runoff generated from the site is captured and retained by the proposed infiltration gallery. This annual capture efficiency is applied to the post-development annual runoff volume calculated by RJB (4,071m³), in addition to the post-development infiltration volume occurring naturally (344m³), increasing the site's post-development infiltration from 344 m³/a to 3,275 m³/a ((4,071m³ x 72.3%) + 344 m³). The revised annual infiltration volume results in eliminating the infiltration deficit of 907 m³/a to a surplus of **2,024m³/a**.



In summary, the proposed stormwater management plan achieves the water balance criteria for the subject lands by fully mitigating the infiltration deficit established in RJB's pre-to-post-development water balance calculations.

5.7. Erosion & Sediment Control

The proposed works will require an *Erosion and Sediment Control (ESC) Plan* in order to provide adequate protection of downstream receiver systems throughout construction. During construction, the majority of the development's natural features will be removed, and the topsoil stripped within the development area. The exposed surface will be susceptible to erosion, increasing the potential for sediment runoff. To minimize local and downstream impacts from erosion and sedimentation during construction, the following measures have been recommended:

- Excess earth and topsoil is to be stockpiled away from the creek limits and/or removed from site. Stockpiles shall be seeded or covered with erosion control if left for periods of greater than 30 days.
- Temporary sediment control fencing should be erected around the perimeter of all grading activities, including double silt fence along the south and east boundaries.
- Temporary sediment fabric and stone filters should be installed on catch basins until surface cover has been stabilized.
- Temporary rock flow check dams should be installed within drainage cut-off swales.
- A temporary construction access mud mat should be installed at the construction accesses to reduce the amount of material that may be transported off site.
- A Temporary erosion and sediment control trap is to be constructed, complete with a rip-rap lined overflow weir functioning as the trap outlet. The sediment trap's purpose is to detain runoff long enough to allow most soil particles to settle out of suspension.
- Construction during dryer months should be monitored for wind-borne transport of sediments. At the direction of the engineer, the contractor may be directed to water down exposed earth areas with an aqueous solution of calcium chloride.
- All disturbed areas not under immediate construction for 30 days, or not intended for building activities within a 3-month time period, should be stabilized with seeding.



- Phased removal of temporary sediment trap, drainage swales, rock check dams, etc. during building phase of the development to coincide with upstream stabilization (established vegetation) of catchment areas.
- A weekly monitoring program to ensure all ESC measures are in place and not damaged by vandalism or a significant weather event.

The measures described above are shown on the Erosion and Sediment Control Plan and Notes & Details, **Drawings ESC-1** and **ESC-2**, respectively, included in **Appendix A**. Through proper implementation of the detailed erosion and sediment control measures, off-site impacts are expected to be minimized during the construction phase of the project.



6. Conclusions

This Detailed Stormwater Management Report identifies the recommended servicing design for the proposed Maplevue South Subdivision. This Report outlines the proposed infrastructure required to service the site with regards to stormwater management quality control, quantity control, water balance and erosion and sediment control.

In particular, this report has recommended the following:

- Low Impact Development measures are recommended to be implemented throughout the subject lands in a variety of forms to meet additional quantity control and annual water balance targets, promote groundwater recharge and mitigate the impacts of increased runoff and stormwater pollution (including Phosphorus loadings) on end-of-pipe SWM facilities by managing runoff as close to its source as possible, as described in **Section 3.4**.
- Construct a Minor and Major Drainage system comprised of pipes and roadways to safely convey minor and major (Regional) storm events to a suitable outlet, as detailed in **Section 5.3.3**.
- Prior to construction, the erosion and sediment control measures outlined in **Section 5.7** and detailed on the engineering plans should be implemented. These controls are to be maintained throughout the construction period and only removed once exposed areas have been stabilized with vegetative cover.
- The Designs in this report are consistent with the *Hewitt's Secondary Plan Area Subwatershed Impact Study* prepared by R.J. Burnside & Associates Ltd., City of Barrie *Storm Drainage and Stormwater Management Policies & Guidelines*, LSRCA Technical Guidelines for *Stormwater Management Submissions*, the CVC/TRCA *Low Impact Development Stormwater Management Planning and Design Guidelines*, the MOE *Stormwater Management Planning and Design Manual* and industry best-practices at the time of report preparation.

It is recommended that this report be accepted as fulfilling the civil engineering and stormwater management requirements in support of the Site Plan Application.

All of which is respectfully submitted,
THE JONES CONSULTING GROUP LTD.

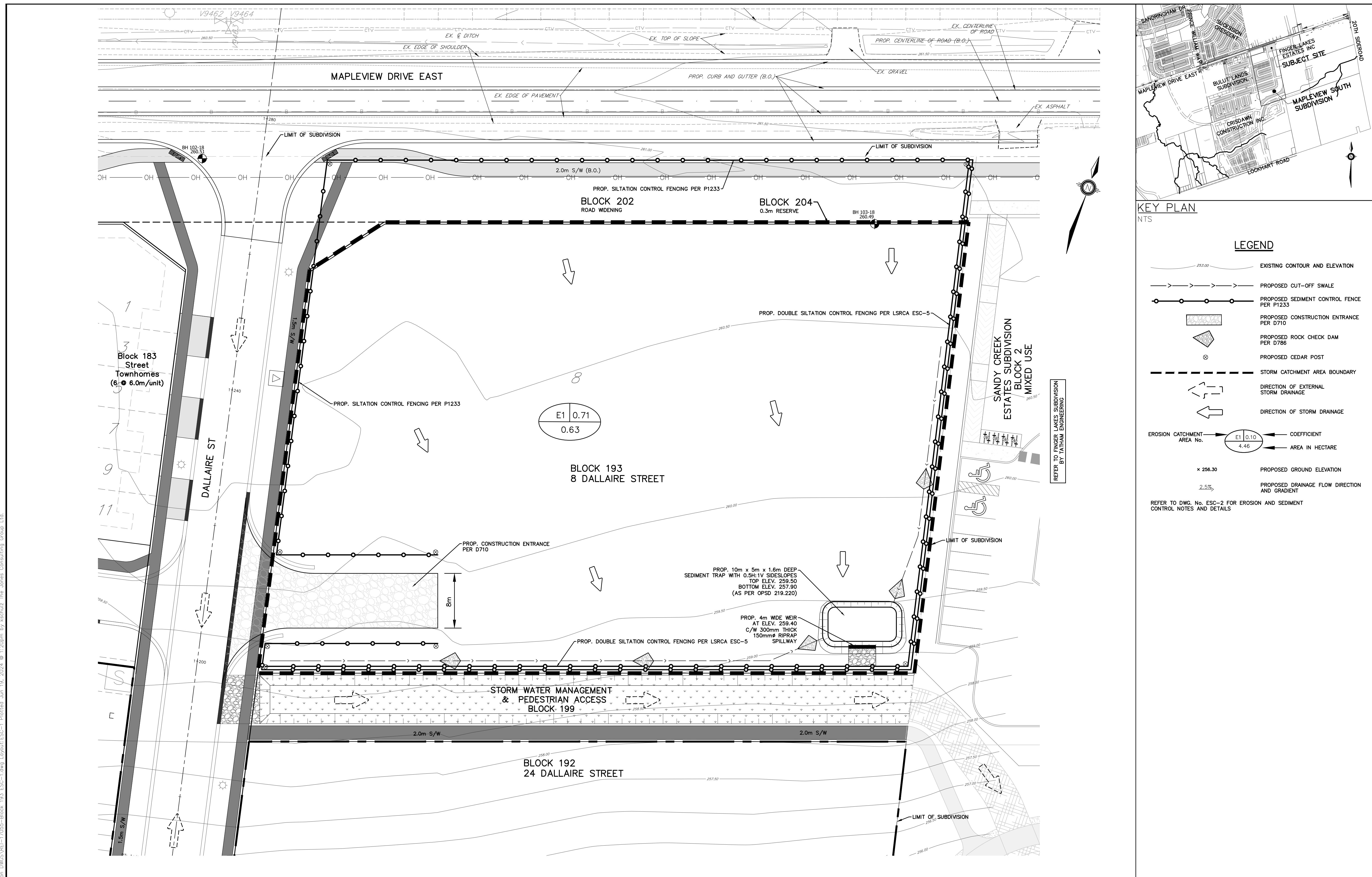


Appendix A

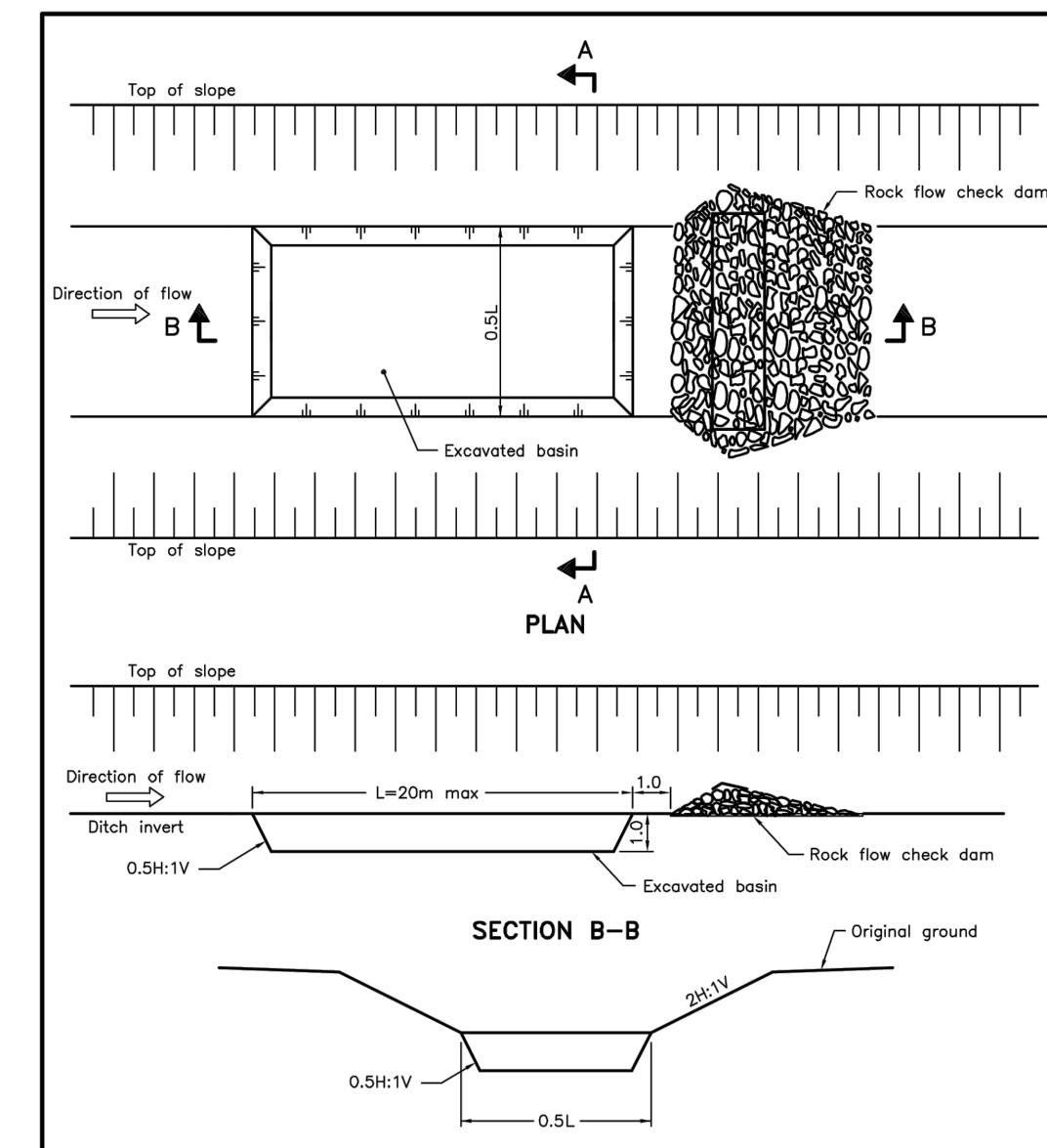
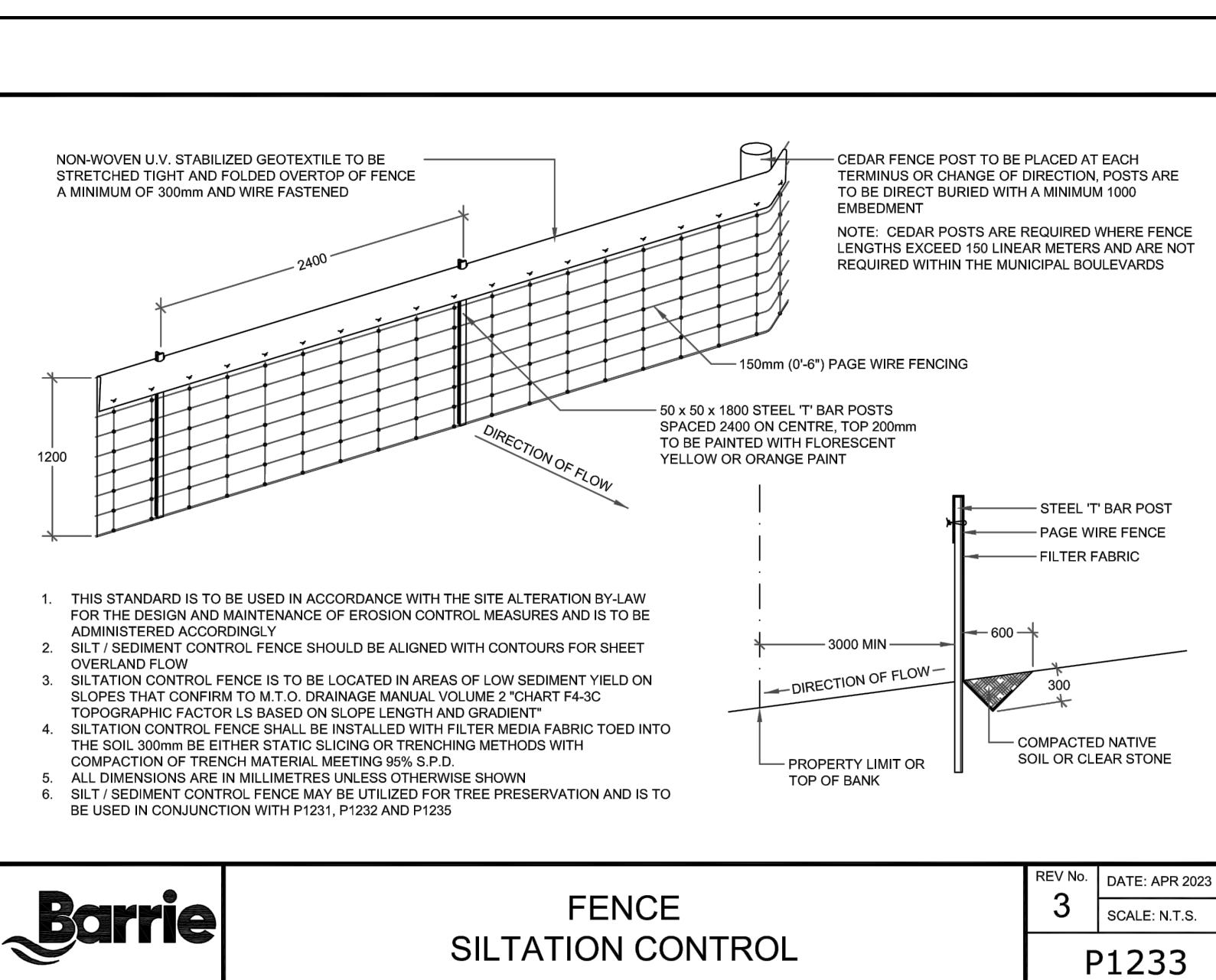
Engineering Drawings

The Jones Consulting Group Ltd. – *Mapleview South (Innisfil) Ltd.* 953 Mapleview Drive East, Block 193 Drawings, Stamped June 21, 2024:

- ESC-1 Erosion and Sediment Control Plan
- ESC-2 Erosion and Sediment Control Plan – Notes and Details
- STM-1 Storm Sewer Subcatchment Plan
- DS-1 Design Sheets
- SWM-1 Post-Development Stormwater Drainage Area Plan
- LID-1 LID Plan View, Infiltration Gallery
- LID-2 LID Sections & Details, Infiltration Gallery

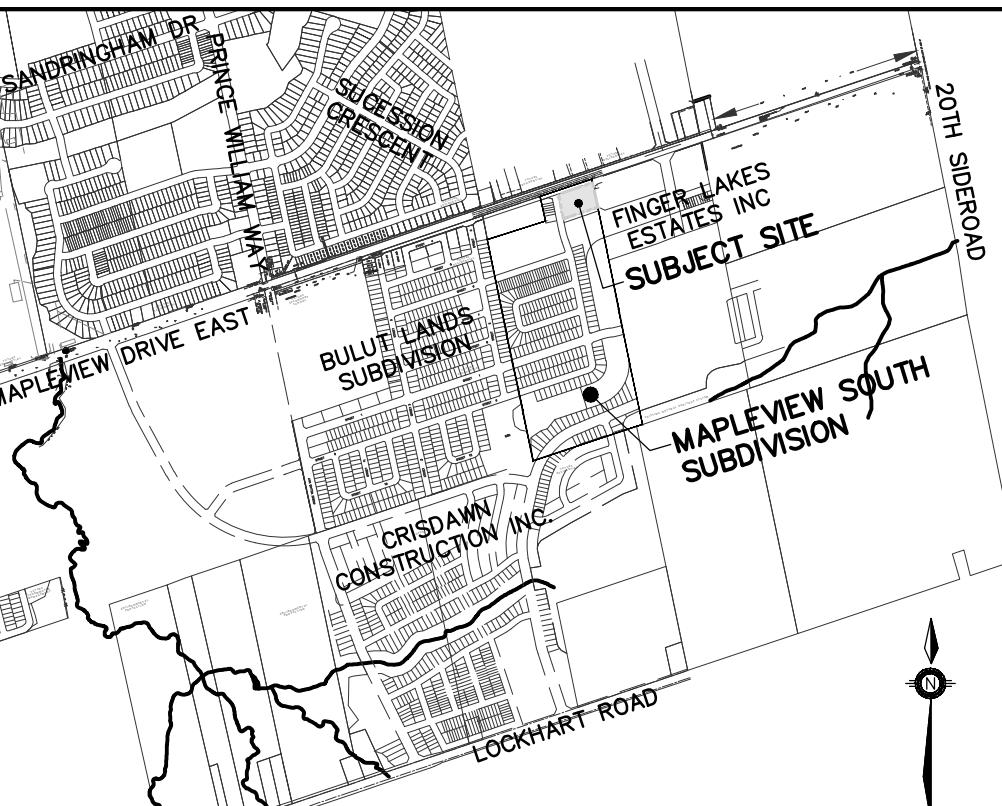


REFERENCES: 1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES 2. OPSD AND OPSS LATEST MANUALS AND GUIDELINES 3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED 4. SANDY COVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED 5. BULUT LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING 6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD. 7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED 8. OLS PLAN BY RUDY MAK SURVEYING LTD. 9. AWAN GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD. 10. HEWITT'S CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD. 11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBİUM INC. 12. HYDROGEOLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED 13. HEWITT'S SECONDARY PLAN AREA SIS BY R.J. BURNSIDE & ASSOCIATES LIMITED 14. LSRCA LATEST MANUALS AND GUIDELINES		BENCHMARK: BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N491212.851 E611241.154 ELEV 223.039 BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 790m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4912264.547 E611717.298 ELEV 225.549 BENCHMARK NO. 03120080008. LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #11) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 211.834 BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONIA ROAD. N4910878.122 E607601.062 ELEV 248.996					
NO.	REVISIONS	DATE	INITIAL				
1.	FIRST SUBMISSION	JUNE 2024	DR				
MAPLEVIEW SOUTH (INNISfil) LTD 953 MAPLEVIEW DRIVE EAST CITY OF BARRIE BLOCK 193 EROSION AND SEDIMENT CONTROL PLAN				 JONES CONSULTING GROUP LTD. <small>PLANNERS & ENGINEERS</small>  M.G. FLIS 100149153 06-21-2024		229 Mapleview Dr. Unit 1 Barrie, ON N4W 5P1 P: 705.742.5383 F: 705.741.0566	



EROSION CONTROL NOTES

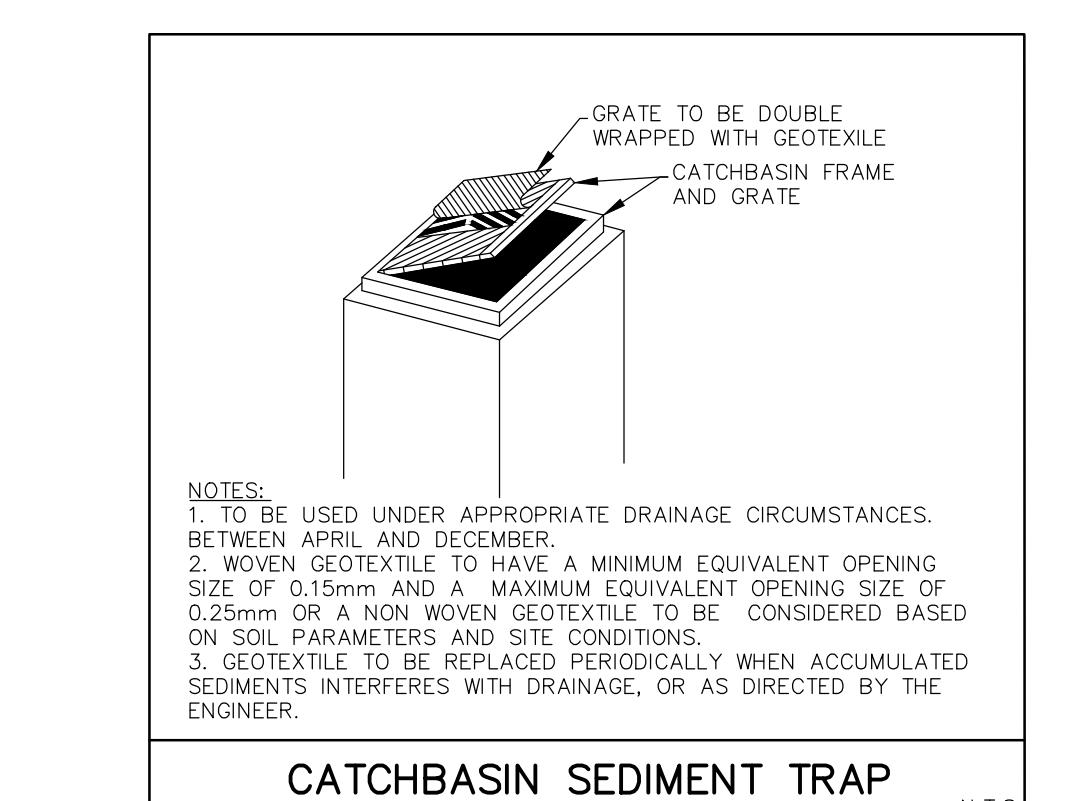
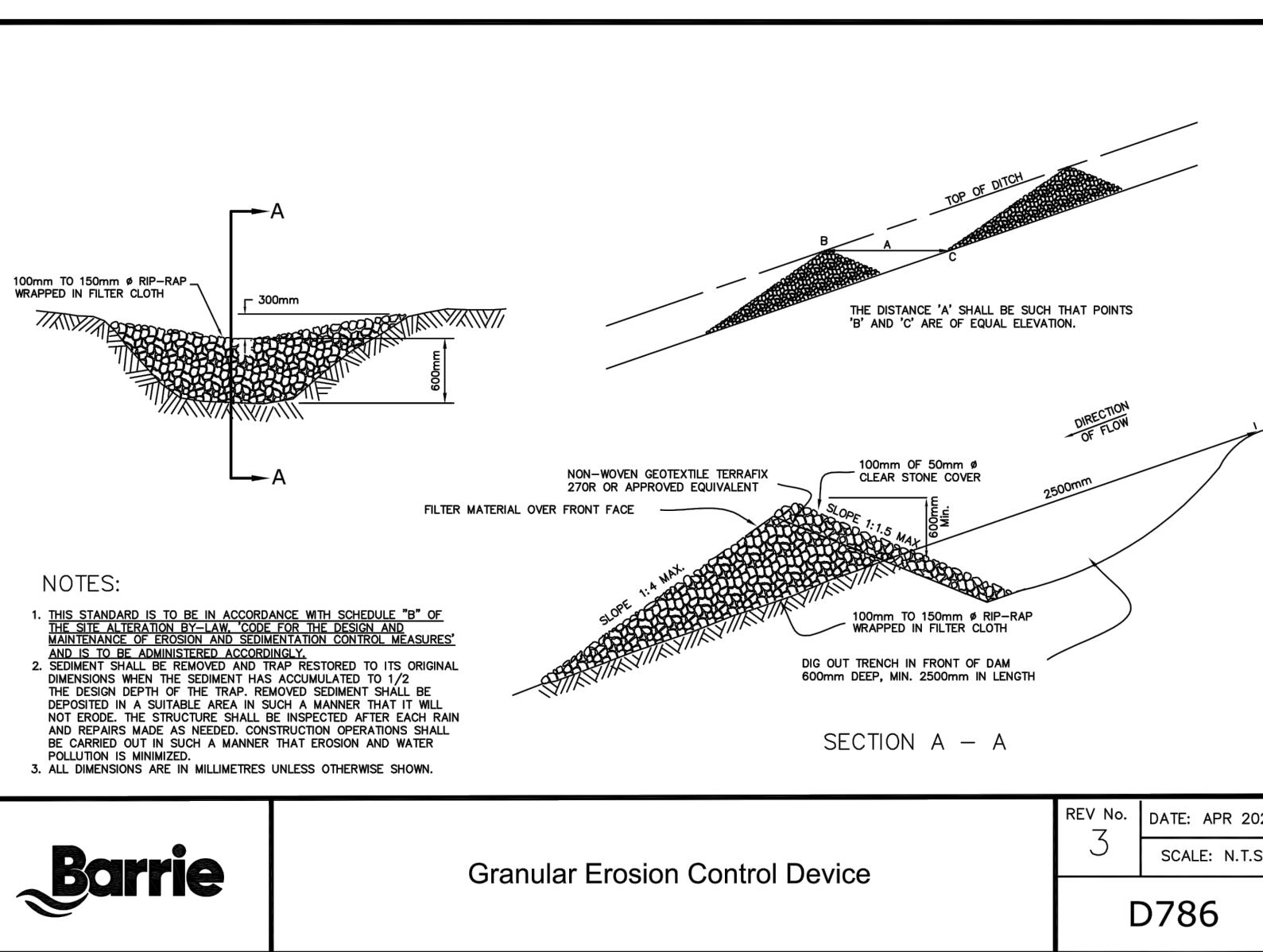
1. THE ACCOMPANYING PLANS SET OUT THE MEASURES THAT WILL BE TAKEN BY THE DEVELOPER AND ITS CONTRACTORS TO CONTROL DOWNSTREAM SEDIMENT TO THE LOWEST LEVEL PRACTICALLY ACHIEVABLE. THE CONDITIONS AND TECHNIQUES SET OUT ARE TO BE FOLLOWED UNLESS APPROVED OTHERWISE BY THE CONTRACT ADMINISTRATOR, CONSERVATION AUTHORITY AND/OR MUNICIPALITY.
2. ALL TEMPORARY SILT CONTROL AND EROSION PROTECTION DEVICES (I.E. SILT FENCING, DRAINAGE SWALES, ROCK CHECK DAMS, SEDIMENT BASIN, GRAVEL ACCESS PAD, ETC.) SHALL BE CONSTRUCTED PRIOR TO COMMENCEMENT OF SITE WORKS AND SHALL REMAIN IN PLACE AND BE MAINTAINED BY THE CONTRACTOR UNTIL CONSTRUCTION IS COMPLETE AND THE GRASS HAS ESTABLISHED GROWTH, SUBJECT TO APPROVAL BY THE CITY ENGINEERING DEPARTMENT.
3. ALL SEDIMENTATION CONTROL MEASURES ARE TO BE INSPECTED REGULARLY (MINIMUM WEEKLY), AS WELL AS AFTER EVERY SIGNIFICANT RAINFALL EVENT AND ANY DAMAGED SILT CONTROL AND EROSION PROTECTION DEVICES SHALL BE PROMPTLY REPAIRED OR REPLACED BY THE CONTRACTOR.
4. THE CONTRACTOR MUST USE MATERIALS, CONSTRUCTION PRACTICES, AND MITIGATION TECHNIQUES IN ORDER TO PREVENT THE UNAUTHORIZED HARMFUL ALTERATION, DISRUPTION OR DESTRUCTION (HADD) OF VEGETATION OR THE IMPAIRMENT OF RECEIVER WATER QUALITY.
5. THE CONTRACTOR SHALL BE PREPARED FOR UNEXPECTED CONDITIONS AND ACCORDINGLY HAVE STOCKPILED MATERIALS ON SITE FOR NECESSARY REPAIRS AS A RESULT OF FAILED OR INADEQUATE CONTROL MEASURES.
6. AREAS WITHOUT STABLE GROUND COVER SHALL BE PROTECTED WITH SILTATION CONTROL FENCING, STRAW MULCH, ETC, AND MAINTAINED BY THE CONTRACTOR UNTIL VEGETATION HAS BECOME ESTABLISHED IN THE SUBSEQUENT GROWING SEASON.
7. ALL EXPOSED SOIL MUST BE GRADED TO A STABLE SLOPE AND TREATED AS QUICKLY AS POSSIBLE TO PREVENT EROSION AND SEDIMENT FROM LEAVING THE SITE. ALL AREA STRIPPED OF VEGETATIVE COVER FOR LONGER THAN 15 DAYS SHALL BE HYDROSEEDED AT THE DIRECTION OF THE ENGINEER. HYDROSEED WITH FIBRETAC AT 100KG/HA AND MIXTURE OF 48% ANNUAL RYE GRASS, 48% FALL RYE, 4% RED CLOVER WILL NEED TO BE APPLIED TO ANY EXPOSED AREAS FOLLOWING TOPSOIL STRIPPING.
8. ALL SITE DRAINAGE TO BE DIRECTED TO THE TEMPORARY SEDIMENT BASINS AND OTHER CHECK DAMS VIA SHEET DRAINAGE, BERMS OR SWALES (AS NECESSARY) TO FACILITATE THE COMPLETION OF GRADING WORKS. THE CONTRACTOR SHALL CONSTRUCT ANY ADDITIONAL SWALES OR BERMS THAT MAY BE NECESSARY TO DIRECT RUN-OFF IN A CONTROLLED MANNER TO A SUITABLE TREATMENT PRACTICE.
9. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE FROM THE PROPOSED CONSTRUCTION ACCESS VIA THE GRAVEL ACCESS PAD.
10. ANY DEWATERING WASTE SHALL BE DISCHARGED TO A VEGETATED AREA AT LEAST 30m FROM ANY WATERCOURSE AND FILTERED PRIOR TO RELEASE. FILTERING METHODS MUST BE APPROVED BY THE SITE INSPECTOR.
11. TECHNIQUES FOR EROSION AND SEDIMENT CONTROLS ARE TO ADHERE TO ACCEPTED ENGINEERING PRACTICE AND MUNICIPAL, CONSERVATION AUTHORITY AND ONTARIO PROVINCIAL STANDARD SPECIFICATIONS AND DRAWINGS. THE CONTRACTOR SHALL OBTAIN A CURRENT COPY AND BECOME FAMILIAR WITH OPSS 805; CONSTRUCTION SPECIFICATION FOR TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES, AS WELL AS APPLICABLE MUNICIPAL STANDARDS AND/OR APPROVAL AGENCY STANDARDS.
12. THE CONTRACTOR MAY CONSIDER ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES, SUCH MEASURES MUST BE PRESENTED IN WRITING FOR APPROVAL BY THE CONTRACT ADMINISTRATOR AND MUST BE APPROVED IN WRITING BY THE APPLICABLE APPROVAL AGENCIES.



KEY PLAN

NTS

SITE DATA	
OVERALL SITE AREA TO BE DISTURBED	0.63 Ha
EXISTING LAND USE	(VACANT) AGRICULTURAL FIELD
PREDOMINANT SOIL TYPE	BONDHEAD SANDY LOAM
SEDIMENT TRAP SIZING	
BOTTOM ELEVATION	257.90
TOP ELEVATION	259.50
OVERFLOW WEIR ELEVATION	259.40
DIMENSIONS (LxWxD)	10m x 5m x 1.6m
STORAGE VOLUME	100m ³
CATCHMENT AREA	0.63 Ha
REQUIRED STORAGE VOLUME BASED ON 125m ³ OF DRAINAGE AREA TO POND	78.75m ³



CONSTRUCTION SEQUENCE

THE FOLLOWING CONSTRUCTION SEQUENCE IS PROVIDED FOR CONTRACTOR GUIDANCE:

THE FOLLOWING CONSTRUCTION SEQUENCE IS PROVIDED FOR CONTRACTOR GUIDANCE:

1. CONSTRUCT ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES INCLUDING SILT FENCE, TREE PRESERVATION FENCE, MUD MATS, CHECK DAMS, SWALES/BERMS AND TEMPORARY SEDIMENT BASIN, ETC.
2. HYDROSEED ALL EROSION CONTROL WORKS, IE. TEMPORARY DRAINAGE SWALES/BERMS.
3. STRIPPING AND REMOVAL OF TOPSOIL. TOPSOIL TO BE REMOVED FROM SITE OR STOCKPILED AT THE DESIGNATED LOCATION AS DIRECTED BY THE ENGINEER.
4. PROCEED WITH EARTH EXCAVATION AND PRE-GRADING.
5. PROCEED WITH SEEDING OF RESTORATION AREAS AS DIRECTED BY ENGINEER.
6. PROCEED WITH SITE WORKS I.E. SITE SERVICING AND SURFACE WORKS INSTALLATIONS.
7. RESTORATION OF DISTURBED AREAS.

NOTE SILTATION AND EROSION CONTROL MEASURES ARE TO BE MONITORED AND MAINTAINED THROUGHOUT CONSTRUCTION AND NECESSARY REPAIRS TO BE COMPLETED PROMPTLY, AS REQUIRED.

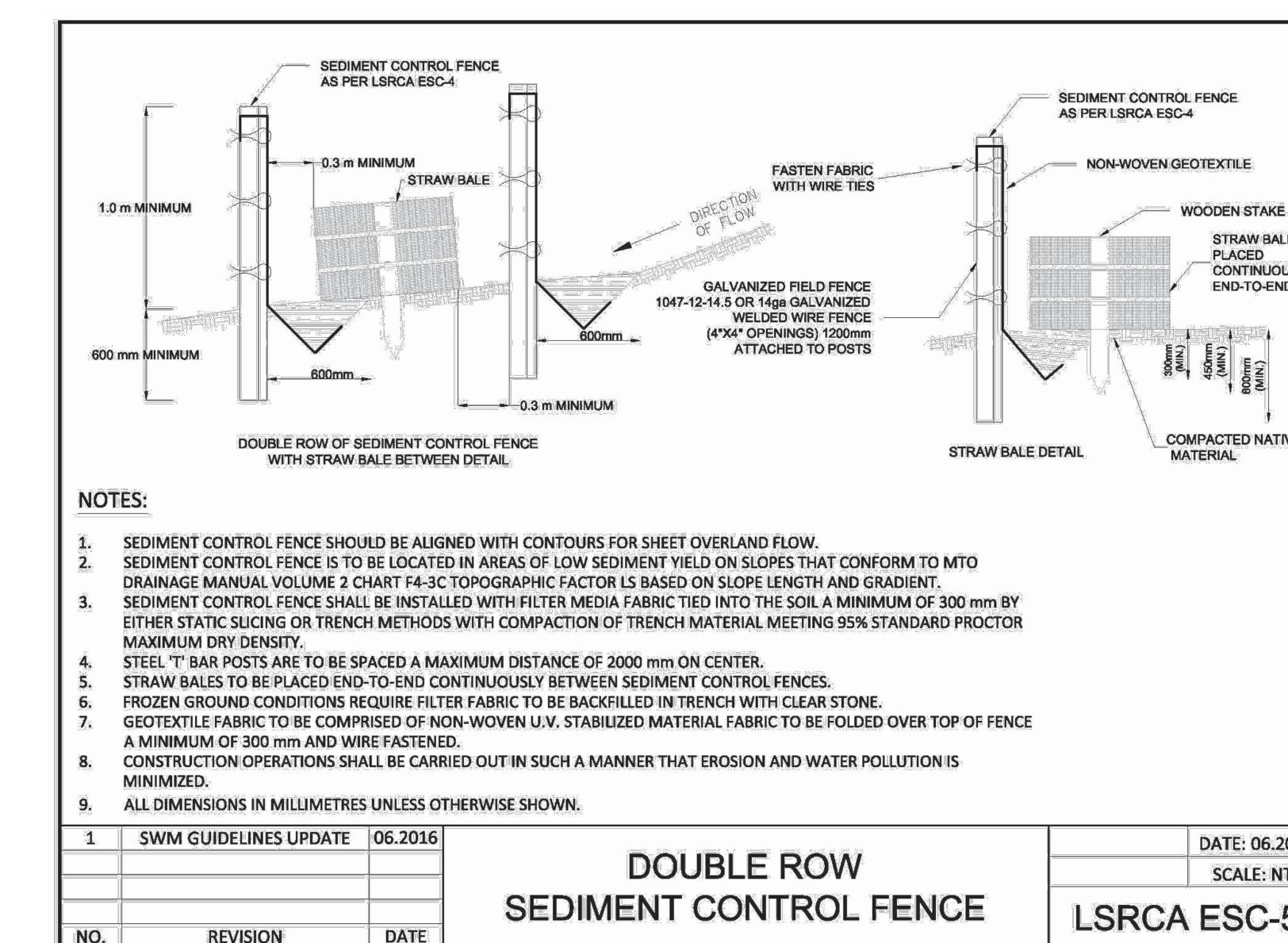
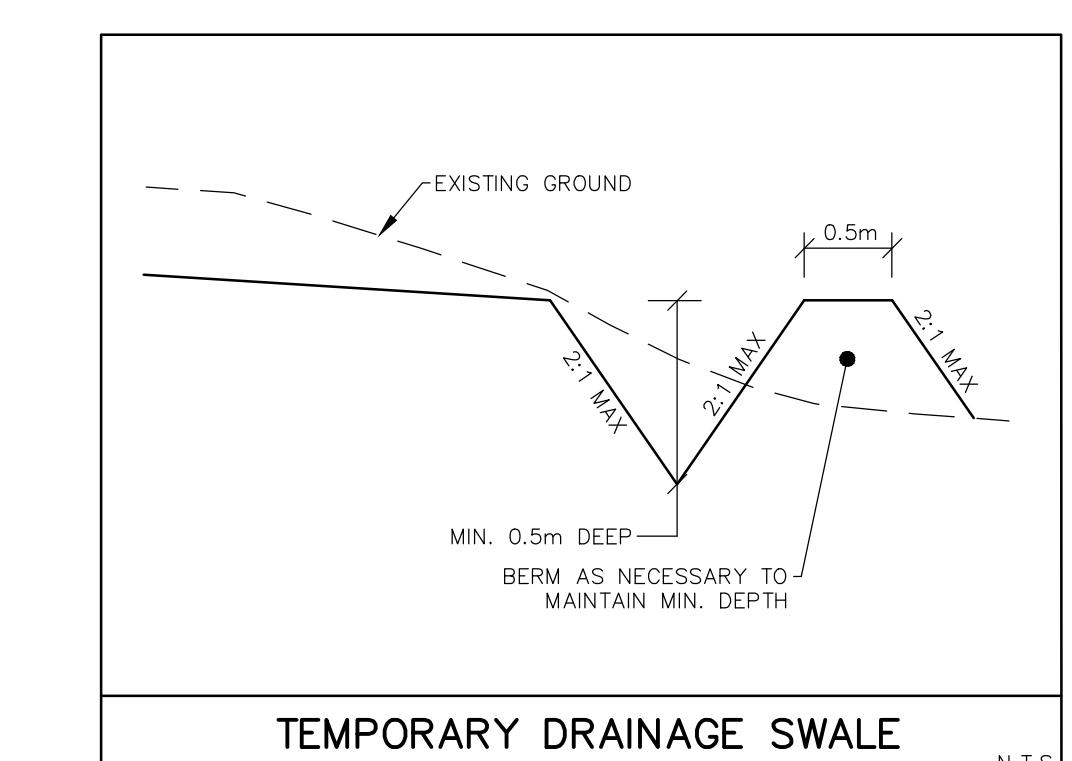
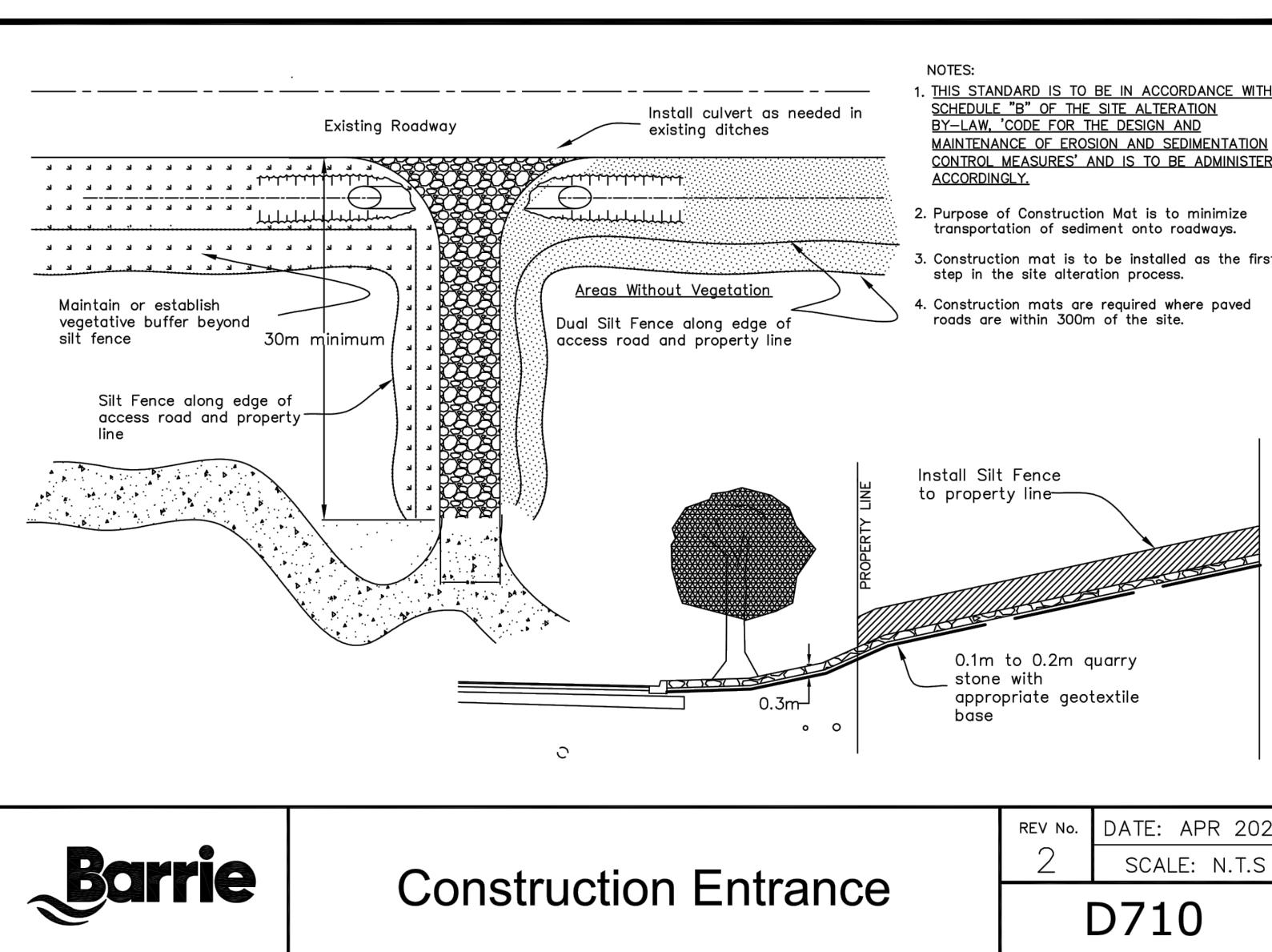
CONTINGENCY PLAN

IF UNFORESEEN EVENTS CAUSE THE STRATEGIES SET OUT IN THIS PLAN TO BE INSUFFICIENT OR INAPPROPRIATE TO MEET THE OBJECTIVE, THE CONTRACTOR IS EXPECTED TO RESPOND IN A TIMELY MANNER WITH ALL REASONABLE MEASURES CONSISTENT WITH SAFETY, TO

IF A SPILL OCCURS IT SHALL BE REPORTED TO THE MINISTRY OF ENVIRONMENT CONSERVATION AND PARKS AND THE MINISTRY OF NATURAL RESOURCES. THE ON CALL CITY OF BARRIE ENVIRONMENTAL OFFICER SHOULD ALSO BE NOTIFIED VIA CELL PHONE (705) 727-7500.

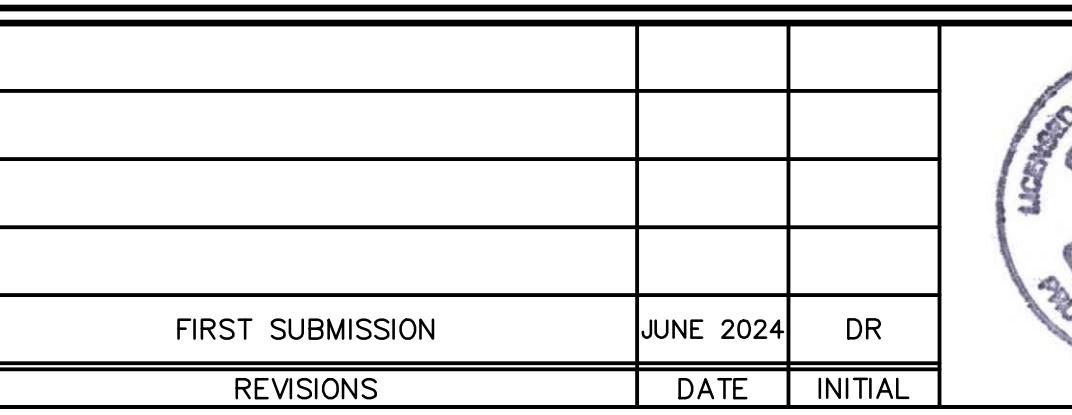
725-3374.

IF APPROVAL AGENCIES DETERMINE THAT LONG TERM DAMAGE TO THE NATURAL ENVIRONMENT HAS OCCURRED DUE TO FAILURE OF THIS PLAN TO CONTROL SEDIMENT, A RESTORATION PLAN WILL BE DEVELOPED BY THE CONTRACTOR IN CONSULTATION WITH AND APPROVAL FROM THE APPROPRIATE AGENCIES FOR IMPLEMENTATION BY THE CONTRACTOR.



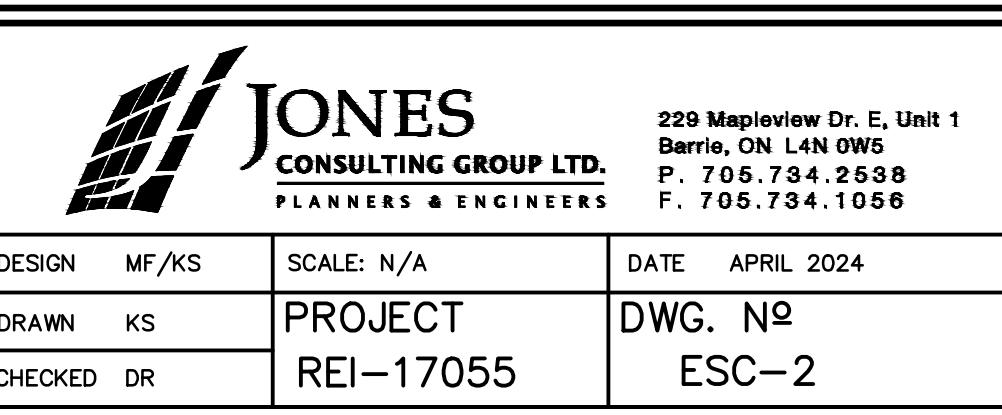
3GS\REI-17055-Block 193 ESC-1.dwg Layed:ESC-2 Plotted Jun 21, 2024 @ 8:20am by kschulz The Jones Consulting Group Ltd.

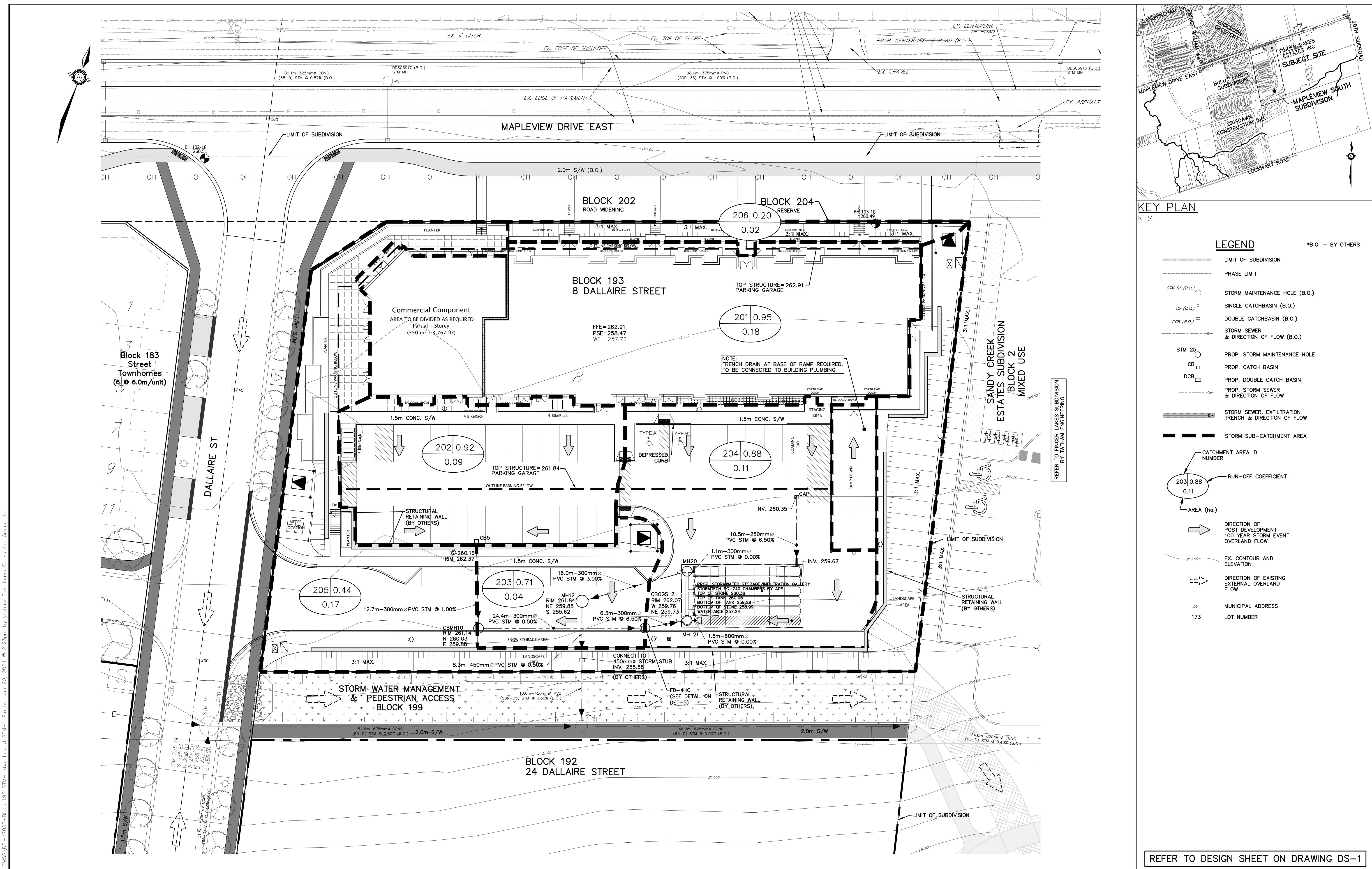
REFERENCES:	BENCHMARK:
<ol style="list-style-type: none"> 1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES 2. OPSD AND OPSS 3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED 4. SANDY COVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED 5. BULUT LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING 6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD. 7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED 8. OLS PLAN BY RUDY MAK SURVEYING LTD. 9. AWAN GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD. 10. HEWITT'S CENTRAL SUBDIVISION (BRADLEY HOMES) BY JONES CONSULTING GROUP LTD. 11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBIDIUM INC. 12. HYDROGEOLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED 13. HEWITT'S SECONDARY PLAN AREA SIS BY R.J. BURNSIDE & ASSOCIATES LIMITED 14. LSRCA LATEST MANUALS AND GUIDELINES 	<p>BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N4912122.851 E611241.154 ELEV 223.039</p> <p>BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 790m WEST OF THE MAPLEVIEW DRIVE EAST AND 20TH SIDE ROAD INTERSECTION. N4912264.547 E611717.298 ELEV 225.549</p> <p>BENCHMARK NO. 03120080008. LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE STREET (HWY #11) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N4911763.816 E610187.698 ELEV 211.834</p> <p>BENCHMARK NO: 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONIA ROAD. N4910878.122 E607601.062 ELEV 248.996</p>



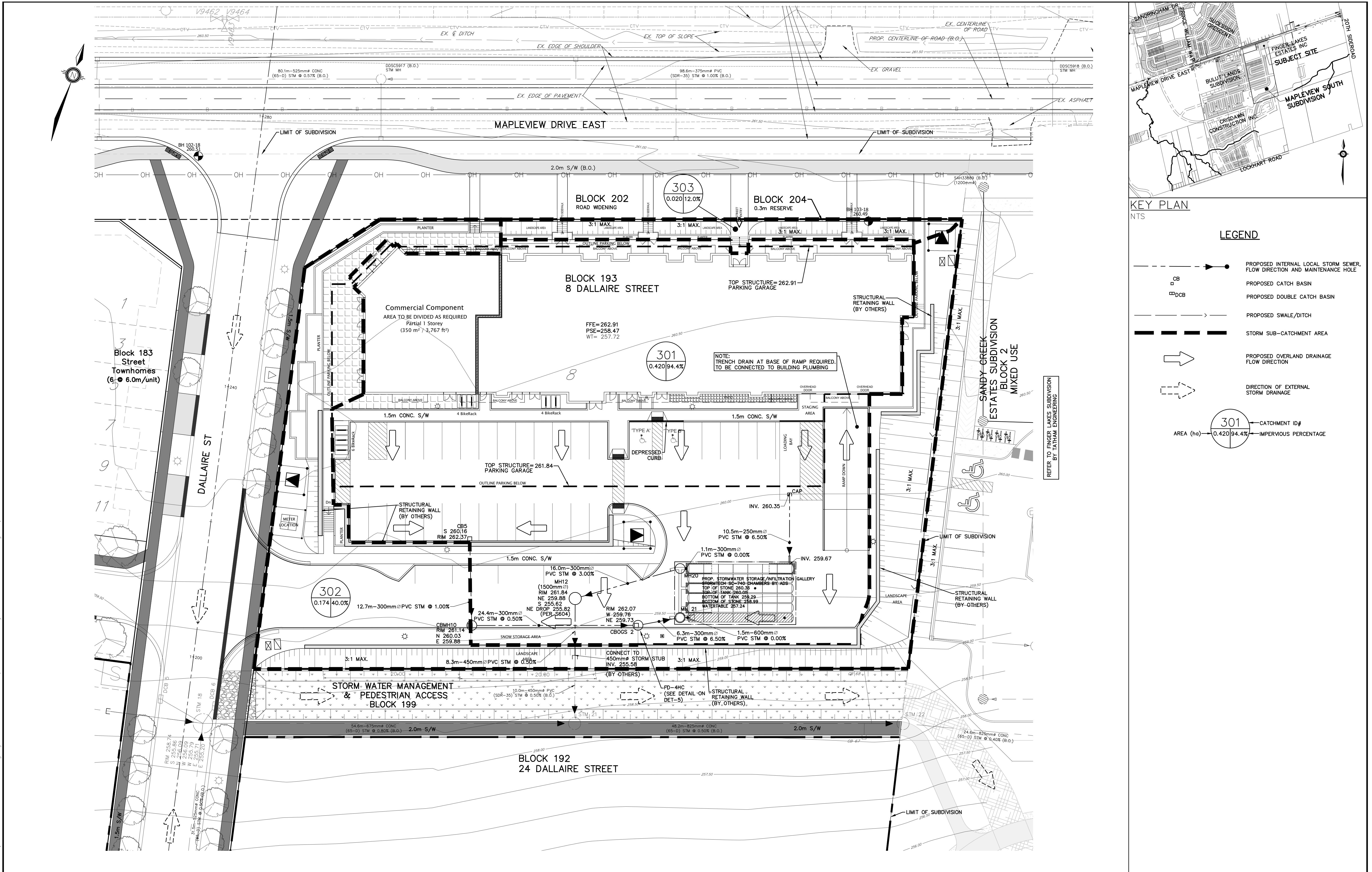
MAPLEVIEW SOUTH (INNISFIL) LTD
953 MAPLEVIEW DRIVE EAST
CITY OF BARRIE

BLOCK 193
EROSION AND SEDIMENT CONTROL PLAN
NOTES AND DETAILS



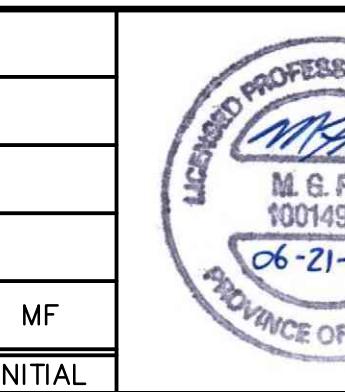


BLK 193 STORM SEWER DESIGN - MINOR SYSTEM																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		Design flow in (m³/s)			Q= C·I·A / 360			Pipe capacity (m³/s)			Q			Client: Anthony Reino																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		Site specific runoff coefficient			C			Manning roughness value			n=0.013			Project: Mapleview South (Innisfil) LTD - BLK 193																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Rainfall intensity (mm/hr)			I = A(T.C. + B) ^ C			Cross sectional area of pipe (m²)			A			Address: 953 Mapleview Drive East																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
function of the local intensity-duration data			A= 843.019			Hydraulic Radius (m)			R_h			File: REI-17055																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
function of the local intensity-duration data			B= 4.582			Sewer pipe slope (m/m)			S			Design: KR																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
function of the local intensity-duration data			C= 0.763			Velocity of flow (m/s)			V			Check: MF																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Max. time of concentration (min)			T.C.= 10									Date: June 19 2024																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Drainage area (ha)			A									Design sheet: DS-1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
AREAS	Street	MANHOLE		LENGTH (m)	INCREMENT			TOTAL CA	FLOW TIME (min)		I (mm/h)	TOTAL Q (cms)	S (%)	D (mm)	Q FULL (cms)	V FULL (m/s)	% FULL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		FROM	TO		C	A	CA		TO	IN																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
201	BLK 193	BLDG	LID	10.5	0.95	0.18	0.17	0.17	10.00	0.06	109	0.052	6.50	250	0.152	3.1	34.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
202	BLK 193	CB5	CBMH10	12.7	0.92	0.09	0.08	0.08	10.00	0.15	109	0.024	1.00	300	0.097	1.4	24.7																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
203	BLK 193	CBMH10	CBOGS2	24.4	0.71	0.04	0.03	0.11	10.15	0.42	108	0.032	0.50	300	0.068	1.0	47.3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
204	BLK 193	CBOGS2	LID	6.3	0.88	0.11	0.10	0.21	10.58	0.03	106	0.061	6.50	300	0.247	3.5	24.6																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	BLK 193	LID	MH12	16.0				0.21	10.61	0.11	106	0.061	3.00	300	0.167	2.4	36.2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	BLK 193	MH12	STUB	8.3				0.21	10.72	0.11	105	0.060	0.50	450	0.202	1.3	29.9																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
MAPLEVIEW SOUTH SUBDIVISION SANITARY DESIGN SHEET (DETAILED DESIGN 1ST SUBMISSION, JUNE 2023)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
SANITARY SEWER DESIGN - LOCAL SEWER Development Details Basis																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
DESIGN SHEET 1 of 1 FILE NO REI-17055 CONTRACT / PROJECT MAPLEVIEW SOUTH (INNISFIL) LTD.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<p>Barrie</p> <p>$n = 0.013$ $M = 5/P^0.2$ Babbitt $M = 1/[14(P+P^0.5)]$ Harmon $Q_p = P^0.7 M/86.4$ $Q_p = I^A$ $Q_p = Q_p + Q_i$ $Q_{Commercial}$</p> <p>Numbers in blue or text in red are equations (Harmon or Babbitt peaking factor where; $M \geq 2$), the greater of the two is used in the spreadsheet. Please refer to Section 3.3.1.1 of the Barrie Sanitary Design Guidelines for additional guidance on which peaking factor to use.</p> <p>(Peak population flow where; $q = 225 \text{ L/day/person}$; $P = \text{population in thousands}$) (Peak extraneous flow; $I = 0.1 \text{ L/s/ha over development area}$) (Total peak flow as the sum of peak population flow and peak extraneous flow)</p> <p>See Note 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">AREA - STREET</th> <th colspan="2">MAINTENANCE HOLE</th> <th rowspan="2">DWELL UNITS</th> <th rowspan="2">DWELL (ACC) UNITS</th> <th rowspan="2">DENSITY P.P.U.</th> <th rowspan="2">POP. (P)</th> <th rowspan="2">POP. (ACC)</th> <th rowspan="2">M PEAKING FACTOR BABBITT</th> <th rowspan="2">M PEAKING FACTOR HARMON</th> <th rowspan="2">Max PEAKING FACTOR</th> <th rowspan="2">Q_p (l/s)</th> <th rowspan="2">AREA (ACC) (ha)</th> <th rowspan="2">Q_i (l/s)</th> <th rowspan="2">Q_tot (l/s)</th> <th rowspan="2">L (m)</th> <th rowspan="2">D (mm)</th> <th rowspan="2">S (%)</th> <th rowspan="2">Qf FULL (l/s)</th> <th rowspan="2">d/D⁽²⁾</th> <th rowspan="2">d/D⁽³⁾</th> <th rowspan="2">Velocity FULL (m/s)</th> <th rowspan="2">Velocity Partial⁽¹⁾ (m/s)</th> <th rowspan="2">Velocity > 0.6 (m/s)</th> </tr> <tr> <th>FROM</th> <th>TO</th> </tr> </thead> <tbody> <tr><td>1A - Colosimo Cres</td><td></td><td></td><td>8</td><td></td><td>3.25</td><td>26</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>1B - Colosimo Cres</td><td>SAN 01A</td><td>SAN 02A</td><td>8</td><td>16</td><td>2.57</td><td>21</td><td>47</td><td>9.234</td><td>4.321</td><td>9.234</td><td>1.120</td><td>0.49</td><td>0.49</td><td>0.049</td><td>1.169</td><td>52.2</td><td>200</td><td>2.00</td><td>46.384</td><td>0.109</td><td>Ok</td><td>1.476</td><td>0.618</td><td>Ok</td></tr> <tr><td>2A - Colosimo Cres</td><td></td><td></td><td>10</td><td></td><td>3.25</td><td>33</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2B - Colosimo Cres</td><td>SAN 02A</td><td>SAN 03A</td><td>16</td><td>42</td><td>2.57</td><td>41</td><td>120</td><td>7.638</td><td>4.221</td><td>7.638</td><td>2.391</td><td>0.76</td><td>1.25</td><td>0.125</td><td>2.516</td><td>108.7</td><td>200</td><td>1.10</td><td>34.399</td><td>0.183</td><td>Ok</td><td>1.095</td><td>0.628</td><td>Ok</td></tr> <tr><td>3 - Dallaire St</td><td>SAN 03A</td><td>SAN 04A</td><td>6</td><td>48</td><td>3.25</td><td>20</td><td>140</td><td>7.412</td><td>4.201</td><td>7.412</td><td>2.696</td><td>0.32</td><td>1.57</td><td>0.157</td><td>2.853</td><td>74.6</td><td>200</td><td>1.00</td><td>32.798</td><td>0.199</td><td>Ok</td><td>1.044</td><td>0.629</td><td>Ok</td></tr> <tr><td>4 - Colosimo Cres</td><td>SAN 05A</td><td>SAN 06A</td><td>8</td><td>8</td><td>3.25</td><td>26</td><td>26</td><td>10.375</td><td>4.364</td><td>10.375</td><td>0.702</td><td>0.39</td><td>0.39</td><td>0.039</td><td>0.741</td><td>58.5</td><td>200</td><td>2.00</td><td>46.384</td><td>0.088</td><td>Ok</td><td>1.476</td><td>0.534</td><td>Check</td></tr> <tr><td>5 - Colosimo Cres</td><td>SAN 06A</td><td>SAN 07A</td><td>3</td><td>11</td><td>3.25</td><td>10</td><td>36</td><td>9.735</td><td>4.342</td><td>9.735</td><td>0.906</td><td>0.19</td><td>0.58</td><td>0.058</td><td>0.864</td><td>14.7</td><td>200</td><td>2.00</td><td>46.384</td><td>0.099</td><td>Ok</td><td>1.476</td><td>0.577</td><td>Check</td></tr> <tr><td>6 - Colosimo Cres</td><td>SAN 07A</td><td>SAN 08A</td><td>18</td><td>29</td><td>3.25</td><td>59</td><td>94</td><td>8.019</td><td>4.251</td><td>8.019</td><td>1.968</td><td>0.64</td><td>1.22</td><td>0.122</td><td>2.090</td><td>80.7</td><td>200</td><td>1.20</td><td>35.929</td><td>0.163</td><td>Ok</td><td>1.144</td><td>0.610</td><td>Ok</td></tr> <tr><td>7 - Colosimo Cres</td><td>SAN 08A</td><td>SAN 04A</td><td>13</td><td>42</td><td>3.25</td><td>42</td><td>137</td><td>7.446</td><td>4.204</td><td>7.446</td><td>2.647</td><td>0.53</td><td>1.75</td><td>0.175</td><td>2.822</td><td>76.4</td><td>200</td><td>1.00</td><td>32.798</td><td>0.198</td><td>Ok</td><td>1.044</td><td>0.627</td><td>Ok</td></tr> <tr><td>8 - Dallaire St</td><td>SAN 04A</td><td>SAN 09A</td><td>5</td><td>95</td><td>3.25</td><td>16</td><td>292</td><td>6.394</td><td>4.083</td><td>6.394</td><td>4.869</td><td>0.33</td><td>3.65</td><td>0.365</td><td>5.234</td><td>77.6</td><td>200</td><td>0.60</td><td>25.408</td><td>0.307</td><td>Ok</td><td>0.809</td><td>0.623</td><td>Ok</td></tr> <tr><td>9 - Dallaire St</td><td>SAN 10A</td><td>SAN 11A</td><td>2</td><td>2</td><td>3.25</td><td>7</td><td>7</td><td>13.689</td><td>4.431</td><td>13.689</td><td>0.232</td><td>0.13</td><td>0.13</td><td>0.013</td><td>0.245</td><td>18.8</td><td>200</td><td>2.00</td><td>46.384</td><td>0.052</td><td>Ok</td><td>1.476</td><td>0.379</td><td>Check</td></tr> <tr><td>10 - Dallaire St</td><td>SAN 11A</td><td>SAN 09A</td><td>5</td><td>7</td><td>3.25</td><td>16</td><td>23</td><td>10.655</td><td>4.373</td><td>10.655</td><td>0.631</td><td>0.29</td><td>0.42</td><td>0.042</td><td>0.673</td><td>64.1</td><td>200</td><td>2.00</td><td>46.384</td><td>0.084</td><td>Ok</td><td>1.476</td><td>0.518</td><td>Check</td></tr> <tr><td>11 - McAush St</td><td>SAN 09A</td><td>SAN 12A</td><td>16</td><td>118</td><td>3.25</td><td>52</td><td>367</td><td>6.109</td><td>4.040</td><td>6.109</td><td>5.842</td><td>0.77</td><td>4.84</td><td>0.484</td><td>6.326</td><td>105.8</td><td>200</td><td>0.50</td><td>23.192</td><td>0.366</td><td>Ok</td><td>0.738</td><td>0.615</td><td>Ok</td></tr> <tr><td>12 - McAush St</td><td>SAN 12A</td><td>SAH 34063 (B.O.)</td><td>18</td><td>136</td><td>3.25</td><td>59</td><td>426</td><td>5.931</td><td>4.009</td><td>5.931</td><td>6.575</td><td>0.83</td><td>5.67</td><td>0.567</td><td>7.142</td><td>120.6</td><td>200</td><td>1.20</td><td>23.192</td><td>0.360</td><td>Ok</td><td>0.738</td><td>0.635</td><td>Ok</td></tr> <tr><td>EXT - McAush St</td><td>SAH 34063 (B.O.)</td><td>SAH 34066 (B.O.)</td><td></td><td>136</td><td></td><td></td><td></td><td>4.009</td><td>5.931</td><td>5.931</td><td>5.675</td><td>0.83</td><td>5.67</td><td>0.567</td><td>7.142</td><td>40.4</td><td>200</td><td>0.50</td><td>23.192</td><td>0.380</td><td>Ok</td><td>0.738</td><td>0.635</td><td>Ok</td></tr> <tr><td>13 - Dallaire St</td><td>SAN 10A</td><td>SAN 13A</td><td>17</td><td>17</td><td>3.25</td><td>55</td><td>55</td><td>8.923</td><td>4.306</td><td>8.923</td><td>1.284</td><td>0.79</td><td>0.79</td><td>0.079</td><td>1.363</td><td>101.2</td><td>200</td><td>1.70</td><td>42.764</td><td>0.122</td><td>Ok</td><td>1.361</td><td>0.606</td><td>Ok</td></tr> <tr><td>14 - Dallaire St</td><td>SAN 13A</td><td>SAN 04A</td><td>12</td><td>29</td><td>3.25</td><td>39</td><td>94</td><td>8.019</td><td>4.251</td><td>8.019</td><td>1.968</td><td>0.59</td><td>1.38</td><td>0.138</td><td>2.106</td><td>95.6</td><td>200</td><td>1.20</td><td>35.929</td><td>0.164</td><td>Ok</td><td>1.144</td><td>0.610</td><td>Ok</td></tr> <tr><td>EXT - Dallaire St</td><td>SAH 34067 (B.O.)</td><td>SAH 34068 (B.O.)</td><td></td><td>29</td><td></td><td></td><td></td><td>8.019</td><td>4.251</td><td>8.019</td><td>1.968</td><td>0.59</td><td>1.38</td><td>0.138</td><td>2.106</td><td>40.1</td><td>250</td><td>1.20</td><td>65.143</td><td>0.123</td><td>Ok</td><td>1.327</td><td>0.594</td><td>Check</td></tr> <tr><td>15 - MD BLK 191</td><td>STUB</td><td>SAN 14A</td><td>300</td><td>300</td><td>2.57</td><td>771</td><td>771</td><td>5.267</td><td>3.870</td><td>5.267</td><td>10.575</td><td>1.83</td><td>1.83</td><td>0.183</td><td>10.758</td><td>11.0</td><td>200</td><td>0.50</td><td>23.192</td><td>0.478</td><td>Ok</td><td>0.738</td><td>0.721</td><td>Ok</td></tr> <tr><td>16 - Lotus Rd</td><td>SAN 14A</td><td>SAN 15A</td><td>14</td><td>314</td><td>2.57</td><td>36</td><td>807</td><td>5.219</td><td>3.858</td><td>5.219</td><td>10.968</td><td>0.42</td><td>2.25</td><td>0.225</td><td>11.193</td><td>85.4</td><td>200</td><td>0.60</td><td>25.406</td><td>0.464</td><td>Ok</td><td>0.809</td><td>0.779</td><td>Ok</td></tr> <tr><td>17 - Lotus Rd</td><td>SAN 15A</td><td>SAN 16A</td><td>10</td><td>324</td><td>2.57</td><td>26</td><td>833</td><td>5.186</td><td>3.850</td><td>5.186</td><td>11.247</td><td>0.33</td><td>2.58</td><td>0.258</td><td>11.505</td><td>77.4</td><td>200</td><td>0.60</td><td>25.406</td><td>0.471</td><td>Ok</td><td>0.809</td><td>0.783</td><td>Ok</td></tr> <tr><td>18 - Dallaire St</td><td>SAN 03A</td><td>SAN 16A</td><td>7</td><td>7</td><td>3.25</td><td>23</td><td>23</td><td>10.655</td><td>4.373</td><td>10.655</td><td>0.631</td><td>0.33</td><td>0.33</td><td>0.033</td><td>0.654</td><td>77.5</td><td>200</td><td>2.00</td><td>46.384</td><td>0.083</td><td>Ok</td><td>1.476</td><td>0.516</td><td>Check</td></tr> <tr><td>19 - Dallaire St</td><td>SAN 17A</td><td>SAN 17A</td><td>2</td><td>333</td><td>3.25</td><td>7</td><td>862</td><td>5.151</td><td>3.841</td><td>5.151</td><td>11.562</td><td>0.16</td><td>3.07</td><td>0.307</td><td>11.868</td><td>58.7</td><td>200</td><td>0.50</td><td>23.192</td><td>0.506</td><td>Check</td><td>0.738</td><td>0</td></tr></tbody></table>																		AREA - STREET	MAINTENANCE HOLE		DWELL UNITS	DWELL (ACC) UNITS	DENSITY P.P.U.	POP. (P)	POP. (ACC)	M PEAKING FACTOR BABBITT	M PEAKING FACTOR HARMON	Max PEAKING FACTOR	Q_p (l/s)	AREA (ACC) (ha)	Q_i (l/s)	Q_tot (l/s)	L (m)	D (mm)	S (%)	Qf FULL (l/s)	d/D ⁽²⁾	d/D ⁽³⁾	Velocity FULL (m/s)	Velocity Partial ⁽¹⁾ (m/s)	Velocity > 0.6 (m/s)	FROM	TO	1A - Colosimo Cres			8		3.25	26																	1B - Colosimo Cres	SAN 01A	SAN 02A	8	16	2.57	21	47	9.234	4.321	9.234	1.120	0.49	0.49	0.049	1.169	52.2	200	2.00	46.384	0.109	Ok	1.476	0.618	Ok	2A - Colosimo Cres			10		3.25	33																			2B - Colosimo Cres	SAN 02A	SAN 03A	16	42	2.57	41	120	7.638	4.221	7.638	2.391	0.76	1.25	0.125	2.516	108.7	200	1.10	34.399	0.183	Ok	1.095	0.628	Ok	3 - Dallaire St	SAN 03A	SAN 04A	6	48	3.25	20	140	7.412	4.201	7.412	2.696	0.32	1.57	0.157	2.853	74.6	200	1.00	32.798	0.199	Ok	1.044	0.629	Ok	4 - Colosimo Cres	SAN 05A	SAN 06A	8	8	3.25	26	26	10.375	4.364	10.375	0.702	0.39	0.39	0.039	0.741	58.5	200	2.00	46.384	0.088	Ok	1.476	0.534	Check	5 - Colosimo Cres	SAN 06A	SAN 07A	3	11	3.25	10	36	9.735	4.342	9.735	0.906	0.19	0.58	0.058	0.864	14.7	200	2.00	46.384	0.099	Ok	1.476	0.577	Check	6 - Colosimo Cres	SAN 07A	SAN 08A	18	29	3.25	59	94	8.019	4.251	8.019	1.968	0.64	1.22	0.122	2.090	80.7	200	1.20	35.929	0.163	Ok	1.144	0.610	Ok	7 - Colosimo Cres	SAN 08A	SAN 04A	13	42	3.25	42	137	7.446	4.204	7.446	2.647	0.53	1.75	0.175	2.822	76.4	200	1.00	32.798	0.198	Ok	1.044	0.627	Ok	8 - Dallaire St	SAN 04A	SAN 09A	5	95	3.25	16	292	6.394	4.083	6.394	4.869	0.33	3.65	0.365	5.234	77.6	200	0.60	25.408	0.307	Ok	0.809	0.623	Ok	9 - Dallaire St	SAN 10A	SAN 11A	2	2	3.25	7	7	13.689	4.431	13.689	0.232	0.13	0.13	0.013	0.245	18.8	200	2.00	46.384	0.052	Ok	1.476	0.379	Check	10 - Dallaire St	SAN 11A	SAN 09A	5	7	3.25	16	23	10.655	4.373	10.655	0.631	0.29	0.42	0.042	0.673	64.1	200	2.00	46.384	0.084	Ok	1.476	0.518	Check	11 - McAush St	SAN 09A	SAN 12A	16	118	3.25	52	367	6.109	4.040	6.109	5.842	0.77	4.84	0.484	6.326	105.8	200	0.50	23.192	0.366	Ok	0.738	0.615	Ok	12 - McAush St	SAN 12A	SAH 34063 (B.O.)	18	136	3.25	59	426	5.931	4.009	5.931	6.575	0.83	5.67	0.567	7.142	120.6	200	1.20	23.192	0.360	Ok	0.738	0.635	Ok	EXT - McAush St	SAH 34063 (B.O.)	SAH 34066 (B.O.)		136				4.009	5.931	5.931	5.675	0.83	5.67	0.567	7.142	40.4	200	0.50	23.192	0.380	Ok	0.738	0.635	Ok	13 - Dallaire St	SAN 10A	SAN 13A	17	17	3.25	55	55	8.923	4.306	8.923	1.284	0.79	0.79	0.079	1.363	101.2	200	1.70	42.764	0.122	Ok	1.361	0.606	Ok	14 - Dallaire St	SAN 13A	SAN 04A	12	29	3.25	39	94	8.019	4.251	8.019	1.968	0.59	1.38	0.138	2.106	95.6	200	1.20	35.929	0.164	Ok	1.144	0.610	Ok	EXT - Dallaire St	SAH 34067 (B.O.)	SAH 34068 (B.O.)		29				8.019	4.251	8.019	1.968	0.59	1.38	0.138	2.106	40.1	250	1.20	65.143	0.123	Ok	1.327	0.594	Check	15 - MD BLK 191	STUB	SAN 14A	300	300	2.57	771	771	5.267	3.870	5.267	10.575	1.83	1.83	0.183	10.758	11.0	200	0.50	23.192	0.478	Ok	0.738	0.721	Ok	16 - Lotus Rd	SAN 14A	SAN 15A	14	314	2.57	36	807	5.219	3.858	5.219	10.968	0.42	2.25	0.225	11.193	85.4	200	0.60	25.406	0.464	Ok	0.809	0.779	Ok	17 - Lotus Rd	SAN 15A	SAN 16A	10	324	2.57	26	833	5.186	3.850	5.186	11.247	0.33	2.58	0.258	11.505	77.4	200	0.60	25.406	0.471	Ok	0.809	0.783	Ok	18 - Dallaire St	SAN 03A	SAN 16A	7	7	3.25	23	23	10.655	4.373	10.655	0.631	0.33	0.33	0.033	0.654	77.5	200	2.00	46.384	0.083	Ok	1.476	0.516	Check	19 - Dallaire St	SAN 17A	SAN 17A	2	333	3.25	7	862	5.151	3.841	5.151	11.562	0.16	3.07	0.307	11.868	58.7	200	0.50	23.192	0.506	Check	0.738	0
AREA - STREET	MAINTENANCE HOLE		DWELL UNITS	DWELL (ACC) UNITS	DENSITY P.P.U.	POP. (P)	POP. (ACC)	M PEAKING FACTOR BABBITT	M PEAKING FACTOR HARMON	Max PEAKING FACTOR	Q_p (l/s)	AREA (ACC) (ha)	Q_i (l/s)	Q_tot (l/s)	L (m)	D (mm)	S (%)		Qf FULL (l/s)	d/D ⁽²⁾																						d/D ⁽³⁾	Velocity FULL (m/s)	Velocity Partial ⁽¹⁾ (m/s)	Velocity > 0.6 (m/s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	FROM	TO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
1A - Colosimo Cres			8		3.25	26																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1B - Colosimo Cres	SAN 01A	SAN 02A	8	16	2.57	21	47	9.234	4.321	9.234	1.120	0.49	0.49	0.049	1.169	52.2	200	2.00	46.384	0.109	Ok	1.476	0.618	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
2A - Colosimo Cres			10		3.25	33																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
2B - Colosimo Cres	SAN 02A	SAN 03A	16	42	2.57	41	120	7.638	4.221	7.638	2.391	0.76	1.25	0.125	2.516	108.7	200	1.10	34.399	0.183	Ok	1.095	0.628	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
3 - Dallaire St	SAN 03A	SAN 04A	6	48	3.25	20	140	7.412	4.201	7.412	2.696	0.32	1.57	0.157	2.853	74.6	200	1.00	32.798	0.199	Ok	1.044	0.629	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
4 - Colosimo Cres	SAN 05A	SAN 06A	8	8	3.25	26	26	10.375	4.364	10.375	0.702	0.39	0.39	0.039	0.741	58.5	200	2.00	46.384	0.088	Ok	1.476	0.534	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
5 - Colosimo Cres	SAN 06A	SAN 07A	3	11	3.25	10	36	9.735	4.342	9.735	0.906	0.19	0.58	0.058	0.864	14.7	200	2.00	46.384	0.099	Ok	1.476	0.577	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
6 - Colosimo Cres	SAN 07A	SAN 08A	18	29	3.25	59	94	8.019	4.251	8.019	1.968	0.64	1.22	0.122	2.090	80.7	200	1.20	35.929	0.163	Ok	1.144	0.610	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
7 - Colosimo Cres	SAN 08A	SAN 04A	13	42	3.25	42	137	7.446	4.204	7.446	2.647	0.53	1.75	0.175	2.822	76.4	200	1.00	32.798	0.198	Ok	1.044	0.627	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
8 - Dallaire St	SAN 04A	SAN 09A	5	95	3.25	16	292	6.394	4.083	6.394	4.869	0.33	3.65	0.365	5.234	77.6	200	0.60	25.408	0.307	Ok	0.809	0.623	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
9 - Dallaire St	SAN 10A	SAN 11A	2	2	3.25	7	7	13.689	4.431	13.689	0.232	0.13	0.13	0.013	0.245	18.8	200	2.00	46.384	0.052	Ok	1.476	0.379	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
10 - Dallaire St	SAN 11A	SAN 09A	5	7	3.25	16	23	10.655	4.373	10.655	0.631	0.29	0.42	0.042	0.673	64.1	200	2.00	46.384	0.084	Ok	1.476	0.518	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
11 - McAush St	SAN 09A	SAN 12A	16	118	3.25	52	367	6.109	4.040	6.109	5.842	0.77	4.84	0.484	6.326	105.8	200	0.50	23.192	0.366	Ok	0.738	0.615	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
12 - McAush St	SAN 12A	SAH 34063 (B.O.)	18	136	3.25	59	426	5.931	4.009	5.931	6.575	0.83	5.67	0.567	7.142	120.6	200	1.20	23.192	0.360	Ok	0.738	0.635	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
EXT - McAush St	SAH 34063 (B.O.)	SAH 34066 (B.O.)		136				4.009	5.931	5.931	5.675	0.83	5.67	0.567	7.142	40.4	200	0.50	23.192	0.380	Ok	0.738	0.635	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
13 - Dallaire St	SAN 10A	SAN 13A	17	17	3.25	55	55	8.923	4.306	8.923	1.284	0.79	0.79	0.079	1.363	101.2	200	1.70	42.764	0.122	Ok	1.361	0.606	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
14 - Dallaire St	SAN 13A	SAN 04A	12	29	3.25	39	94	8.019	4.251	8.019	1.968	0.59	1.38	0.138	2.106	95.6	200	1.20	35.929	0.164	Ok	1.144	0.610	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
EXT - Dallaire St	SAH 34067 (B.O.)	SAH 34068 (B.O.)		29				8.019	4.251	8.019	1.968	0.59	1.38	0.138	2.106	40.1	250	1.20	65.143	0.123	Ok	1.327	0.594	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
15 - MD BLK 191	STUB	SAN 14A	300	300	2.57	771	771	5.267	3.870	5.267	10.575	1.83	1.83	0.183	10.758	11.0	200	0.50	23.192	0.478	Ok	0.738	0.721	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
16 - Lotus Rd	SAN 14A	SAN 15A	14	314	2.57	36	807	5.219	3.858	5.219	10.968	0.42	2.25	0.225	11.193	85.4	200	0.60	25.406	0.464	Ok	0.809	0.779	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
17 - Lotus Rd	SAN 15A	SAN 16A	10	324	2.57	26	833	5.186	3.850	5.186	11.247	0.33	2.58	0.258	11.505	77.4	200	0.60	25.406	0.471	Ok	0.809	0.783	Ok																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
18 - Dallaire St	SAN 03A	SAN 16A	7	7	3.25	23	23	10.655	4.373	10.655	0.631	0.33	0.33	0.033	0.654	77.5	200	2.00	46.384	0.083	Ok	1.476	0.516	Check																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
19 - Dallaire St	SAN 17A	SAN 17A	2	333	3.25	7	862	5.151	3.841	5.151	11.562	0.16	3.07	0.307	11.868	58.7	200	0.50	23.192	0.506	Check	0.738	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																



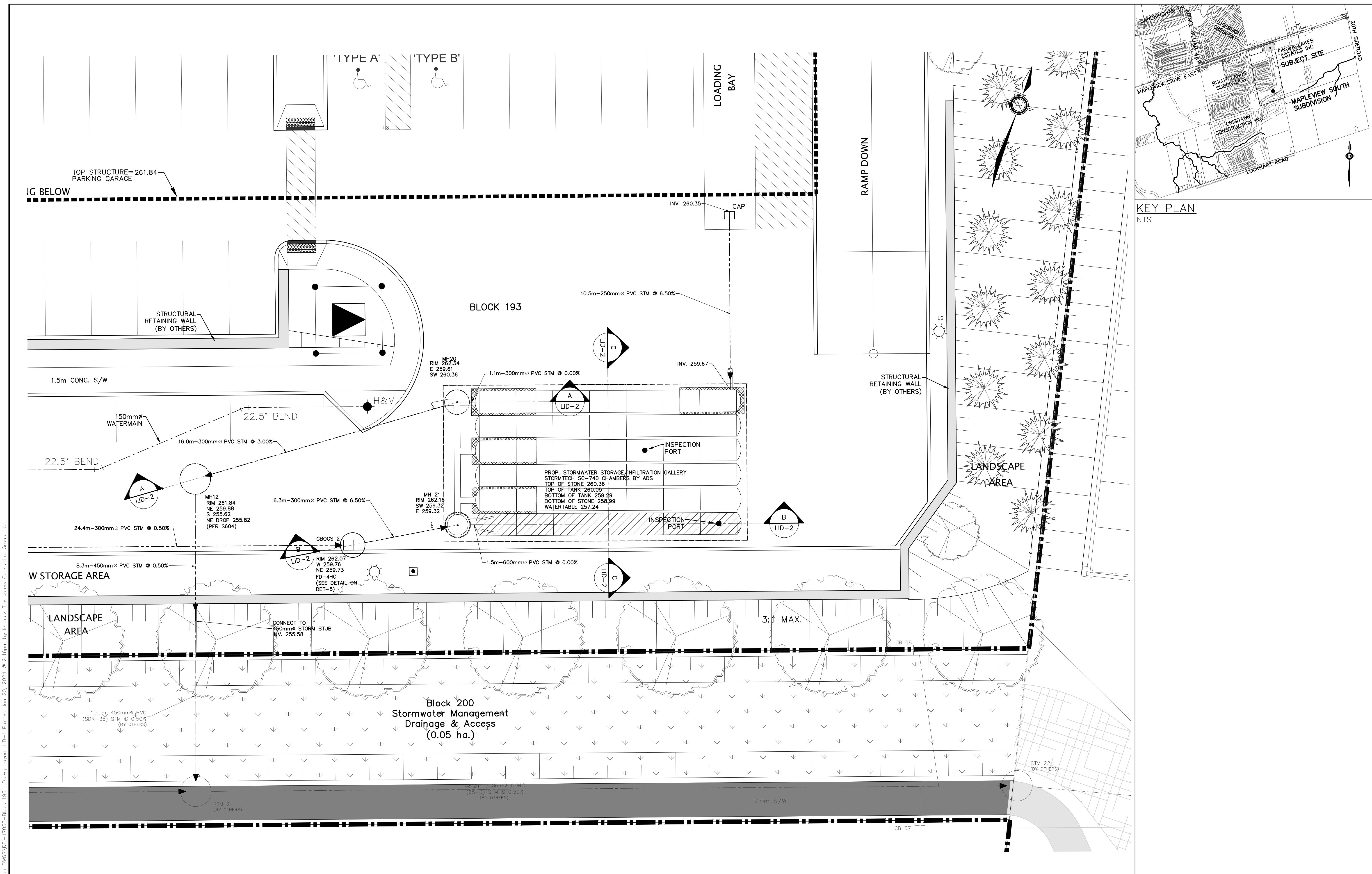
REFERENCES:	
1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES	BENCHMARK: NO. 0312000045 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET AND APPROXIMATELY 500M NORTH OF THE CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N419122.851 E01241.154 ELEV. 223.339
2. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED	BENCHMARK NO. 0312010200 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 790m WEST OF THE MAPLEVIEW DRIVE EAST AND 203m SOUTH OF THE ROAD INTERSECTION. N4191284.547 E01177.286 ELEV. 225.549
3. SANDY CREEK ESTATES SUBDIVISION DEVELOPMENT BY BURNSIDE & ASSOCIATES CONSULTING ENGINEERING LTD.	BENCHMARK NO. 0312000045 LOCATED ON THE SITE OF MAPLEVIEW DRIVE EAST ON 14220 CONCESSION ROAD, APPROXIMATELY 0.8km EAST OF YONGE STREET (HIGHWAY #11) AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. ELEV. 211.234
4. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.	BENCHMARK NO. 0312000054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE EAST APPROXIMATELY 10m EAST OF HURONIA ROAD. N4191073.122 E007601.062 ELEV. 248.999
5. OLS PLAN BY RUDY MAK SURVEYING LTD.	
6. AWA GROUP RESIDENTIAL DEVELOPMENT BY PEARSON GROUP LTD.	
7. RESIDENTIAL DEVELOPMENT BY JONES CONSULTING GROUP LTD.	
8. GEOTECHNICAL INVESTIGATION REPORT BY CAMBİUM INC.	
9. HWTTS SECONDARY PLAN AREA SIS BY R.J. BURNSIDE & ASSOCIATES LIMITED	
10. LSRAA LATEST MANUALS AND GUIDELINES	

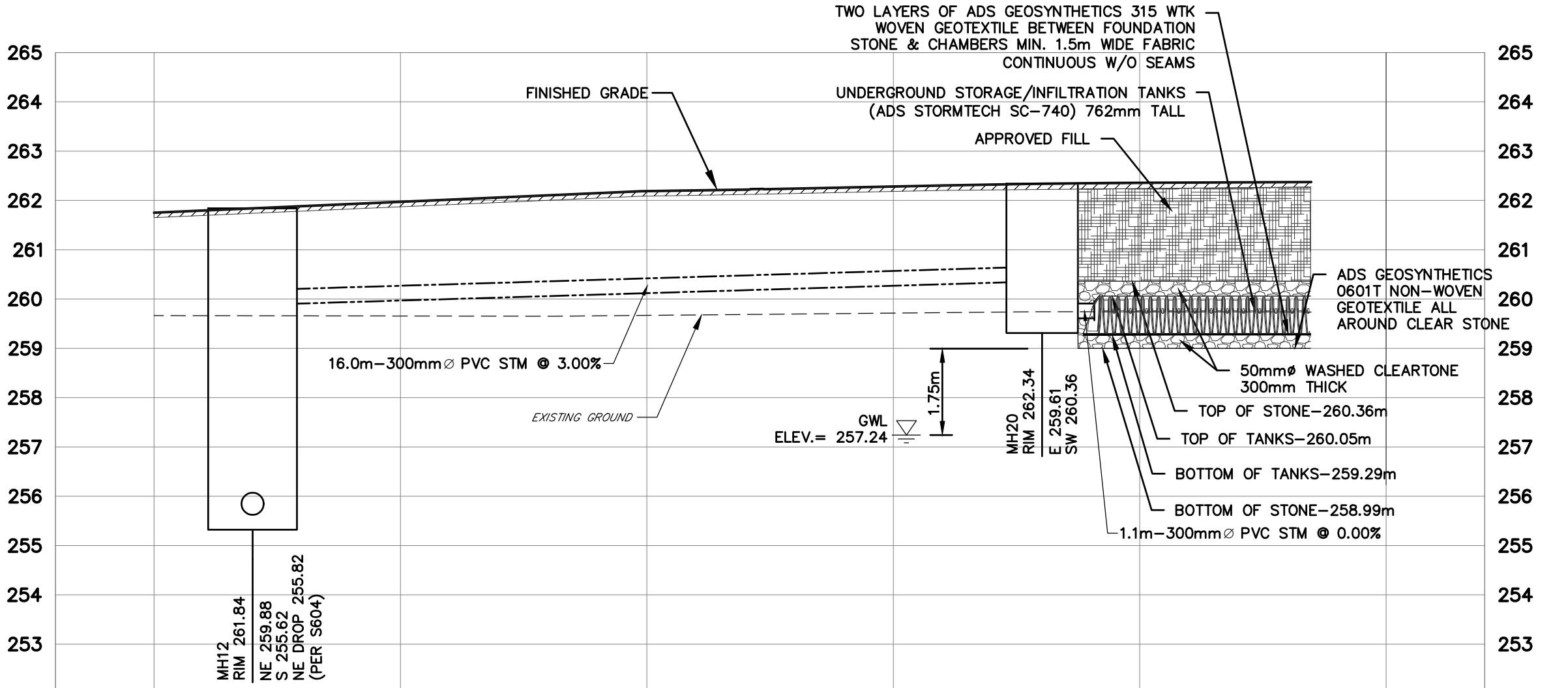
BENCHMARK:		LICENCED PROFESSIONAL ENGINEER		MAPLEVIEW SOUTH (INNISFIL) LTD	
1. BENCHMARK NO. 0312000045 LOCATED APPROXIMATELY 1.9km EAST OF YONGE STREET AND APPROXIMATELY 500M NORTH OF THE CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N419122.851 E01241.154 ELEV. 223.339		M. G. FLIS 10014953 06-21-2024		953 MAPLEVIEW DRIVE EAST CITY OF BARRIE	
1. FIRST SUBMISSION	JUNE 2024	MF		BLOCK 193 POST-DEVELOPMENT STORMWATER DRAINAGE AREA PLAN	
NO.	REVISIONS	DATE	INITIAL		



MAPLEVIEW SOUTH (INNISFIL) LTD
953 MAPLEVIEW DRIVE EAST
CITY OF BARRIE
BLOCK 193
POST-DEVELOPMENT STORMWATER DRAINAGE AREA PLAN

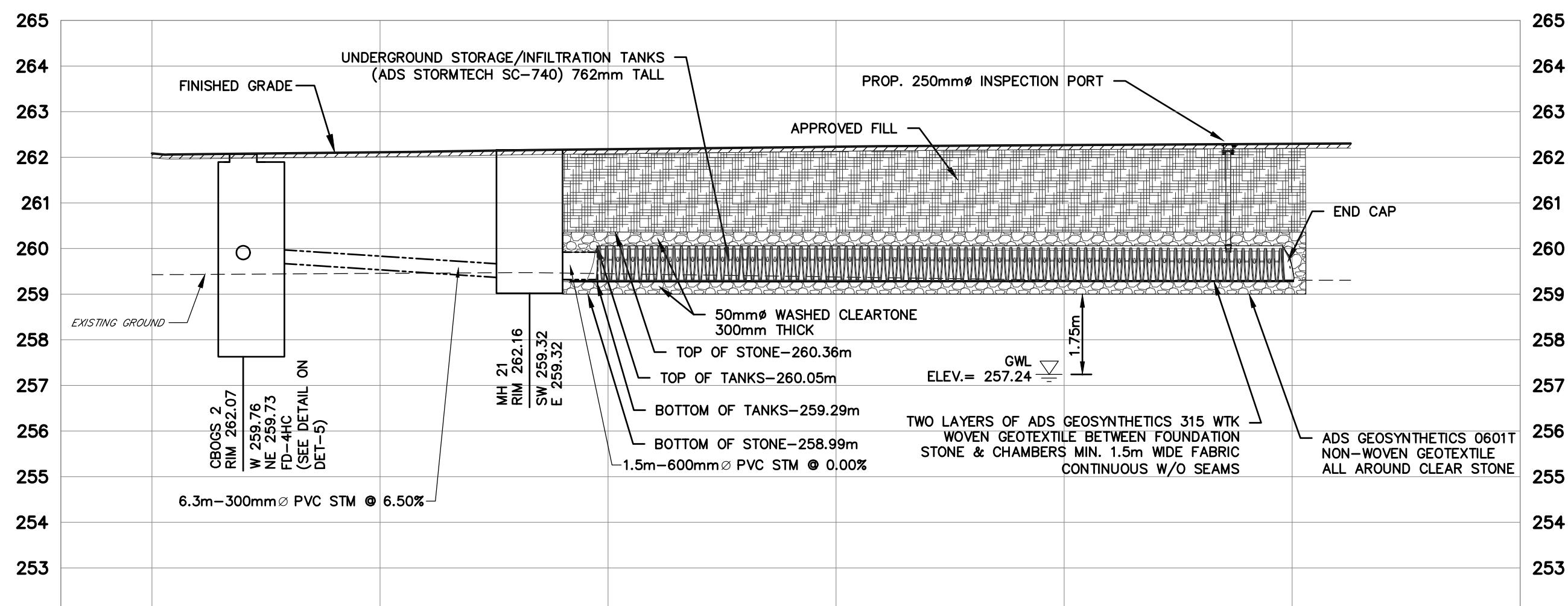
DESIGN VBS	SCALE: 1:1000	DATE MAY 2024
DRAWN VBS	PROJECT DWG. NO SWM-1	
CHECKED RC/DR	REVIEWED RC/DR	RECEIVED RC/DR





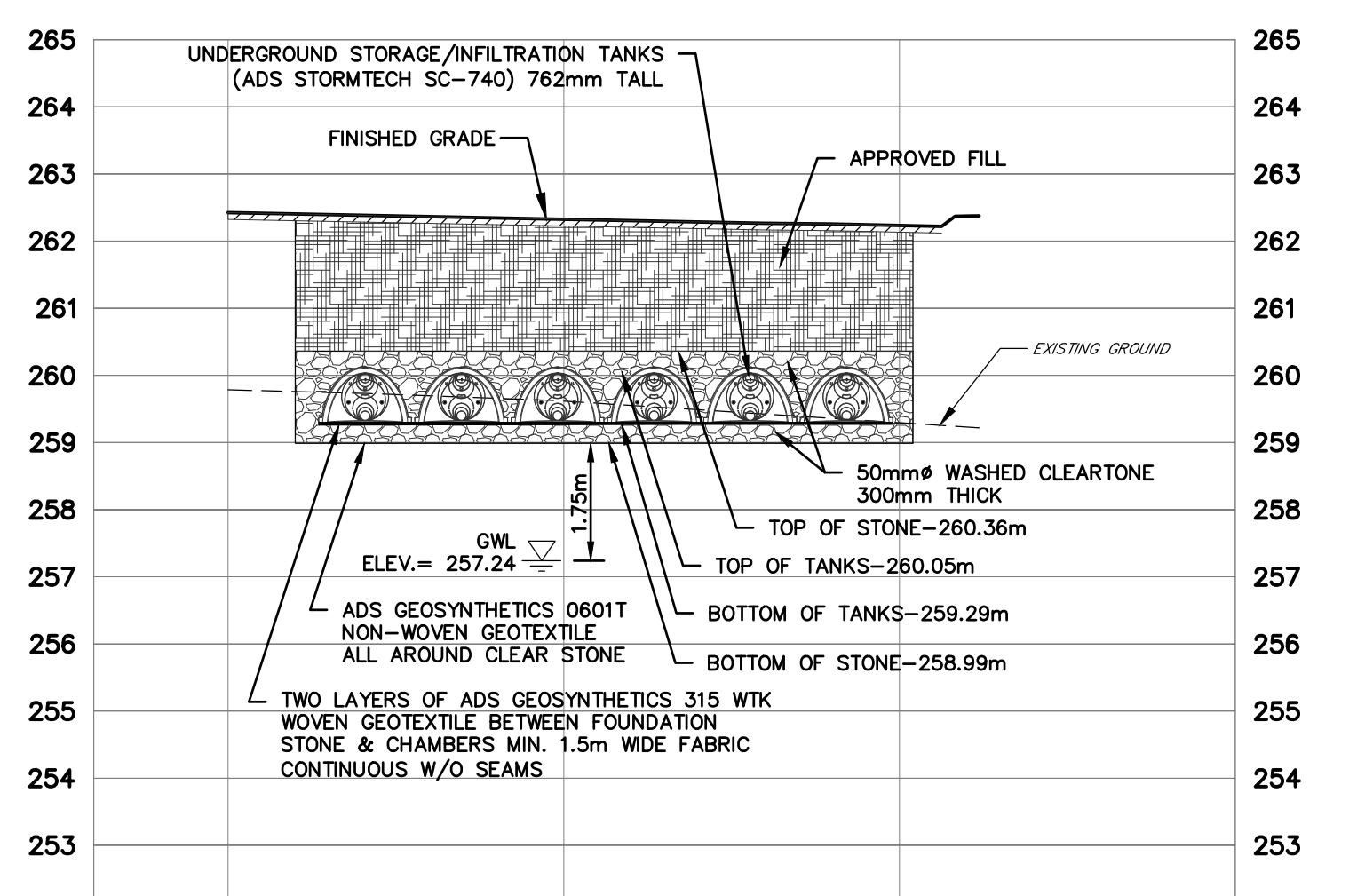
SECTION A-A

1:100



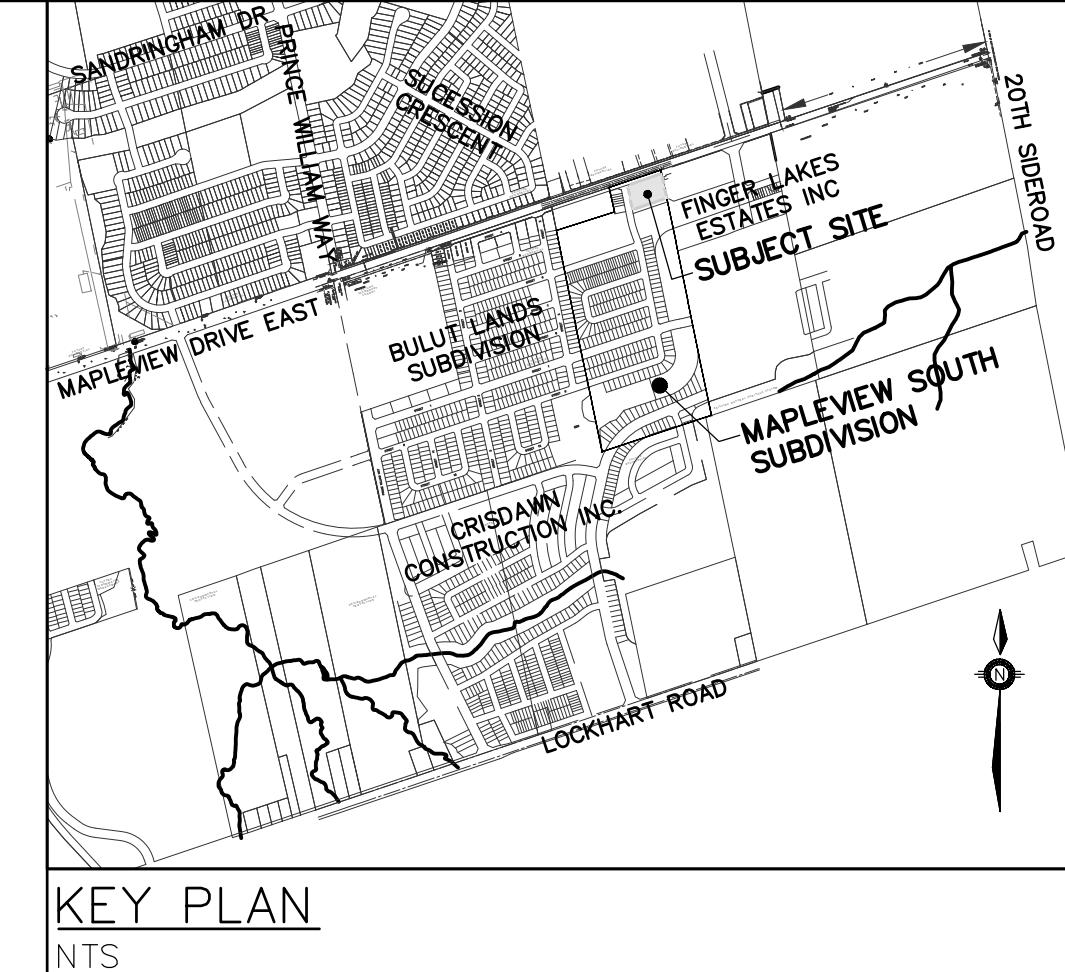
SECTION B-B

1:100



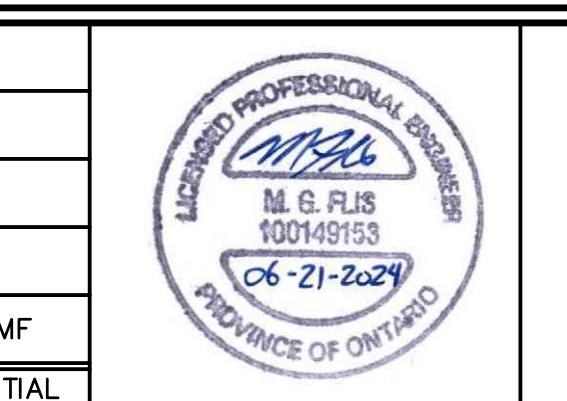
SECTION C-C

1:100



KEY PLAN
NTS

REFERENCES:	
1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES	BENCHMARK:
2. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED	BENCHMARK NO. 0312000054 LOCATED APPROXIMATELY 1.8m EAST OF YONGE STREET, APPROXIMATELY 35m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N491222.851 E91241.154 ELEV. 223.239
3. SANDY COVE CREST REDEVELOPMENT BY TATHAM ENGINEERING LIMITED	BENCHMARK NO. 0312010200 LOCATED ON MAPLEVIEW DRIVE EAST ON THE SOUTH SIDE OF THE BOULEVARD, APPROXIMATELY 79m WEST OF THE MAPLEVIEW DRIVE EAST AND 203m SOUTH OF HURONIA ROAD INTERSECTION. N491228.547 E91177.288 ELEV. 225.549
4. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.	BENCHMARK NO. 0312000054 LOCATED APPROXIMATELY 1.8m EAST OF YONGE STREET, APPROXIMATELY 35m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N491222.851 E91241.154 ELEV. 223.239
5. BURNSTEIN & ASSOCIATES LTD. BY JONES CONSULTING GROUP LTD.	BENCHMARK NO. 0312000054 LOCATED APPROXIMATELY 1.8m EAST OF YONGE STREET, APPROXIMATELY 35m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE EAST AND 35m WEST OF CITY BOUNDARY LINE. N491222.851 E91241.154 ELEV. 223.239
6. OLS PLAN BY RUDY MAK SURVEYING LTD.	BENCHMARK NO. 0312000054 LOCATED APPROXIMATELY 0.8m EAST OF YONGE STREET (W/HY #1) AND APPROXIMATELY 10m NORTH OF MAPLEVIEW DRIVE EAST CENTERLINE. N491018.768 E907601.062 ELEV. 248.999
7. AWA GROUP RESIDENTIAL DEVELOPMENT BY PEARCE ENGINEERS LTD.	BENCHMARK NO. 0312000054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE EAST APPROXIMATELY 10m EAST OF HURONIA ROAD. N491007.122 E907601.062 ELEV. 248.999
8. GEOTECHNICAL INVESTIGATION REPORT BY CAMBIUM INC.	
9. HEWITT SECONDARY PLAN AREA SIS BY R-J BURNSIDE & ASSOCIATES LIMITED	
10. LSRA LATEST MANUALS AND GUIDELINES	



MAPLEVIEW SOUTH (INNISFIL) LTD
953 MAPLEVIEW DRIVE EAST
CITY OF BARRIE

BLOCK 193
LID SECTIONS & DETAILS
INFILTRATION GALLERY

DESIGN MF/KS	SCALE: AS NOTED	DATE MAY 2024
DRAWN KS	PROJECT DWG. NO	REI-17055
CHECKED DR	REVIEWED DR	LID-2



Appendix B

Supporting Calculations

- Storm Sewer Design Sheet
- ADS SC-740 Stormtech Chambers Design Drawings
- ADS FD-4HC OGS Sizing Summary
- ADS FD-4HC OGS Detail Drawing
- Pre- to Post-Development Phosphorous Loading Project Development Summary



BLK 193 STORM SEWER DESIGN - MINOR SYSTEM

Design flow in (m³/s) $Q = C \cdot I \cdot A / 360$
 Site specific runoff coefficient C
 Rainfall intensity (mm/hr) $I = A/(T.C. + B)^C$
 function of the local intensity-duration data $A = 843.019$
 function of the local intensity-duration data $B = 4.582$
 function of the local intensity-duration data $C = 0.763$
 Max. time of concentration (min) $T.C. = 10$
 Drainage area (ha) A

Pipe capacity (m³/s) Q
 Manning roughness value $n = 0.013$
 Cross sectional area of pipe (m²) A
 Hydraulic Radius (m) R_h
 Sewer pipe slope (m/m) S
 Velocity of flow (m/s) V

Client: Anthony Reino
 Project: Mapleview South (Innisfil) LTD - BLK 193
 Address: 953 Mapleview Drive East
 File: REI-17055
 Design: KR
 Check: MF
 Date: June 19 2024
 Design sheet: DS-1



AREAS	Street	MANHOLE		LENGTH (m)	INCREMENT			TOTAL CA	FLOW TIME (min)		I (mm/h)	TOTAL Q (cms)	S (%)	D (mm)	Q FULL (cms)	V FULL (m/s)	% FULL
		FROM	TO		C	A	CA		TO	IN							
201	BLK 193	BLDG	LID	10.5	0.95	0.18	0.17	0.17	10.00	0.06	109	0.052	6.50	250	0.152	3.1	34.6
202	BLK 193	CB5	CBMH10	12.7	0.92	0.09	0.08	0.08	10.00	0.15	109	0.024	1.00	300	0.097	1.4	24.7
203	BLK 193	CBMH10	CBOGS2	24.4	0.71	0.04	0.03	0.11	10.15	0.42	108	0.032	0.50	300	0.068	1.0	47.3
204	BLK 193	CBOGS2	LID	6.3	0.88	0.11	0.10	0.21	10.58	0.03	106	0.061	6.50	300	0.247	3.5	24.6
	BLK 193	LID	MH12	16.0				0.21	10.61	0.11	106	0.061	3.00	300	0.167	2.4	36.2
	BLK 193	MH12	STUB	8.3				0.21	10.72	0.11	105	0.060	0.50	450	0.202	1.3	29.9

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	CODY NEATH 519-465-9958 CODY.NEATH@ADSPipe.com
ADS SALES REP:	RYAN MARTIN 705-207-3059 RYAN.MARTIN@ADSPipe.com
PROJECT NO:	S407367
ONTARIO SITE COORDINATOR:	RYAN RUBENSTEIN 519-710-3687 RYAN.RUBENSTEIN@ADSPipe.com



ADS
SiteAssist™
FOR STORMTECH
INSTALLATION INSTRUCTIONS
VISIT OUR WEBSITE



953 MAPLEVIEW DRIVE BLOCK 193

BARRIE, ON.

SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL BE CERTIFIED TO CSA B184, "POLYMERIC SUB-SURFACE STORMWATER MANAGEMENT STRUCTURES", AND MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE CSA S6 CL-625 TRUCK AND THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 50 mm (2").
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 23° C / 73° F), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPAKTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 150 mm (6") SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 20-50 mm (3/4-2").
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/SC-800/DC-780 CONSTRUCTION GUIDE".
3. FULL 900 mm (36") OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

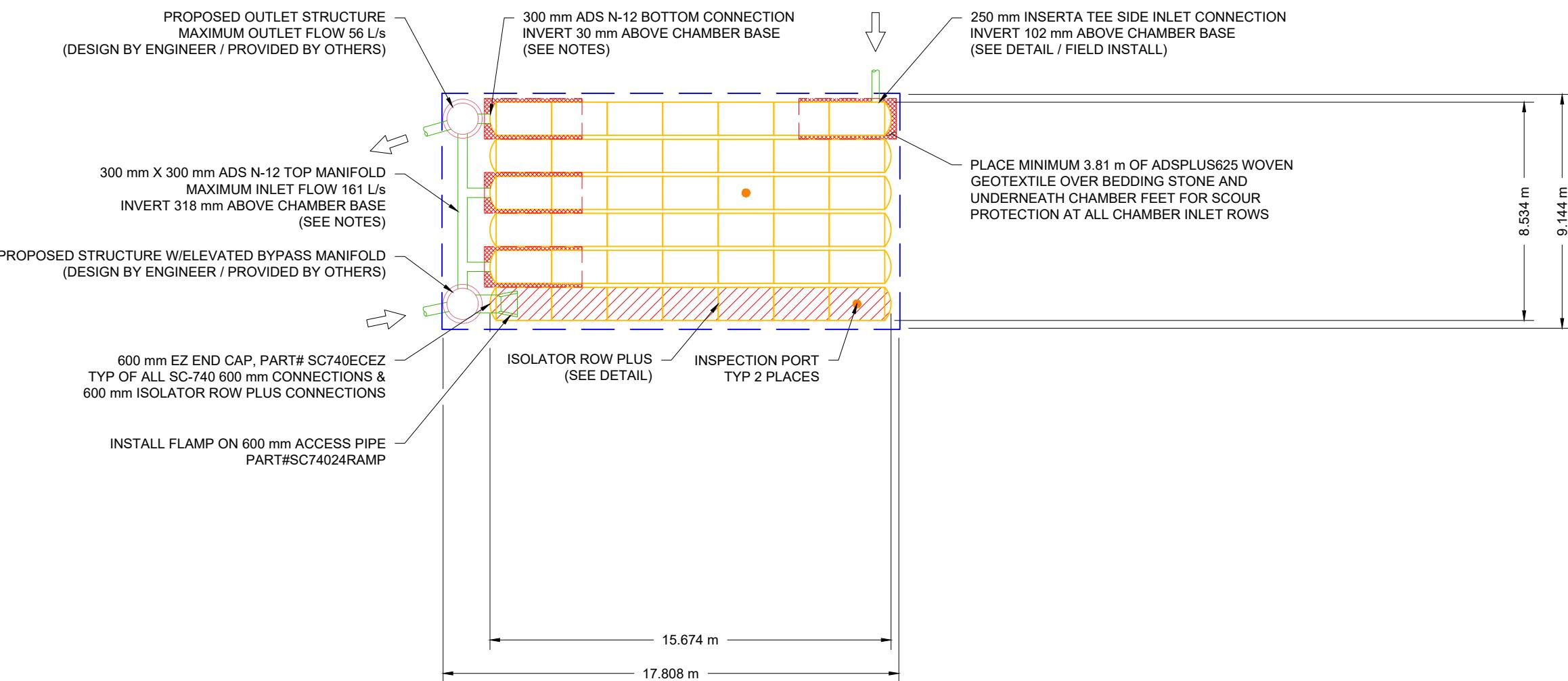
42	STORMTECH SC-740 CHAMBERS
12	STORMTECH SC-740 END CAPS
305	STONE ABOVE (mm)
305	STONE BELOW (mm)
40	% STONE VOID
123.5	INSTALLED SYSTEM VOLUME (m³) (PERIMETER STONE INCLUDED)
165.3	SYSTEM AREA (m²)
54.2	SYSTEM PERIMETER (m)

PROPOSED ELEVATIONS

262.495	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):
260.667	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):
260.514	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):
260.514	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT):
260.362	TOP OF STONE:
260.057	TOP OF SC-740 CHAMBER:
259.613	300 mm TOP MANIFOLD INVERT:
259.395	INSERTA TEE SIDE INLET CONNECTION INVERT:
259.325	300 mm BOTTOM CONNECTION INVERT:
259.298	600 mm ISOLATOR ROW PLUS INVERT:
259.295	BOTTOM OF SC-740 CHAMBER:
258.990	BOTTOM OF STONE:

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- ATTENTION:** THIS DRAWING IS NOT INTENDED FOR USE IN BIDDING OR CONSTRUCTION WITHOUT THE PRIOR APPROVAL OF THE PROJECT'S ENGINEER OF RECORD (EOR). AS WITH ALL PROPOSED ADS LAYOUTS, THE EOR SHOULD REVIEW AND APPROVE THIS DRAWING PRIOR TO USE IN BIDDING AND/OR CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE EOR TO ENSURE THAT THE PRODUCT(S) DEPICTED AND THE ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.
- NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.



ADS.

StormTech®

Chamber System

4640 TRUEMAN BLVD
HILLIARD, OH 43026

SCALE = 1 : 200

953 MAPLEVIEW DRIVE
BLOCK 193
BARRIE, ON.

DATE: 04-11-24 DRAWN: JR

PROJECT #: S407367 CHECKED: JR

DESCRIPTION

6/3/24 RCT REVISED PER NEW PLAN

5/7/24 RCT REVISED PER NEW PLAN

DATE DRWN CHKD

888-892-2694 | WWW.STORMTECH.COM

2 SHEET
OF 5

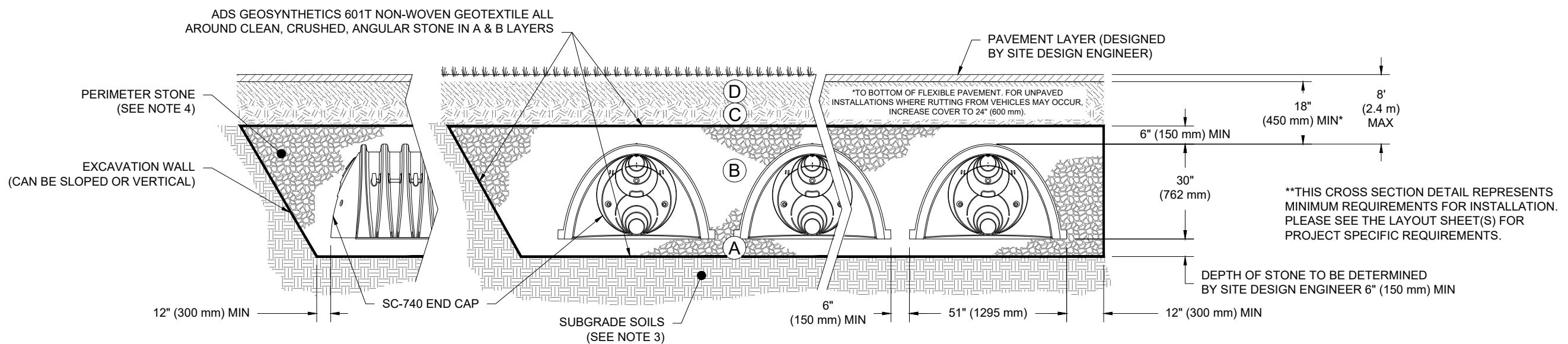
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT TEAM. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ⁵	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ⁵	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

PLEASE NOTE:

1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERS WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
5. WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



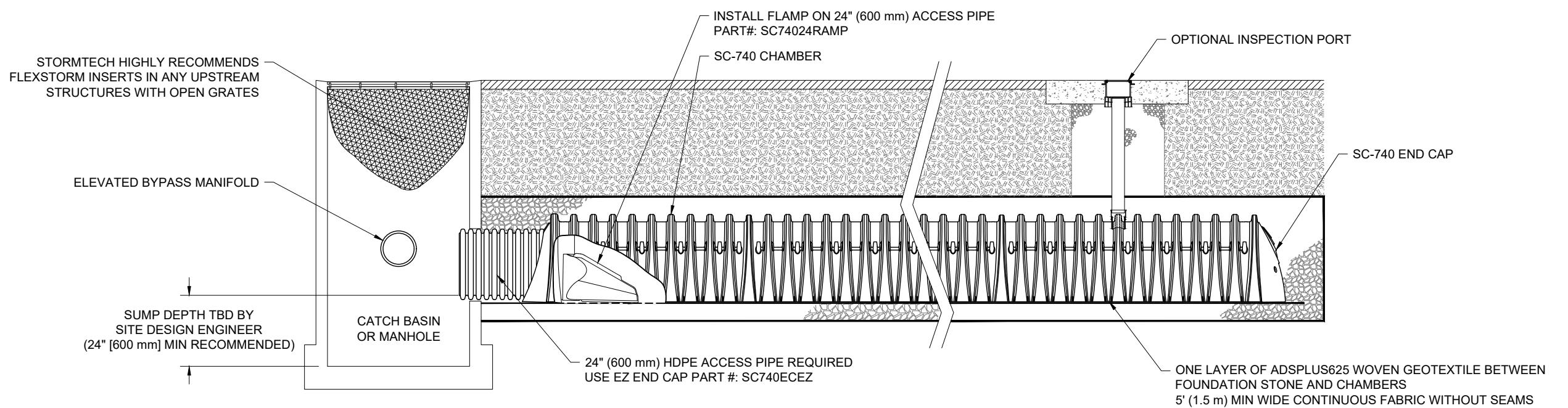
NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
2. SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

953 MAPLEVIEW DRIVE
BLOCK 193
BARRIE, ON.
DATE: 04-11-24 DRAWN: JR
PROJECT #: S407367 CHECKED: JR

StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD
HILLIARD, OH 43026
ADS.
3 SHEET
OF 5
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.



SC-740 ISOLATOR ROW PLUS DETAIL

NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT

- INSPECTION PORTS (IF PRESENT)
 - REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
 - REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
 - USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
 - LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
 - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- ALL ISOLATOR PLUS ROWS
 - REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
 - USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
 - MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
 - FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
 - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS

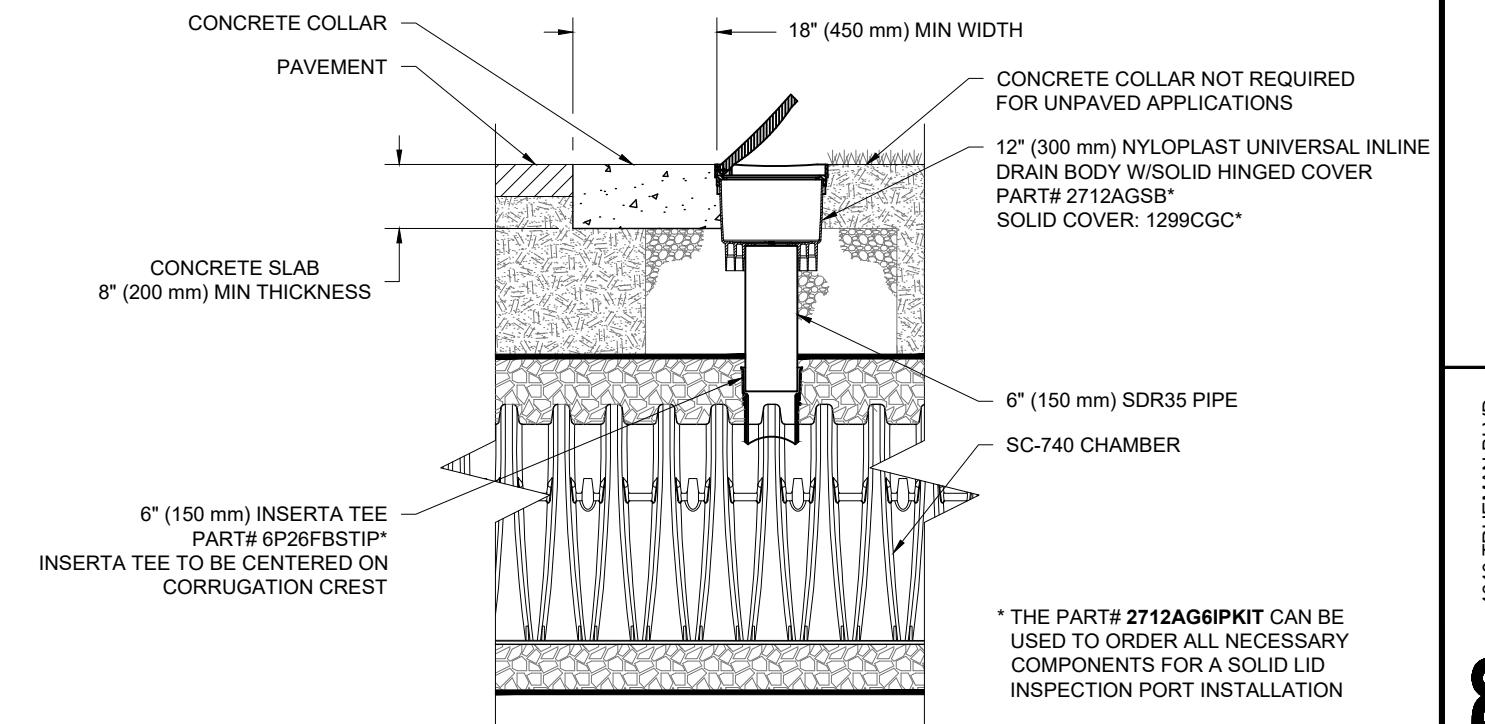
- A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



* THE PART# 2712AG6IPKIT CAN BE USED TO ORDER ALL NECESSARY COMPONENTS FOR A SOLID LID INSPECTION PORT INSTALLATION

SC-740 6" (150 mm) INSPECTION PORT DETAIL

NTS

953 MAPLEVIEW DRIVE
BLOCK 193
BARRIE, ON.

DATE: 04-11-24 DRAWN: JR
PROJECT #: S407367 CHECKED: JR

6/3/24 RCT RCT REVISED PER NEW PLAN
5/7/24 RCT RCT REVISED PER NEW PLAN
DATE DRWN CHKD DESCRIPTION

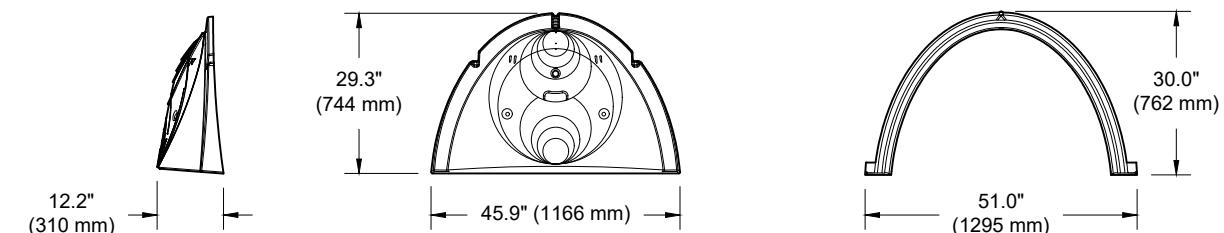
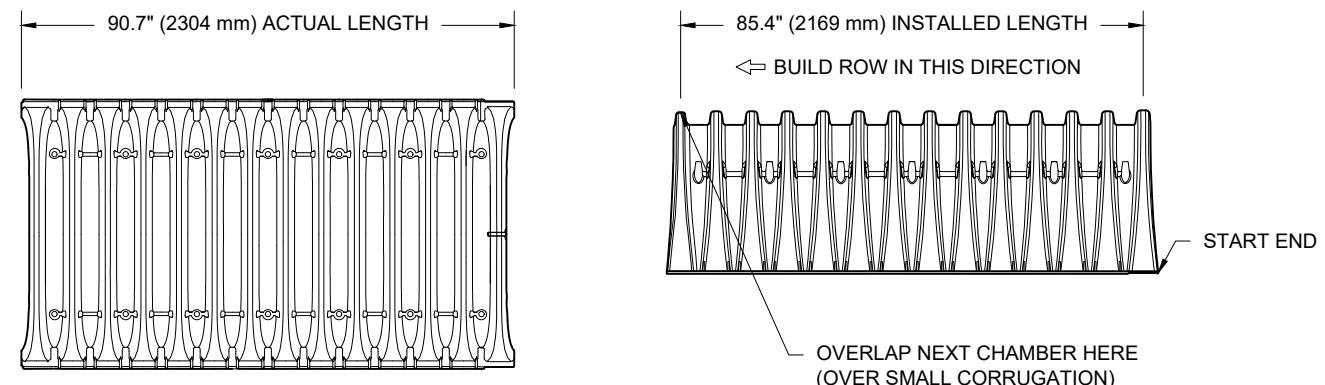
StormTech®
Chamber System
888-892-2694 | WWW.STORMTECH.COM

ADS.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT TEAM. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

SC-740 TECHNICAL SPECIFICATION

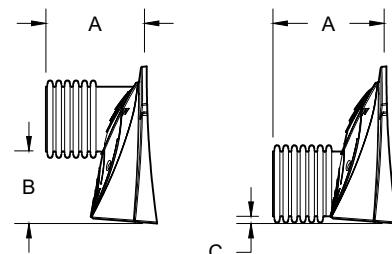
NTS



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m ³)
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m ³)
WEIGHT	75.0 lbs.	(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
PRE-CORED END CAPS END WITH "PC"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC			---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC			---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC			---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC			---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC			---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC			---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

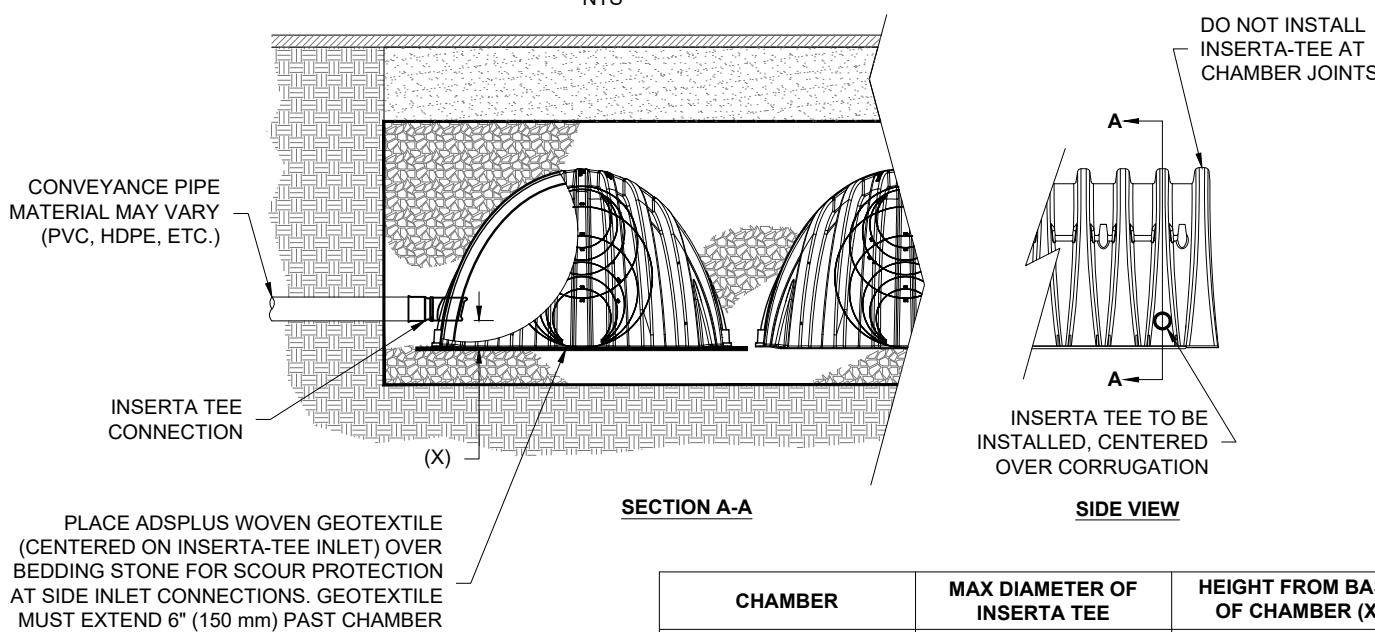
ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

INSERTA TEE DETAIL

NTS



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
SC-310	6" (150 mm)	4" (100 mm)
SC-740	10" (250 mm)	4" (100 mm)
SC-800	10" (250 mm)	4" (100 mm)
DC-780	10" (250 mm)	4" (100 mm)
MC-3500	12" (300 mm)	6" (150 mm)
MC-4500	12" (300 mm)	8" (200 mm)
MC-7200	12" (300 mm)	8" (200 mm)

INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON

NOTES:

- PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.
- CONTACT ADS ENGINEERING SERVICES IF INSERTA TEE INLET MUST BE RAISED AS NOT ALL INVERTS ARE POSSIBLE.

Inserta Tee®
Lateral Connection

4640 TRUEMAN BLVD
HILLIARD, OH 43026

ADS.

5 SHEET
OF 5

953 MAPLEVIEW DRIVE
BLOCK 193
BARRIE, ON.
DATE: 04-11-24 DRAWN: JR
PROJECT #: S407367 CHECKED: JR
DESCRIPTION

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

Project Name:	953 Mapleview - Block 193	
Consulting Engineer:	Jones Consulting Group	
Location:	Barrie, ON	
Sizing Completed By:	C. Neath	Email: cody.neath@ads-pipe.com

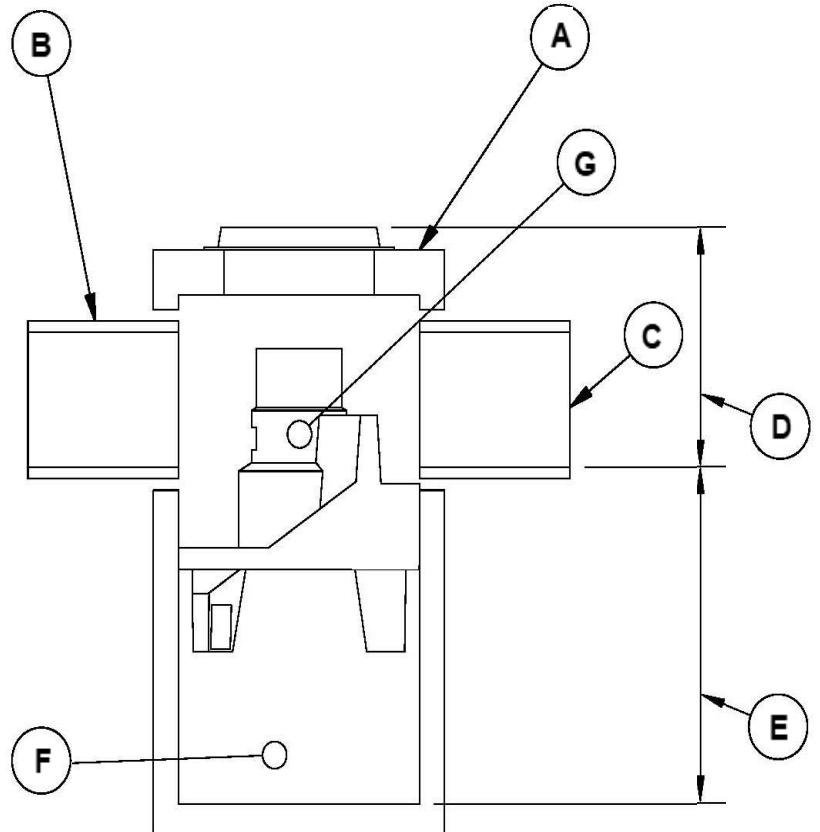
Treatment Requirements		
Treatment Goal:		Enhanced (MOE)
Selected Parameters:	80% TSS	90% Volume
Selected Unit:		FD-4HC

Summary of Results		
Model	TSS Removal	Volume Treated
FD-4HC	95.0%	>90%
FD-5HC	97.0%	>90%
FD-6HC	98.0%	>90%
FD-8HC	99.0%	>90%
FD-10HC	99.0%	>90%

FD-4HC Specification	
Unit Diameter (A):	1,200 mm
Inlet Pipe Diameter (B):	300 mm
Outlet Pipe Diameter (C):	300 mm
Height, T/G to Outlet Invert (D):	2340 mm
Height, Outlet Invert to Sump (E):	1515 mm
Sediment Storage Capacity (F):	0.78 m ³
Oil Storage Capacity (G):	723 L
Recommended Sediment Depth for Maintenance:	440 mm
Max. Pipe Diameter:	600 mm
Peak Flow Capacity:	510 L/s

Site Elevations:	
Rim Elevation:	262.07
Inlet Pipe Elevation:	259.76
Outlet Pipe Elevation:	259.73

Site Details	
Site Area:	0.24 ha
% Impervious:	90%
Rational C:	0.84
Rainfall Station:	Barrie, ONT
Particle Size Distribution:	Fine
Peak Flowrate:	61 L/s



Notes:

Removal efficiencies are based on NJDEP Test Protocols and independently verified.

All units supplied by ADS have numerous local, provincial, and international certifications (copies of which can be provided upon request). The design engineer is responsible for ensuring compliance with applicable regulations.



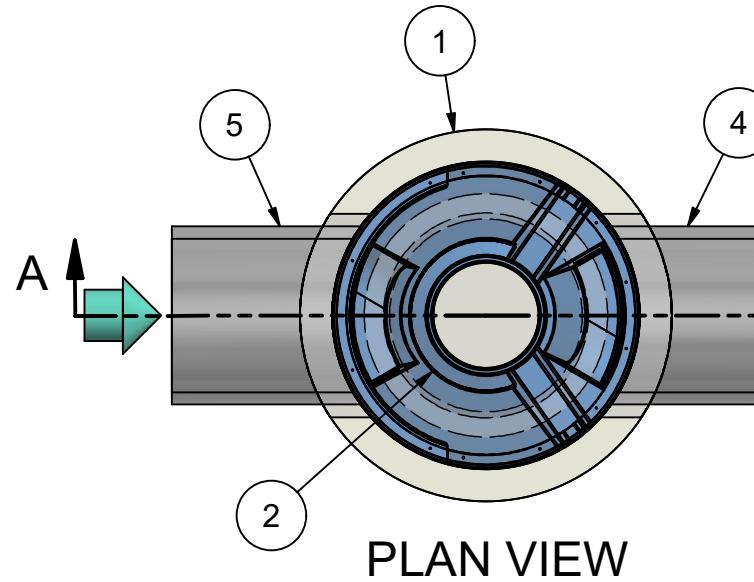
Project Name: 953 Mapleview - Block 193
 Consulting Engineer: Jones Consulting Group
 Location: Barrie, ON

Net Annual Removal Efficiency Summary: FD-4HC

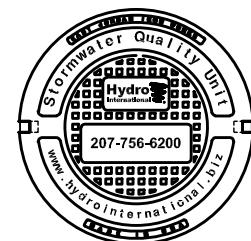
Rainfall Intensity ⁽¹⁾	Fraction of Rainfall ⁽¹⁾	FD-4HC Removal Efficiency ⁽²⁾	Weighted Net-Annual Removal Efficiency
mm/hr	%	%	%
0.50	0.3%	100.0%	0.3%
1.00	25.7%	100.0%	25.7%
1.50	5.3%	100.0%	5.3%
2.00	13.4%	100.0%	13.4%
2.50	5.5%	100.0%	5.5%
3.00	3.7%	99.1%	3.7%
3.50	7.2%	97.7%	7.0%
4.00	3.4%	96.5%	3.2%
4.50	2.4%	95.4%	2.3%
5.00	4.3%	94.5%	4.1%
6.00	3.6%	92.9%	3.4%
7.00	4.3%	91.6%	4.0%
8.00	3.4%	90.5%	3.1%
9.00	1.6%	89.5%	1.5%
10.00	2.1%	88.6%	1.9%
20.00	8.9%	83.1%	7.4%
30.00	2.3%	80.0%	1.8%
40.00	1.0%	77.9%	0.8%
50.00	0.5%	76.3%	0.4%
100.00	0.7%	71.5%	0.5%
150.00	0.1%	68.9%	0.0%
200.00	0.0%	0.0%	0.0%
Total Net Annual Removal Efficiency:			95.4%
Total Runoff Volume Treated:			>90%

Notes:

- (1) Rainfall Data: 1978:2007, HLY03, Barrie, ONT, 6110557.
- (2) Based on third party verified data and approximating the removal of a PSD similar to the STC Fine distribution
- (3) Rainfall adjusted to 5 min peak intensity based on hourly average.



PLAN VIEW



HYDRO FRAME AND COVER (INCLUDED)

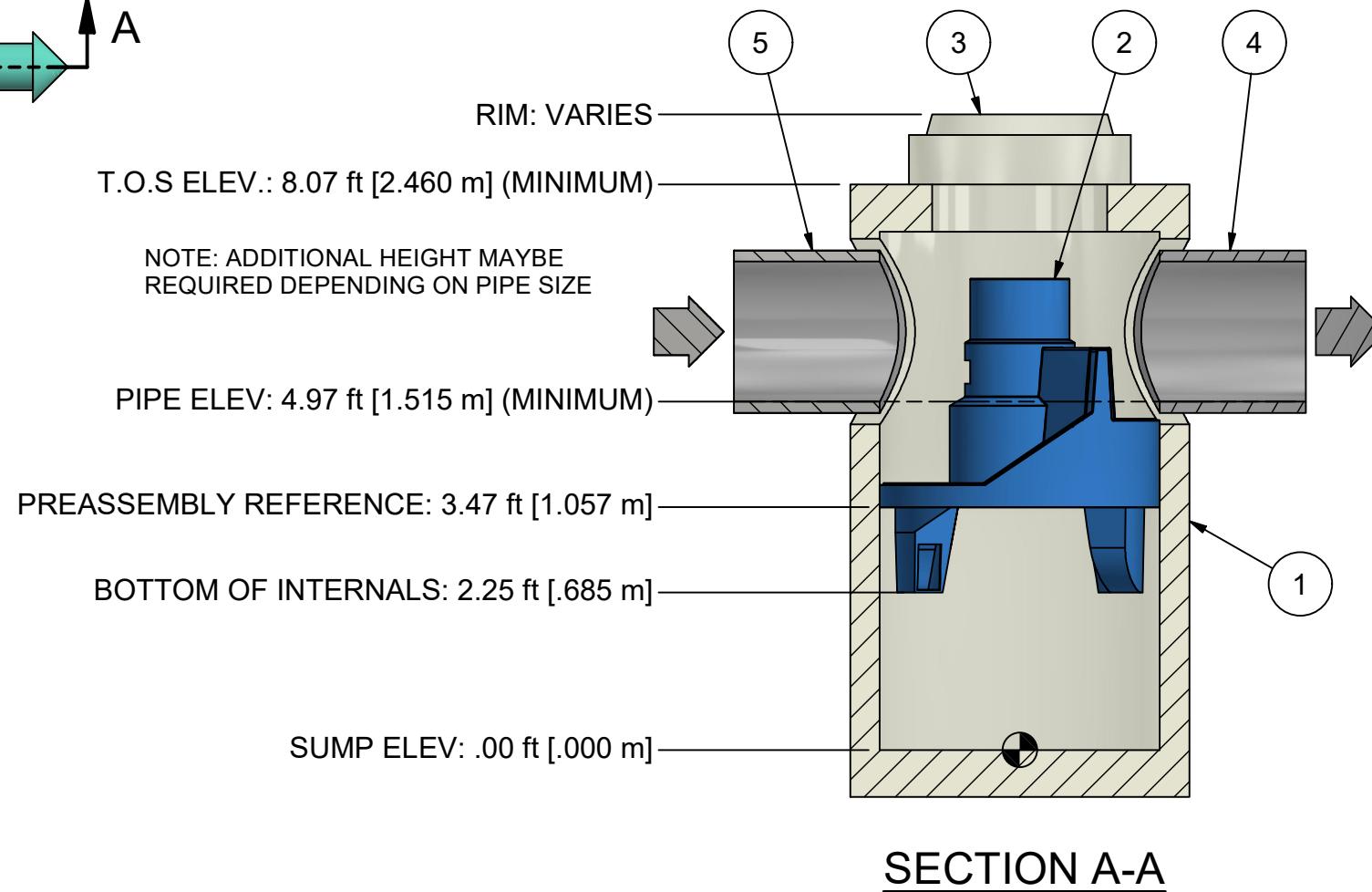
GRADE RINGS BY OTHERS AS REQUIRED

PRODUCT SPECIFICATION:

1. Peak Hydraulic Flow: 18.0 cfs (510 l/s)
2. Min Sediment Storage Capacity: 0.7 cu. yd. (0.5 cu. m.)
3. Maximum Inlet/Outlet Pipe Diameters: 24 in. (600 mm)
4. The Treatment System Shall Use An Induced Vortex To Separate Pollutants From Stormwater Runoff.
5. For More Product Information Including Regulatory Acceptances, Please Visit <https://hydro-int.com/en/products/first-defense>

GENERAL NOTES:

1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 24".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plan.s)
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.



SECTION A-A

PARTS LIST				
ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	48	1200	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	24 (MAX)	600 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	24 (MAX)	600 (MAX)	INLET PIPE (BY OTHERS)

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.

2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.

3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.



IF IN DOUBT ASK

DATE: 10/7/2019	SCALE: 1:30
DRAWN BY: ER	CHECKED BY: MRJ

APPROVED BY

Title
4-ft DIAMETER

FIRST DEFENSE

GENERAL ARRANGEMENT

Hydro International
hydro-int.com
HYDRO INTERNATIONAL

WEIGHT:
19448 lbmass

MATERIAL:

STOCK NUMBER:

DRAWING NO.:
FD GA-4

SHEET SIZE:
B

SHEET:
1 OF 1

Rev:
-



Project DEVELOPMENT Summary

DEVELOPMENT: Block 193 Site Plan - Mapleview South Subdivision
Subwatershed: Hewitts Creek

Total Pre-Development Area (ha):	0.63	Total Pre-Development Phosphorus Load (kg/yr):	0.12
----------------------------------	-------------	--	-------------

Pre-Development Land Use	Area (ha)	P coeff. (kg/ha)	P Load (kg/yr)
Cropland	0.63	0.19	0.12

POST-DEVELOPMENT LOAD

Post-Development Land Use	Area (ha)	P coeff. (kg/ha)	Best Management Practice applied with P Removal Efficiency	P Load (kg/yr)
High Intensity - Residential	0.63	1.32	Treatment Train Approach	79% 0.18

Refer to Table 8 of the 953 Mapleview Drive E - Block 193 Site Plan, Detailed SWMR, prepared by The Jones Consulting Group, dated May 2024.

Post-Development Area Altered:	0.63	P Load (kg/yr)
Total Pre-Development Area:	0.63	
Unaffected Area:	0	
		Pre-Development: 0.12
		Post-Development: 0.83
		Change (Pre - Post): -0.71
		595% Net Increase in Load
		Post-Development (with BMPs): 0.18
		Change (Pre - Post): -0.06
		47.28% Net Increase in Load

DEVELOPMENT: Block 193 Site Plan - Maplevue South Subdivision**Subwatershed: Hewitts Creek****CONSTRUCTION PHASE LOAD**

	P Load (kg/yr)
SUMMARY WITH IMPLEMENTATION OF BMPs	
Pre-Development:	0.12
Construction Phase Amortized Over 8 Years :	to be determined
Post-Development:	0.18
Post-Development + Amortized Construction:	to be determined
Pre-Development Load - Post-Development Load:	-0.06
Conclusion:	47% Increase in Load
Pre-Development Load - (Post-Development + Amortized Construction Load):	to be determined
Conclusion:	to be determined
Based on a comparison of Pre-Development and Post-Development loads, and in consideration of Construction Phase loads, the Ministry would encourage the Municipality to:	
Not approve development as site specific appropriate	

	Project:	Block 193 Site Plan - Mapleview South Subdivision	Date:	Jun-24
	File No.:	REI-17055	Designed:	KR
	Subject:	BLK 193 Infiltration Gallery per TRCA/CVC LID Manual	Checked:	MF
	Revisions:			

BMP Type **LOT LEVEL / CONVEYANCE CONTROL**

Infiltration Galleries, designed per CVC Section 4.4 - Soakaways, Infiltration Trenches & Chambers, generally involve the collection of runoff to a stone filled reservoir providing storage for a particular return period event. Water then infiltrates into the ground over a period of 24 - 48 hours typically, recharging the groundwater sources. Infiltration Galleries are of three general types of facilities: Soakaway Pits (Typical to a Single Lot), Infiltration Trenches (Typical to Multiple Lots, located in an easement), or Infiltration Chambers (Typically centralized modular storage units below ground). These facilities promote groundwater recharge through infiltration which aids in meeting Water Balance, provide Water Quality benefits through a treatment train approach and can assist in Stream Erosion Control

Common Concerns

- 1 Risk of Groundwater Contamination
- 2 Risk of Soil Contamination
- 3 Location on Private Property / Enforcement
- 4 Standing Water and Mosquitos
- 5 Proximity to Foundations & Seepage
- 6 Winter Operation

Physical Suitability and Constraints

- 1 Proximity to Drinking Water Sources i.e. WHPA's, not within 2yr Travel Time
- 2 Site Topography, locate on slopes <15%
- 3 Water Table, minimum 1.0m separation from Bottom of Facility to SHGWT
- 4 Site Soils & Infiltration Capacity, min 15 mm/hr
- 5 Drainage Area, 5:1 to 20:1 Impervious Drainage Area to BMP Area (10:1 Max for Roads)
- 6 Pollution Hot Spot Runoff
- 7 Setback from Buildings, minimum of 5m from foundations
- 8 Proximity to Underground Utilities

Table 4.4.1 Ability of soakaways, infiltration trenches and chambers to meet SWM objectives

BMP	Water Balance Benefit	Water Quality Improvement	Stream Channel Erosion Control Benefit
Soakaways, Infiltration Trenches and Chambers	Yes	Yes	Partial - depends on soil infiltration rate

Table 4.4.2 Volumetric runoff reduction¹ achieved by infiltration trenches and perforated pipe systems

LID Practice	Location	Runoff Reduction ¹	Reference
Infiltration trench with underdrain	Virginia	60%	Schueler (1983)
Grass swale/ Perforated pipe system	Ontario	73%	J.F. Sabourin and Associates (2008a)
Grass swale/ Perforated pipe system	Ontario	86%	J.F. Sabourin and Associates (2008a)
Perforated pipe system	Ontario	95%	SWAMP (2005)
Perforated pipe system	Ontario	89%	SWAMP (2005)
Runoff Reduction Estimate²		85%	

Notes:

1. Runoff reduction estimates are based on differences in runoff volume between the practice and a conventional impervious surface over the period of monitoring.
2. This estimate is provided only for the purpose of initial screening of LID practices suitable for achieving stormwater management objectives and targets. Performance of individual facilities will vary depending on site specific contexts and facility design parameters and should be estimated as part of the design process and submitted with other documentation for review by the approval authority.

BMP Sizing Guidelines

- 1 Geometry & Layout, typically linear or rectangular, modular units afford flexibility to suit nearly any system orientation
- 2 Pretreatment should be provided to ensure system longevity, by way of leaf screens, vegetated filter strips/grass swales or filter devices (OGS Units)
- 3 Conveyance by Direct Inlet, 3rd Pipe System, or Storm Sewer, an Overflow should be provided outletting to grade or a nearby Storm Sewer
- 4 The infiltration rate of the soil in the pervious area should be at least 15 mm/hr
- 5 Filter Media will vary depending on type of system to be constructed. Typically includes a layer of clear stone (50mm dia.), which fills the reservoir. Systems can also be complimented with an underlying sand filter layer for improved Water Quality benefits. A geotextile is commonly used as a separator between adjacent native soils and stone reservoir, as well as between filter mediums. Check AOS (non-woven) or POA (woven) for piping, clogging, etc.

	Project:	Block 193 Site Plan - Mapleview South Subdivision	Date:	13-Jun-24
	File No.:	REI-17055	Designed:	KR
	Subject:	BLK 193 Infiltration Gallery per TRCA/CVC LID Manual	Checked:	MF
	Revisions:	0	0	

BMP Sizing Calculations (Infiltration Galleries)

Note: If sizing a chamber system, use the manufacturers design spreadsheet / sizing tools

1) Depth of a facility is a function of native soil infiltration rate, porosity of storage media, and targeted drawdown time:

$$\text{Eq. 1.2 } d_{R\text{ MAX}} = i * t_s / V_R$$

Where: $d_{R\text{ MAX}}$ = Maximum Depth of Stone Reservoir (mm), Limit to 2000mm MAX.
 i = Infiltration Rate for Native Soils (mm/hr) - Use FS Rate, not actual
 t_s = Drawdown Time (Design for 24 - 48 Hours)
 V_R = Void Ratio of Stone Reservoir (Typically 0.4 for 50mm Clear Stone)

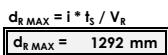
2) Facility footprint is then determined based on the Water Quality Volume (WQV) to be captured, as well as the available storage volume in the reservoir:

$$\text{Eq. 2 } A_F = WQV / (d_{R\text{ MAX}} * V_R)$$

Where: A_F = Footprint Area of Facility (m^2)
 WQV = Water Quality Volume (m^3), Depth of Runoff (mm) * Catchment (m^2) OR Runoff Vol. (m^3)
 $d_{R\text{ MAX}}$ = Design Stone Reservoir Depth (m)
 V_R = Void Ratio of Stone Reservoir (Typically 0.4 for 50mm Clear Stone)

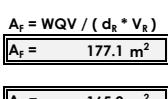
Infiltration Gallery Sizer:

 = user input  = calculated / constant  = design parameter

1) 
 $d_{R\text{ MAX}} = i * t_s / V_R$
 $d_{R\text{ MAX}} = 1292 \text{ mm}$

Where: $i = 11.4 \text{ mm/hr}$
 $t_s = 45.32 \text{ hrs}$
 $V_R = 0.4$

Note: CHECK DEPTH TO SHGWT FOR MINIMUM 1.0m SEPARATION

2) 
 $A_F = WQV / (d_{R\text{ MAX}} * V_R)$
 $A_F = 177.1 \text{ m}^2$
 $A_F = 165.2 \text{ m}^2$

Where: $WQV = 91.476 \text{ m}^3$
 $d_{R\text{ MAX}} = 1.292 \text{ m}$
 $V_R = 0.4$

Depth of Runoff: 21.78 mm
Catchment Area: 4200 m^2
XIMP: 94%
Imp. Area 3964 m^2

Recommended Area Check (5:1 - 20:1 Ratio): **CAUTION! Consider additional protection against sedimentation**

301 OTTHYMO Catchment ID

A_p based on I/P Ratio:
 $A_{F\text{ MIN}} = 264.264 \text{ m}^2$
 $A_{F\text{ MAX}} = 792.792 \text{ m}^2$

I/P_{PROV} : 24 : 1

ADDITIONAL NOTES:

Contributing Area Land Use is comprised of Medium Density Residential and Rooftop Drainage. Upstream pre-treatment is provided by an OGS unit prior to flows entering the facility

References: **STEP Low Impact Development Stormwater Management Planning & Design Guide:** https://wiki.sustainabletechnologies.ca/wiki/Main_Page

Item	Page	Link
Eq.'s 1.1, 1.2, 2, 3	Bioretention: Sizing	https://wiki.sustainabletechnologies.ca/wiki/Bioretention:_Sizing
Eq. 4	Curb Cuts	https://wiki.sustainabletechnologies.ca/wiki/Curb_cuts
Eq. 5	Flow Through Media	https://wiki.sustainabletechnologies.ca/wiki/Flow_through_media
Eq. 6	Flow Through Perforated Pipe	https://wiki.sustainabletechnologies.ca/wiki/Flow_through_perforated_pipe



Appendix C

OTTHYMO Modeling

- Post-Development OTTHYMO Inputs
- Discrete Event Modelling: 25mm Storm, Detailed Output
- Continuous Event Modelling: Water Balance Summary
- OTTHYMO Digital Modeling Files

Weighted Curve Number Calculator

Input:

Catchment ID	301	Weighted Curve Number	Weighted Runoff 'C'
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam		
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.024	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.397	98.0	0.95

Calculated:

Area	0.420	ha
Average CN	95	
Average Pervious CN	49	
Average Runoff 'C'	0.90	

Initial Abstraction Calculator

Input:

Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm

Calculated:

Total Average IA	2.17	mm
Average Pervious IA	5.00	mm

*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

Time of Concentration Calculator

Input:

Flow Length Max El.	<input type="text"/>	m
Flow Length Min. El.	<input type="text"/>	m
Catchment Flow Length	<input type="text"/> 25	m

Calculated:

Catchment Ave. Slope	<input type="text"/> 2.00	%
Imperviousness	<input type="text"/> 94.38%	
Directly Connected	<input type="text"/>	
Imperviousness	<input type="text"/> 94.38%	

Calculated: RATIONAL COEFFICIENT
5YR Rational 'C'

<input type="text"/> 0.90

Calculated: MTO DRAINAGE MANUAL
25YR Rational 'C'
50YR Rational 'C'
100YR Rational 'C'

<input type="text"/> 0.99
<input type="text"/> 1.00
<input type="text"/> 1.00

Calculated: AIRPORT METHOD (Runoff Coef <0.4)
Time of Concentration
Time of Concentration
Time to Peak

<input type="text"/> 2.56	min
<input type="text"/> 0.04	hr
<input type="text"/> 0.03	hr

$$Tc=3.26*(1.1-C)*L^{0.5}*S^{-0.33}$$

Calculated: BRANSBY-WILLIAMS METHOD (Runoff Coef >=0.4)
Time of Concentration
Time of Concentration
Time to Peak

<input type="text"/> 1.35	min
<input type="text"/> 0.02	hr
<input type="text"/> 0.02	hr

$$Tc=0.057*L^{0.2}*A^{-0.1}$$

Use:
Time of Concentration
Time to Peak

<input type="text"/> 0.02	hr
<input type="text"/> 0.02	hr

Catchment Area Summary (301)					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.0236	49	1.16	0.10	0.0024
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.3968	98	38.88	0.95	0.3769
Impervious "AB" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "AB"	0.4204				
Weighted CN "AB"			95.25		0.9022
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.4204	Weighted CN	95.25	Weighted "C"	0.90

Weighted Curve Number Calculator

Input:

Catchment ID	302	Weighted Curve Number	Weighted Runoff 'C'
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam		
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.104	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.069	98.0	0.95

Calculated:

Area	0.174	ha
Average CN	69	
Average Pervious CN	49	
Average Runoff 'C'	0.44	

Initial Abstraction Calculator

Input:

Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm

Calculated:

Total Average IA	3.80	mm
Average Pervious IA	5.00	mm

*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

Time of Concentration Calculator

Input:

Flow Length Max El.	<input type="text"/>	m
Flow Length Min. El.	<input type="text"/>	m
Catchment Flow Length	<input type="text"/> 10	m

Calculated:

Catchment Ave. Slope	<input type="text"/> 12.00	%
Imperviousness	<input type="text"/> 40.00%	
Directly Connected	<input type="text"/>	
Imperviousness	<input type="text"/> 24.00%	

Calculated: RATIONAL COEFFICIENT
5YR Rational 'C' 0.44

Calculated: MTO DRAINAGE MANUAL
25YR Rational 'C' 0.48
50YR Rational 'C' 0.53
100YR Rational 'C' 0.55

Calculated: AIRPORT METHOD (Runoff Coef <0.4)
Time of Concentration 3.00 min
Time of Concentration 0.05 hr
Time to Peak 0.03 hr

$$Tc=3.26*(1.1-C)*L^{0.5}*S^{-0.33}$$

Calculated: BRANSBY-WILLIAMS METHOD (Runoff Coef >=0.4)
Time of Concentration 0.41 min
Time of Concentration 0.01 hr
Time to Peak 0.00 hr

$$Tc=0.057*L^{0.2}*A^{-0.1}$$

Use:
Time of Concentration 0.01 hr
Time to Peak 0.00 hr

Catchment Area Summary (302)					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.1041	49	5.10	0.10	0.0104
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.0417	98	4.08	0.95	0.0396
Impervious "AB" (Dis-Connected)	0.0278	98	2.72	0.95	0.0264
Total Area "AB"	0.1736				
Weighted CN "AB"			68.60		0.4400
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.1736	Weighted CN	68.60	Weighted "C"	0.44

Weighted Curve Number Calculator

Input:

Catchment ID	303	Weighted Curve Number	Weighted Runoff 'C'
Hydrologic Soil Group	AB		
Soil Texture	Bondhead Sandy Loam		
Wetland(ha)/CN	0.000	N/A	N/A
Woods(ha)/CN	0.000	N/A	N/A
Pasture/Lawn Area(ha)/CN	0.018	49.0	0.10
Cultivated(ha)/CN	0.000	N/A	N/A
Impervious Area(ha)/CN	0.002	98.0	0.95

Calculated:

Area	0.020	ha
Average CN	55	
Average Pervious CN	49	
Average Runoff 'C'	0.20	

Initial Abstraction Calculator

Input:

Wetland	16	mm
Woods	10	mm
Pasture/Lawns	5	mm
Cultivated	7	mm
Impervious Areas	2	mm

Calculated:

Total Average IA	4.64	mm
Average Pervious IA	5.00	mm

*Weighted Curve Numbers and Weighted Rational Coefficients are determined from the weighted average of the area and Curve Number or Rational Coefficient in a given soil type, i.e. Type A, B, C or D.

Time of Concentration Calculator

Input:

Flow Length Max El.	3	m
Flow Length Min. El.		
Catchment Flow Length		

Calculated:

Catchment Ave. Slope	25.00	%
Imperviousness	12.00%	
Directly Connected		
Imperviousness	1.20%	

Calculated: RATIONAL COEFFICIENT
5YR Rational 'C'

0.20

Calculated: MTO DRAINAGE MANUAL
25YR Rational 'C'
50YR Rational 'C'
100YR Rational 'C'

0.22
0.24
0.25

Calculated: AIRPORT METHOD (Runoff Coef <0.4)
Time of Concentration
Time of Concentration
Time to Peak

1.75	min
0.03	hr
0.02	hr

$$Tc=3.26*(1.1-C)*L^{0.5}*S^{-0.33}$$

Calculated: BRANSBY-WILLIAMS METHOD (Runoff Coef >=0.4)
Time of Concentration
Time of Concentration
Time to Peak

0.13	min
0.00	hr
0.00	hr

$$Tc=0.057*L^{0.2}*A^{-0.1}$$

Use:
Time of Concentration
Time to Peak

0.03	hr
0.02	hr

Catchment Area Summary (303)					
	Area (ha)	CN	CN*A	Rational "C"	C*A
Wetlands "A"	0.0000	50	0.00	0.05	0.0000
Woods "A"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "A"	0.0000	49	0.00	0.10	0.0000
Cultivated "A"	0.0000	66	0.00	0.22	0.0000
Impervious "A" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "A" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "A"	0.0000				
Weighted CN "A"			0.00		0.0000
Wetlands "AB"	0.0000	50	0.00	0.05	0.0000
Woods "AB"	0.0000	36	0.00	0.08	0.0000
Pasture/Lawn "AB"	0.0177	49	0.87	0.10	0.0018
Cultivated "AB"	0.0000	66	0.00	0.22	0.0000
Impervious "AB" (Connected)	0.0002	98	0.02	0.95	0.0002
Impervious "AB" (Dis-Connected)	0.0022	98	0.21	0.95	0.0021
Total Area "AB"	0.0201				
Weighted CN "AB"			54.88		0.2020
Wetlands "B"	0.0000	50	0.00	0.05	0.0000
Woods "B"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "B"	0.0000	69	0.00	0.28	0.0000
Cultivated "B"	0.0000	74	0.00	0.35	0.0000
Impervious "B" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "B" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "B"	0.0000				
Weighted CN "B"			0.00		0.0000
Wetlands "BC"	0.0000	50	0.00	0.05	0.0000
Woods "BC"	0.0000	60	0.00	0.25	0.0000
Pasture/Lawn "BC"	0.0000	69	0.00	0.28	0.0000
Cultivated "BC"	0.0000	74	0.00	0.35	0.0000
Impervious "BC" (Connected)	0.0000	98	0.00	0.95	0.0000
Impervious "BC" (Dis-Connected)	0.0000	98	0.00	0.95	0.0000
Total Area "BC"	0.0000				
Weighted CN "BC"			0.00		0.0000
Totals:	0.0201	Weighted CN	54.88	Weighted "C"	0.20

```

V   V   I   SSSSS   U   U   A   L
V   V   I   SS    U   U   A A   L
V   V   I   SS    U   U   A A A   L
V   V   I   SS    U   U   A   A   L
VV   I   SSSSS   UUUUU   A   A   LLLL
000   TTTTTT   TTTTTT   H   H   Y   Y   M   M   000   TM
0   0   T   T   H   H   Y   Y   MM   MM   O   O
0   0   T   T   H   H   Y   M   M   O   O
000   T   T   H   H   Y   M   M   000

```

(v 6.2.2015)

Developed and Distributed by Smart City Water Inc
 Copyright 2007 - 2022 Smart City Water Inc
 All rights reserved.

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\vo2\voin.dat
 Output filename: C:\Users\kransom.JONES\AppData\Local\civica\VH5\0e32c285-5856-4fe8-af0e-3a4eb0307df2\52
 Summary filename: C:\Users\kransom.JONES\AppData\Local\civica\VH5\0e32c285-5856-4fe8-af0e-3a4eb0307df2\52

DATE: 05-31-2024

TIME: 11:43:04

USER:

COMMENTS: _____

 ** SIMULATION : WQE 25mm 4hr CHI **

| CHICAGO STORM | IDF curve parameters: A= 458.560
 | Ptotal= 25.00 mm | B= 4.699
 | | C= 0.781
 used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
 Storm time step = 5.00 min
 Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	'	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.56	1.00	6.77		2.00	4.31	3.00	2.07
0.08	1.65	1.08	10.39		2.08	3.92	3.08	1.99
0.17	1.76	1.17	24.03		2.17	3.61	3.17	1.92
0.25	1.88	1.25	77.76		2.25	3.34	3.25	1.85
0.33	2.03	1.33	31.02		2.33	3.12	3.33	1.79
0.42	2.20	1.42	17.08		2.42	2.92	3.42	1.73
0.50	2.41	1.50	11.77		2.50	2.76	3.50	1.68
0.58	2.68	1.58	9.02		2.58	2.61	3.58	1.63
0.67	3.02	1.67	7.34		2.67	2.48	3.67	1.58
0.75	3.47	1.75	6.21		2.75	2.36	3.75	1.54
0.83	4.11	1.83	5.40		2.83	2.25	3.83	1.50
0.92	5.09	1.92	4.79		2.92	2.16	3.92	1.46

| CALIB
 | NASHYD (0303) | Area (ha)= 0.02 Curve Number (CN)= 55.0
 | ID= 1 DT= 1.0 min | Ia (mm)= 4.64 # of Linear Res.(N)= 3.00
 | | U.H. Tp(hrs)= 0.02

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----								
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	'	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.56	1.017	6.77		2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77		2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77		2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77		2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77		2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39		2.100	3.92	3.10	1.99

0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.78	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46
0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Unit Hyd Qpeak (cms)= 0.038

PEAK FLOW (cms)= 0.000 (i)
 TIME TO PEAK (hrs)= 1.333
 RUNOFF VOLUME (mm)= 1.765
 TOTAL RAINFALL (mm)= 24.998
 RUNOFF COEFFICIENT = 0.071

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 CALIB STANDHYD (0302) Area (ha)= 0.17
 ID= 1 DT= 1.0 min Total Imp(%)= 40.00 Dir. Conn.(%)= 24.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.07	0.10	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	2.00	2.00	
Length (m)=	34.06	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----
 TIME RAIN | TIME RAIN | ' TIME RAIN | TIME RAIN
 hrs mm/hr | hrs mm/hr | ' hrs mm/hr | hrs mm/hr

0.017	1.56	1.017	6.77	2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77	2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77	2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77	2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77	2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39	2.100	3.92	3.10	1.99
0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.78	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46
0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Max.Eff.Inten.(mm/hr)= 77.76
 over (min) 5.00 33.00
 Storage Coeff. (min)= 1.20 (ii) 32.62 (ii)
 Unit Hyd. Tpeak (min)= 5.00 33.00
 Unit Hyd. peak (cms)= 0.45 0.03

TOTALS

PEAK FLOW (cms)= 0.01 0.00 0.008 (iii)
 TIME TO PEAK (hrs)= 1.35 2.02 1.35
 RUNOFF VOLUME (mm)= 23.00 1.93 6.87
 TOTAL RAINFALL (mm)= 25.00 25.00 25.00
 RUNOFF COEFFICIENT = 0.92 0.08 0.27

(i) CN PROCEDURE SELECTED FOR PERVERIOUS LOSSES:
 CN* = 49.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0302):	0.17	0.008	1.35	6.87
+ ID2= 2 (0303):	0.02	0.000	1.33	1.77
=====				
ID = 3 (0006):	0.19	0.008	1.35	6.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0301)	Area (ha)= 0.42
ID= 1 DT= 1.0 min	Total Imp(%)= 94.38
Dir. Conn.(%)= 94.38	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.40	0.02
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	2.00	2.00
Length (m)=	52.92	25.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.56	1.017	6.77	2.017	4.31	3.02	2.07
0.033	1.56	1.033	6.77	2.033	4.31	3.03	2.07
0.050	1.56	1.050	6.77	2.050	4.31	3.05	2.07
0.067	1.56	1.067	6.77	2.067	4.31	3.07	2.07
0.083	1.56	1.083	6.77	2.083	4.31	3.08	2.07
0.100	1.65	1.100	10.39	2.100	3.92	3.10	1.99
0.117	1.65	1.117	10.39	2.117	3.92	3.12	1.99
0.133	1.65	1.133	10.39	2.133	3.92	3.13	1.99
0.150	1.65	1.150	10.39	2.150	3.92	3.15	1.99
0.167	1.65	1.167	10.39	2.167	3.92	3.17	1.99
0.183	1.76	1.183	24.03	2.183	3.61	3.18	1.92
0.200	1.76	1.200	24.03	2.200	3.61	3.20	1.92
0.217	1.76	1.217	24.03	2.217	3.61	3.22	1.92
0.233	1.76	1.233	24.03	2.233	3.61	3.23	1.92
0.250	1.76	1.250	24.03	2.250	3.61	3.25	1.92
0.267	1.88	1.267	77.76	2.267	3.34	3.27	1.85
0.283	1.88	1.283	77.76	2.283	3.34	3.28	1.85
0.300	1.88	1.300	77.76	2.300	3.34	3.30	1.85
0.317	1.88	1.317	77.76	2.317	3.34	3.32	1.85
0.333	1.88	1.333	77.76	2.333	3.34	3.33	1.85
0.350	2.03	1.350	31.02	2.350	3.12	3.35	1.79
0.367	2.03	1.367	31.02	2.367	3.12	3.37	1.79
0.383	2.03	1.383	31.02	2.383	3.12	3.38	1.79
0.400	2.03	1.400	31.02	2.400	3.12	3.40	1.79
0.417	2.03	1.417	31.02	2.417	3.12	3.42	1.79
0.433	2.20	1.433	17.08	2.433	2.92	3.43	1.73
0.450	2.20	1.450	17.08	2.450	2.92	3.45	1.73
0.467	2.20	1.467	17.08	2.467	2.92	3.47	1.73
0.483	2.20	1.483	17.08	2.483	2.92	3.48	1.73
0.500	2.20	1.500	17.08	2.500	2.92	3.50	1.73
0.517	2.41	1.517	11.78	2.517	2.76	3.52	1.68
0.533	2.41	1.533	11.77	2.533	2.76	3.53	1.68
0.550	2.41	1.550	11.77	2.550	2.76	3.55	1.68
0.567	2.41	1.567	11.77	2.567	2.76	3.57	1.68
0.583	2.41	1.583	11.77	2.583	2.76	3.58	1.68
0.600	2.68	1.600	9.02	2.600	2.61	3.60	1.63
0.617	2.68	1.617	9.02	2.617	2.61	3.62	1.63
0.633	2.68	1.633	9.02	2.633	2.61	3.63	1.63
0.650	2.68	1.650	9.02	2.650	2.61	3.65	1.63
0.667	2.68	1.667	9.02	2.667	2.61	3.67	1.63
0.683	3.02	1.683	7.34	2.683	2.48	3.68	1.58
0.700	3.02	1.700	7.34	2.700	2.48	3.70	1.58
0.717	3.02	1.717	7.34	2.717	2.48	3.72	1.58
0.733	3.02	1.733	7.34	2.733	2.48	3.73	1.58
0.750	3.02	1.750	7.34	2.750	2.48	3.75	1.58
0.767	3.47	1.767	6.21	2.767	2.36	3.77	1.54
0.783	3.47	1.783	6.21	2.783	2.36	3.78	1.54
0.800	3.47	1.800	6.21	2.800	2.36	3.80	1.54
0.817	3.47	1.817	6.21	2.817	2.36	3.82	1.54
0.833	3.47	1.833	6.21	2.833	2.36	3.83	1.54
0.850	4.11	1.850	5.40	2.850	2.25	3.85	1.50
0.867	4.11	1.867	5.40	2.867	2.25	3.87	1.50
0.883	4.11	1.883	5.40	2.883	2.25	3.88	1.50
0.900	4.11	1.900	5.40	2.900	2.25	3.90	1.50
0.917	4.11	1.917	5.40	2.917	2.25	3.92	1.50
0.933	5.09	1.933	4.79	2.933	2.16	3.93	1.46
0.950	5.09	1.950	4.79	2.950	2.16	3.95	1.46

0.967	5.09	1.967	4.79	2.967	2.16	3.97	1.46
0.983	5.09	1.983	4.79	2.983	2.16	3.98	1.46
1.000	5.09	2.000	4.79	3.000	2.16	4.00	1.46

Max.Eff.Inten.(mm/hr)=	77.76	2.25	*TOTALS*
over (min)	5.00	4.00	
Storage Coeff. (min)=	1.57 (ii)	3.47 (ii)	
Unit Hyd. Tpeak (min)=	5.00	4.00	
Unit Hyd. peak (cms)=	0.41	0.31	
PEAK FLOW (cms)=	0.07	0.00	0.075 (iii)
TIME TO PEAK (hrs)=	1.35	1.38	1.35
RUNOFF VOLUME (mm)=	23.00	1.41	21.78
TOTAL RAINFALL (mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT =	0.92	0.06	0.87

(i) CN PROCEDURE SELECTED FOR PERVERSUS LOSSES:
 CN* = 49.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CHAMBER(0002)	OUTFLOW: OFF, UNDERDRAIN: OFF, INFIL: ON
IN= 2--> OUT= 3	CHAMBER:
DT= 1.0 min	MAX STO VOL (cu.m.)= 123.41 Bottom Area(m2) = 165.20

DEPTH (mm)	STORAGE (cu.m.)	DEPTH (mm)	STORAGE (cu.m.)
0.00	0.00	711.00	69.83
25.00	1.68	737.00	72.68
51.00	3.36	762.00	75.49
76.00	5.03	787.00	78.26
102.00	6.71	813.00	80.97
127.00	8.39	838.00	83.62
152.00	10.07	864.00	86.20
178.00	11.75	889.00	88.72
203.00	13.42	914.00	91.17
229.00	15.10	940.00	93.52
254.00	16.78	965.00	95.77
279.00	18.46	991.00	97.88
305.00	20.14	1016.00	99.76
330.00	23.39	1041.00	101.55
356.00	26.64	1067.00	103.27
381.00	29.87	1092.00	104.95
406.00	33.08	1118.00	106.63
432.00	36.28	1143.00	108.31
457.00	39.46	1168.00	109.98
483.00	42.62	1194.00	111.66
508.00	45.76	1219.00	113.34
533.00	48.87	1245.00	115.02
559.00	51.96	1270.00	116.70
584.00	55.02	1295.00	118.37
610.00	58.05	1321.00	120.05
635.00	61.05	1346.00	121.73
660.00	64.01	1372.00	123.41
686.00	66.94	0.00	0.00

NATIVE SOIL LAYER:
 Infiltration (m/hr) = 0.0114

INFLOW:ID= 2	0.42	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OVERFLOW:ID= 3	0.00	0.000	0.00	0.00

Volume Reduction Rate[(RVin-RVout)/RVin](%)=	100.00
Time to reach Max storage (Hr)=	4.07
Volume of water for drawdown in LID (cu.m.)=	85.34
Volume of maximum water storage (cu.m.)=	85.42
Calculated Drawdown Time (Hr)=	45.32

Junction Command(0003)

INFLOW : ID= 3(0002)	0.00	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 2(0003)	0.00	0.00	0.00	0.00

```
-----  
| ADD HYD ( 0007) |  
| 1 + 2 = 3 |  
-----  
| AREA QPEAK TPEAK R.V.  
| (ha) (cms) (hrs) (mm)  
*** W A R N I N G : HYDROGRAPH 0003 <ID= 1> IS DRY.  
*** W A R N I N G : HYDROGRAPH 0007 = HYDROGRAPH 0006  
ID1= 1 ( 0003): 0.00 0.000 0.00 0.00  
+ ID2= 2 ( 0006): 0.19 0.008 1.35 6.34  
=====  
ID = 3 ( 0007): 0.19 0.008 1.35 6.34
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

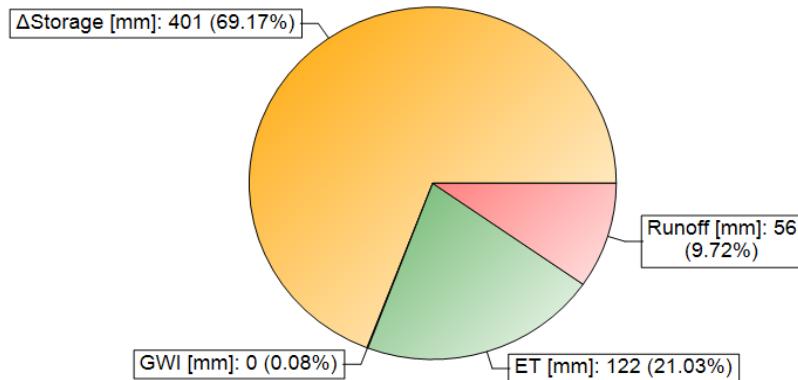
```
=====
```

OTTHYMO Continuous Simulation Modelling - Block 193

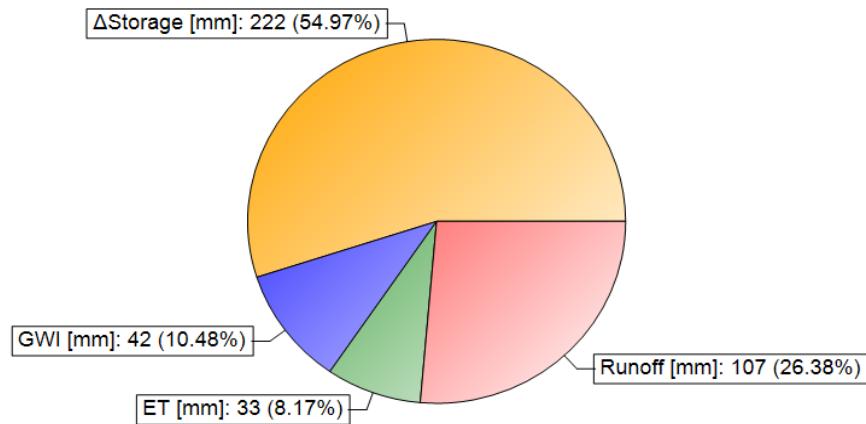
Addhyd 7 - Water Balance Output

Period	Precipitation (mm)	Rain (mm)	Snow (mm)	Snowmelt (mm)	ET (mm)	INFIL (mm)	GWI (mm)	Runoff (mm)	Δ Storage	Runoff Coef
2005	580.2	489.5	90.7	51.3	122.0	394.7	0.5	56.4	401.3	0.1
2006	404.1	242.4	161.7	366.8	33.0	317.8	42.3	106.6	222.1	0.3
Avg	492.2	365.9	126.2	209.0	77.5	356.3	21.4	81.5	311.7	0.2
Total	984.3	731.9	252.4	418.1	155.0	712.5	42.8	163.0	623.5	-

Water Balance
2005



Water Balance
2006

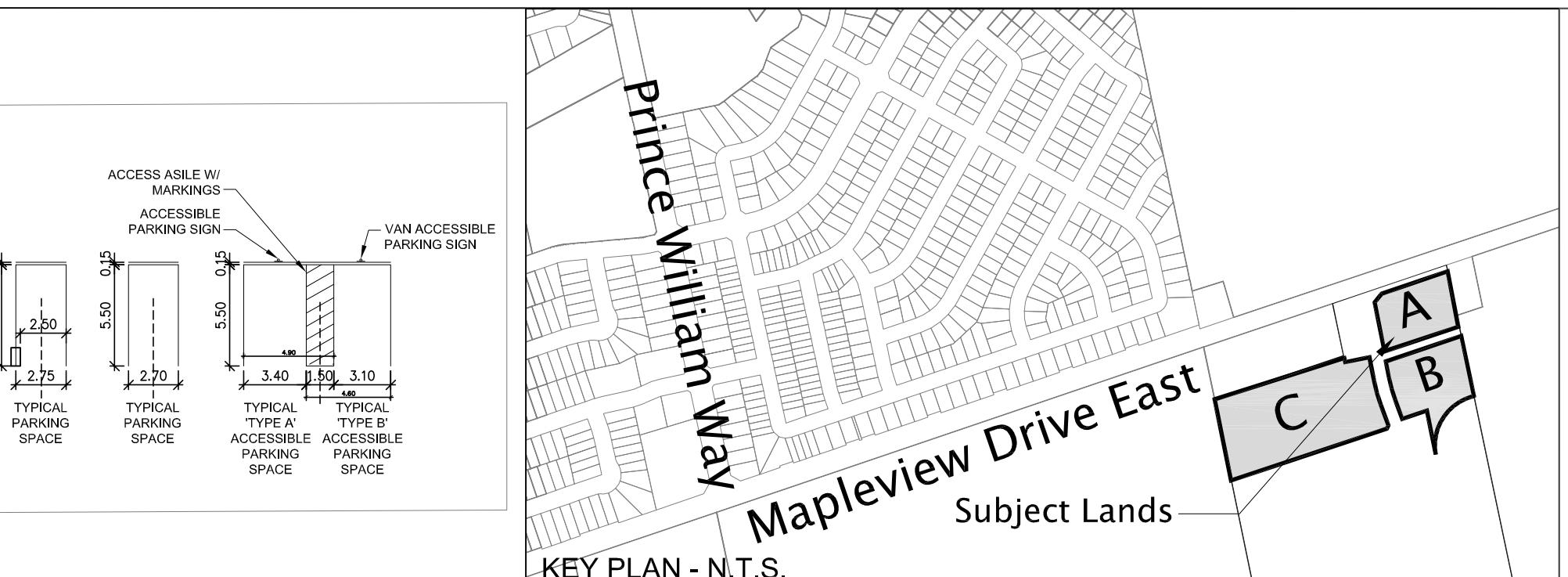
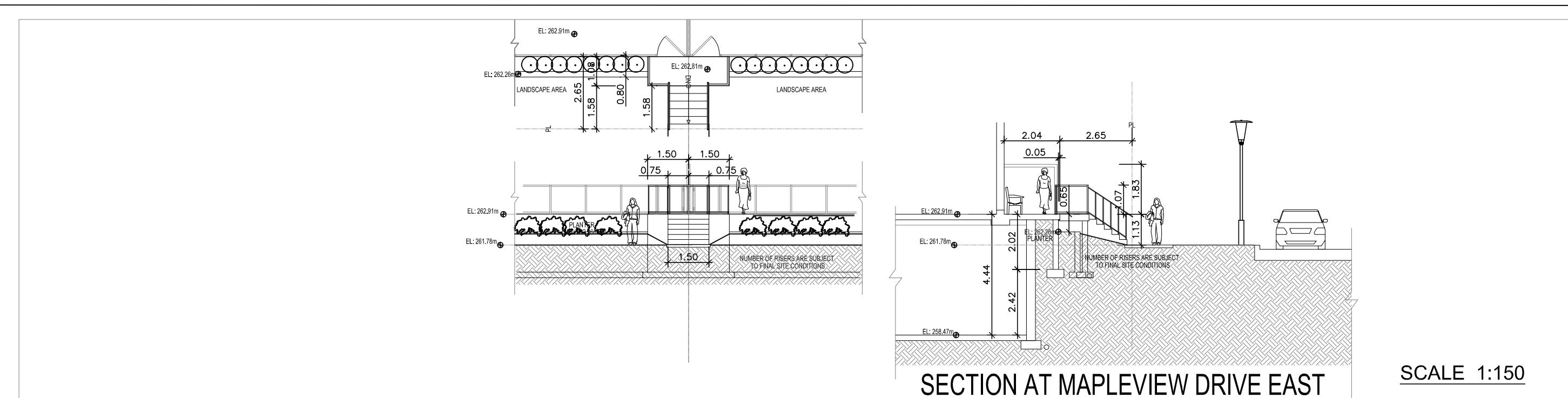




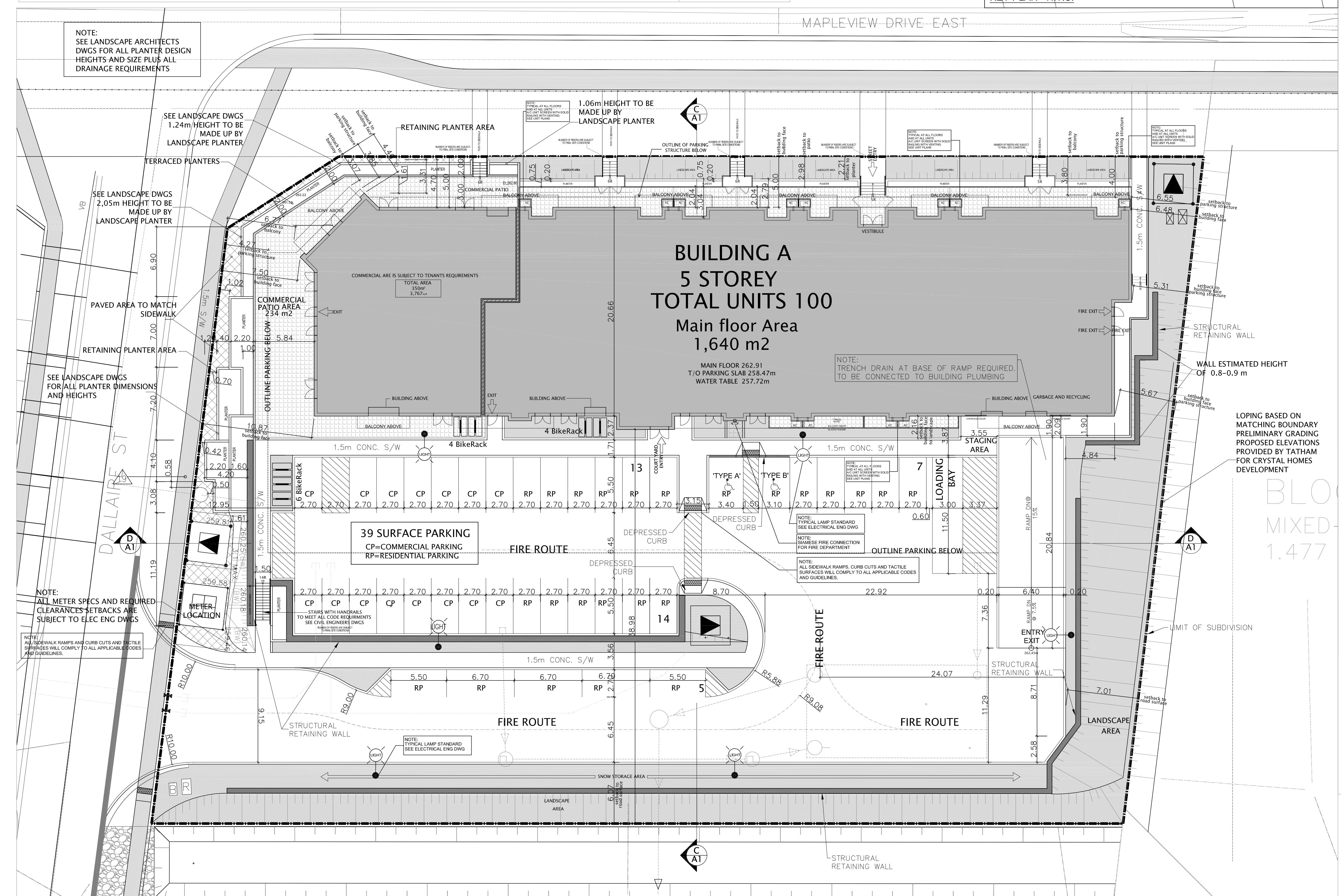
Appendix D

Supporting Documents

- 953 Maplevue Drive – Block-193 Site Plan, S&C Architects Inc., June 6, 2024
- 953 Maplevue Drive – Proposed Draft Plan of Subdivision, TJCG, Dec 2019
- Simcoe County Soils Map Excerpt, Report No. 29
- Drawing No. SWM-3, Maplevue South Subdivision Phase 1 Registration Drawings, TJCG, May 2021
- Drawing No. STM-1, Maplevue South Subdivision Phase 1 Registration Drawings, TJCG, May 2021
- Water Balance for Pre- and Post-Development Land Use Conditions – Site Plan Block 193, prepared by RJB

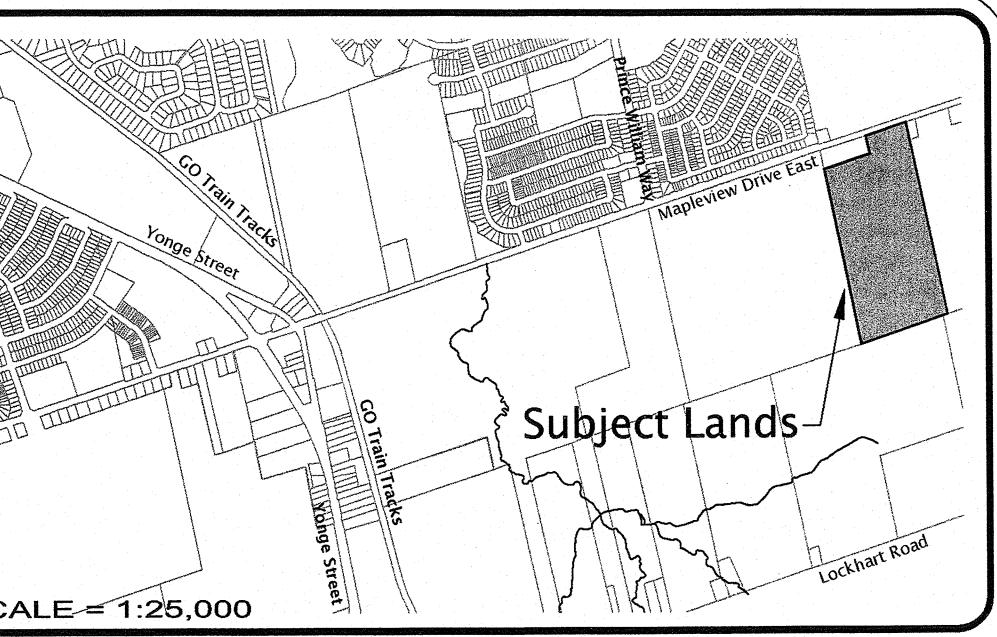


Building Footprint		100 units	
2.2.43A GROUP C			
Allowable 1,800 m ²			
Proposed 1,649 m ²			
Building Footprint		100 units	
REQUIRED		PROPOSED	
Site Plan Area		0.63 ha.(6,267.66m ²)	
Frontage		85.4 m	
Front Yard		5.33 m	
Interior Side Yard		5.31m	
Interior Side Yard		7.50m	
Car Yard		38.98 m	
Coverage		26 % (0.18 ha.)	
Accessory Structures		0 % (0.00 ha.)	
Landscape Open Space		39 % (0.25 ha.)	
Covered Area		35 % (0.22 ha.)	
Density Index		158.73	
Floor Space Index		1.31	
Commercial Area		21.45%	
		816 m ²	
Commercial Floor to Floor Height		Required 4.5m	
		Provided 4.5m	
Building Footprint			
Setback at street frontage			
Percentage of building at the setback to all street frontage		Required min 50% Provided 74%	
Percentage of building within the setback to all street frontage		Required max 50% Provided 26%	
Building			
GFA		8184 m ²	
Height in Stories		5	
Units		100	
Parking Calculations		Required	
Required Parking (100(units) x 1.0)		100 spaces	
Required Parking Commercial (per 24m ²)(350/24=15)		15 spaces	
Total Required		115 spaces	
Parking Breakdown		Provided	
Local Surface Spaces		22 spaces	
Local Surface Spaces Commercial		15 spaces	
Space Barrier Free Spaces		2 spaces	
Underground Barrier Free Spaces		2 spaces	
Local Underground Spaces		81 spaces	
Total Provided		122 spaces	



Route		AFFORDABLE UNIT *						
Area	Unit Type	Main floor	2nd floor	3rd floor	4th floor	5th floor		
55m	1 bed 1 bath	2	2	2	2	2	10	
34m	Studio	2	4	4	4	4	18	
55m	1 bed/1 bath/den	2	4	4	4	4	18	
49m	1 bed/1 bath		1	1	1	1	4	
57m	1 bed/1 bath/den	3	2	2	2	2	11	
81m	2 bed/2 bath	2	4	4	4	4	18	
83m	2 bed/2 bath	1	1	1	1	1	5	
109m	3 bed/2.5 bath		1	1	1		3	
111m	3 bed 2.5 bath					1	1	
70m	2 bed 2 bath		1	1	1		3	
72m	2 bed/2 bath					1	1	
103m	2 bed/2 bath/den	1	1	1	1	1	4	
57m	1 bed/1 bath		1	1	1		3	
52m	1 bed/1 bath					1	1	
		12	22	22	22	22	100	
Total Units						100		

The logo for Maple Glen is centered within a white rectangular frame. It features a stylized maple leaf at the top, composed of five distinct points. Below the leaf, the word "maple" is written in a large, lowercase, sans-serif font. Underneath "maple", the word "glen" is written in a slightly smaller, lowercase, sans-serif font. At the very bottom of the logo, the words "IN BARRIE" are printed in a small, uppercase, sans-serif font. The entire logo is rendered in black on a white background.



Proposed Draft Plan of Subdivision
Part of Lot 19, Concession 11
Geographic Township of Innisfil,
Now in the
City of Barrie 2021

OWNER'S CERTIFICATE
I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE THE JONES CONSULTING GROUP LTD., TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE CITY OF BARRIE FOR APPROVAL.

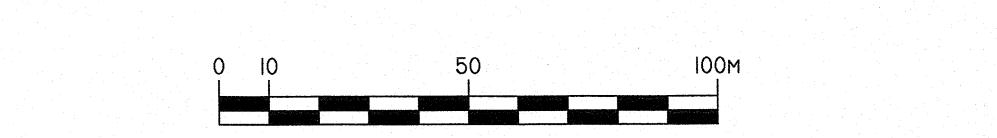
April 12, 2021
MAPLEVIEW SOUTH (INNISFIL) LTD.
ANTHONY REIN, P.S.
I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

April 7, 2021
RUDY MAK, O.S.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

- a) SHOWN ON DRAFT PLAN
- b) SHOWN ON DRAFT PLAN
- c) SHOWN ON KEY PLAN
- d) RESIDENTIAL, OPEN SPACE, STORMWATER MANAGEMENT, & ENVIRONMENTAL PROTECTION
- e) SHOWN ON DRAFT PLAN
- f) SHOWN ON DRAFT PLAN

STATISTICS	Area (ha.)	Units
★ 13.7 m Singles	48 units	
■ 11.5 m Singles	66 units	
○ 10.4 m Singles	30 units	
▼ 9.0 m Singles (LOTS 1-18)	39 units	
SUB TOTAL	183 units	
Street Townhomes (6.0m)	74 units	
(BLOCKS 184 - 193)		
Medium Density Residential (BLOCKS 194 - 198 @ 70 up)	2.93 ha.	205 units
Future Lots & Blocks (BLOCKS 197 - 204)	0.14 ha.	4 units
Open Space (BLOCK 205)	0.01 ha.	
Environmental Protection (BLOCKS 206 - 208)	2.78 ha.	
Stormwater Management & Drainage (BLOCKS 209 - 211)	1.41 ha.	
Widening & Reserve (BLOCKS 212 - 218)	0.14 ha.	
Roads (MINOR COLLECTOR, STREET 'A') (MAJOR COLLECTOR, STREET 'B') (LOCAL STREETS 'C' - 'F')	3.83 ha.	
TOTAL	19.03 ha.	466 units



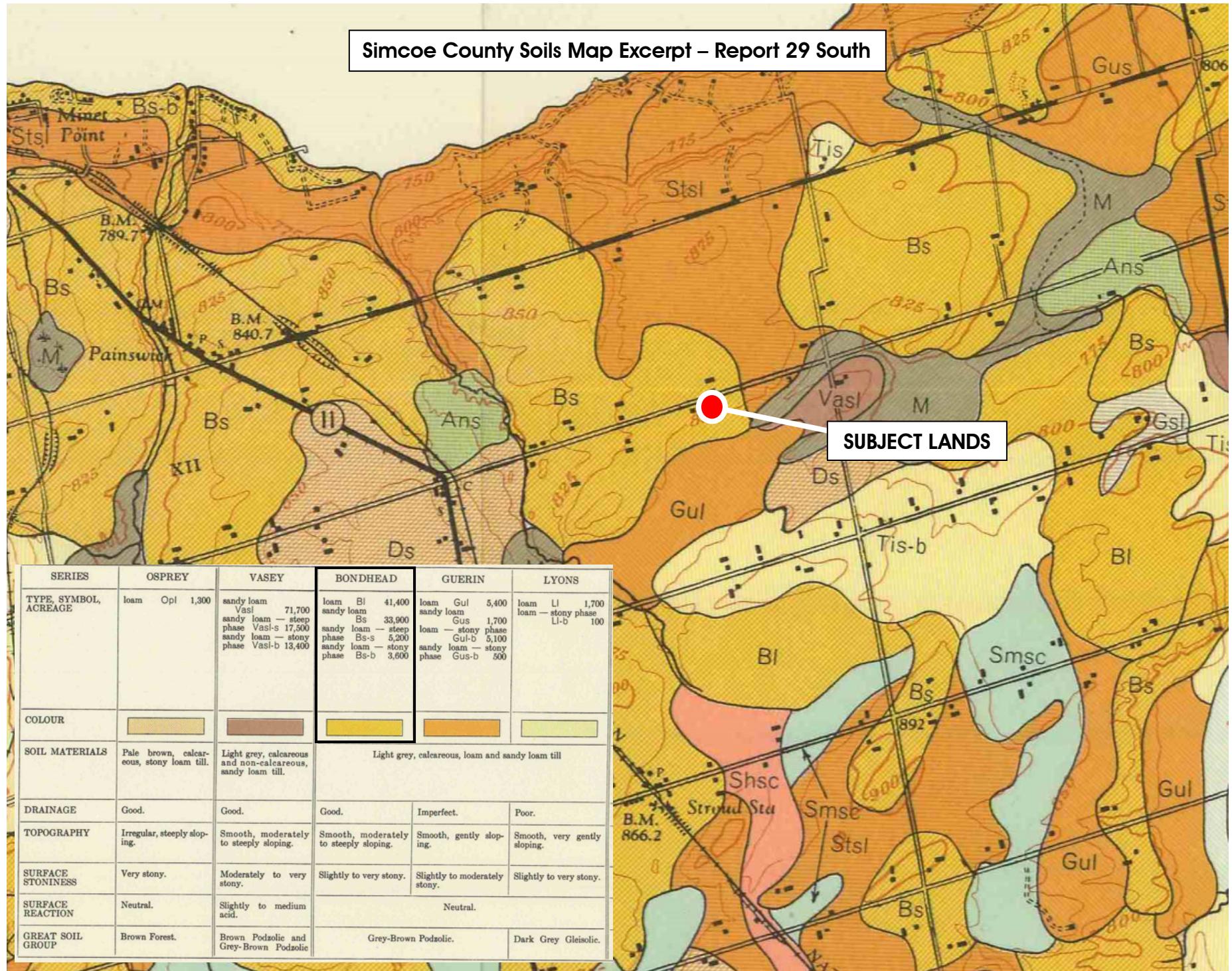
MAPLEVIEW SOUTH (INNISFIL) LTD.
953 MAPLEVIEW DRIVE, BARRIE, ONTARIO

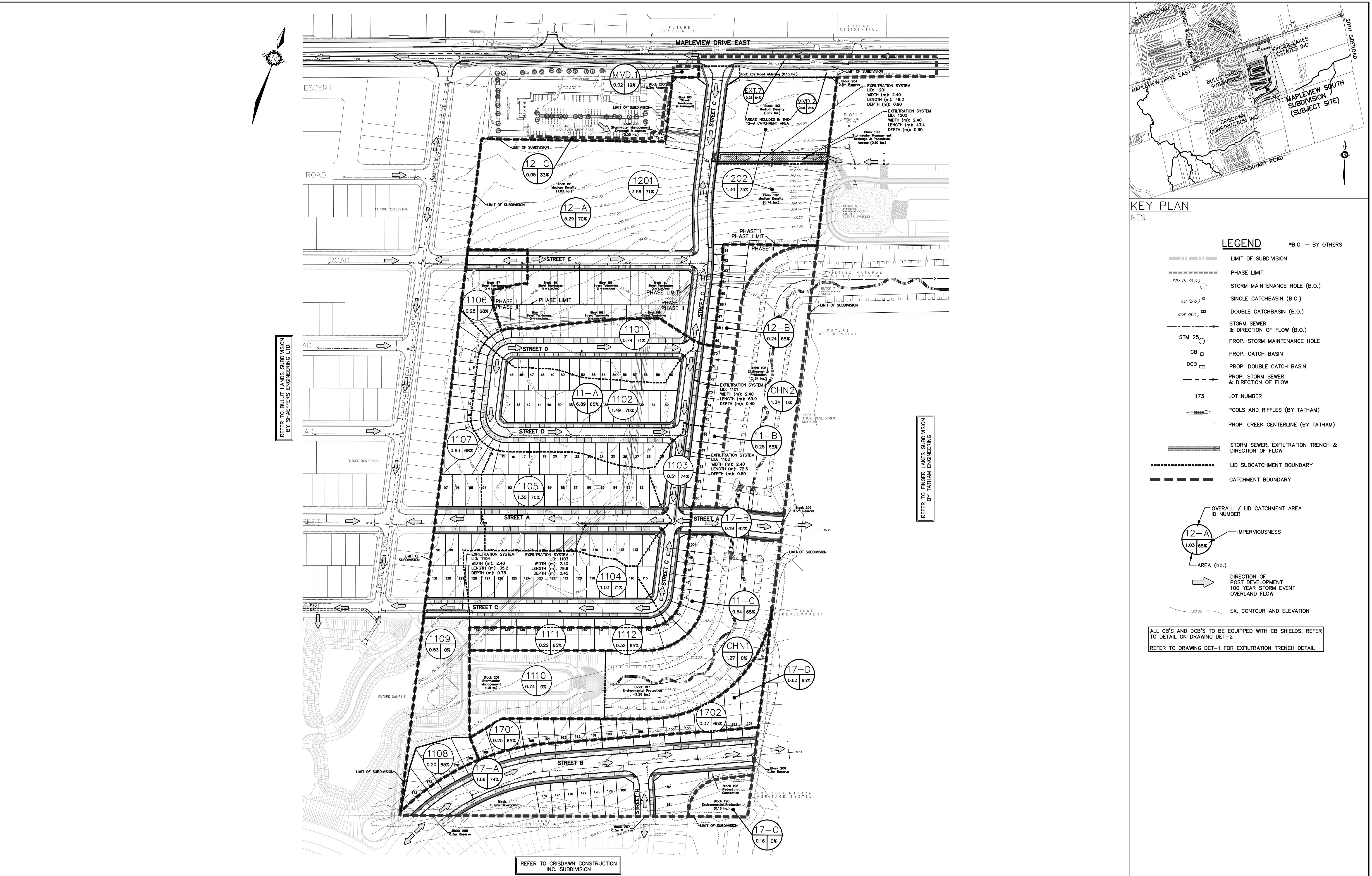
PROPOSED DRAFT PLAN OF SUBDIVISION

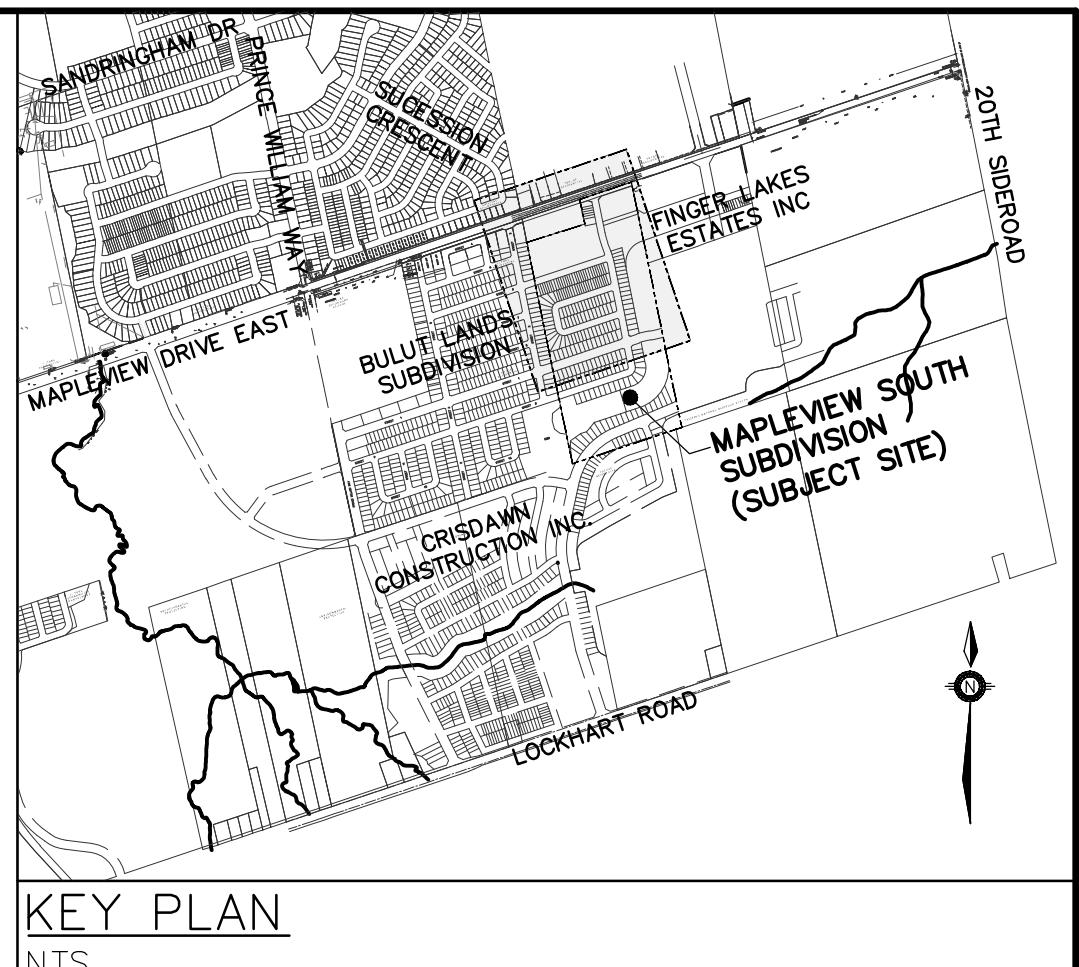
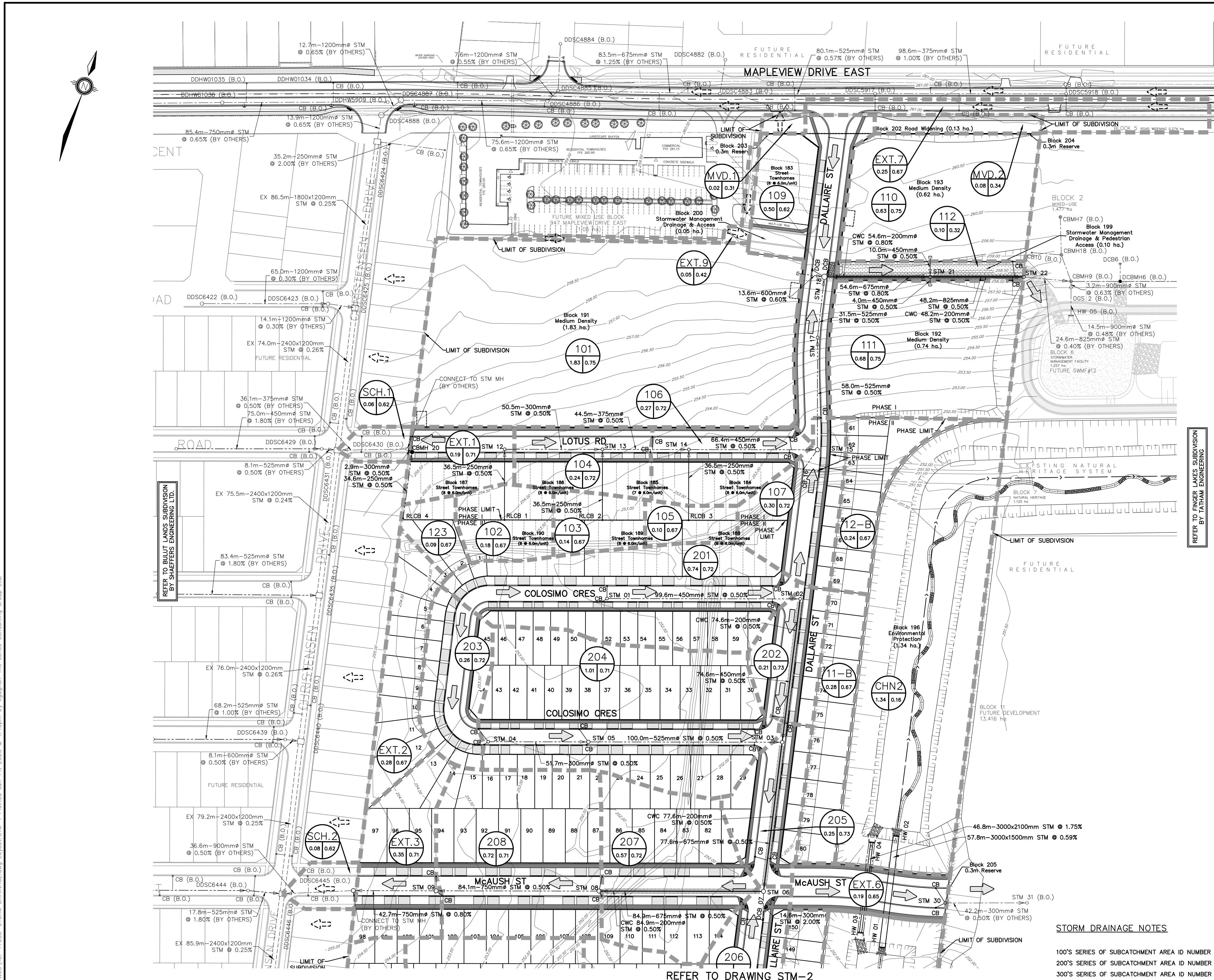
Raymond J. Duran, R.P.P.	Date Issued: DEC. 13, 2019
REGISTERED PROFESSIONAL PLANNER	Checked By: RD
JONES CONSULTING GROUP LTD.	Project No.: REI-17055
PLANNERS & ENGINEERS	Drawn By: m.c.r.
229 Mapleview Drive East, Unit 1, Barrie, Ontario, L4N 0W5	Drawing Name: REI-17055-DP-4B.dwg
Phone: 705-734-2538	
Fax: 705-734-1056	

SCHEDULE OF REVISIONS		
DATE	DESCRIPTION	DRAWN
FEB. 25, 2021	CHANGES AS PER ENG COMMENTS/SWM POND REVISION	m.c.r.
MARCH 5, 2021	REVISION TO LOTS 172 & 173	m.c.r.
APRIL 1, 2021	MINOR CHANGES TO TITLE BLOCK ONLY	m.c.r.

Simcoe County Soils Map Excerpt – Report 29 South







KEY PLAN

LEGEND

***B.O. – BY OTHERS**

PROP. SANITARY SERVICE
PHASE LIMIT
STORM MAINTENANCE HOLE (B.O.)
SINGLE CATCHBASIN (B.O.)
DOUBLE CATCHBASIN (B.O.)
STORM SEWER
& DIRECTION OF FLOW (B.O.)

PROP. STORM MAINTENANCE HOLE
PROP. CATCH BASIN
PROP. DOUBLE CATCH BASIN
PROP. STORM SEWER
& DIRECTION OF FLOW

STORM SEWER, EXFILTRATION
TRENCH & DIRECTION OF FLOW

MENT AREA ID
R

— RUN-OFF COEFFICIENT

DIRECTION OF
POST DEVELOPMENT
100 YEAR STORM EVENT
OVERLAND FLOW

EX. CONTOUR AND
ELEVATION

DIRECTION OF EXISTING
EXTERNAL OVERLAND
FLOW

MUNICIPAL ADDRESS
LOT NUMBER

POOLS AND RIFFLES (BY TATHAM)

PROP. CREEK CENTERLINE (BY TATHAM)

STORM DRAINAGE NOTES

0'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#12
0'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#11
0'S SERIES OF SUBCATCHMENT AREA ID NUMBER DRAIN INTO SWMF#17

REFERENCES:

1. CITY OF BARRIE LATEST MANUALS AND GUIDELINES
2. OPSD AND OPSS
3. CRYSTAL HOMES SUBDIVISION DEVELOPMENT BY TATHAM ENGINEERING LIMITED
4. SANDY CLOVE CREEK REALIGNMENT BY TATHAM ENGINEERING LIMITED
5. BULUT LANDS SUBDIVISION DEVELOPMENT BY SCHAEFFERS CONSULTING ENGINEERING
6. DRAFT PLAN OF MAPLEVIEW SOUTH SUBDIVISION BY JONES CONSULTING GROUP LTD.
7. MAPLEVIEW DRIVE EAST WIDENING BY R.J. BURNSIDE & ASSOCIATES LIMITED
8. OLS PLAN BY RUDY MAK SURVEYING LTD.
9. AWAN GROUP RESIDENTIAL DEVELOPMENT BY PEARSON ENGINEERING LTD.
10. HEWITT'S GATE EAST PHASE 3 BRADLEY HOMES BY JONES CONSULTING GROUP LTD.
11. GEOTECHNICAL INVESTIGATION REPORT BY CAMBIUM INCORPORATION
12. HYDROGEOLOGICAL ASSESSMENT BY R.J. BURNSIDE & ASSOCIATES LIMITED
13. HEWITT'S SECONDARY PLAN AREA SIS BY R.J. BURNSIDE & ASSOCIATES LIMITED
14. LSRCA LATEST MANUALS AND GUIDELINES

BENCHMARK:

BENCHMARK NO. 03120080055 LOCATED APPROXIMATELY 1.9km EAST OF STREET, APPROXIMATELY 6m NORTH OF CENTERLINE OF MAPLEVIEW DRIVE 35m WEST OF CITY BOUNDARY LINE. N4912122.851 E611241.154 ELEV 223.039

BENCHMARK NO. 03120110020 LOCATED ON MAPLEVIEW DRIVE EAST ON THE BOULEVARD, APPROXIMATELY 790m WEST OF THE MAPLEVIEW DRIVE 20TH SIDE ROAD INTERSECTION. N4912264.547 E611717.298 ELEV 225.549

BENCHMARK NO. 03120080008. LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE (12TH CONCESSION ROAD), APPROXIMATELY 0.8km EAST OF YONGE #11 AND APPROXIMATELY 10.0m NORTH OF MAPLEVIEW DRIVE EAST N4911763.816 E610187.698 ELEV 211.834

BENCHMARK NO. 03120080054 LOCATED ON THE SOUTH LIMIT OF MAPLEVIEW DRIVE WEST APPROXIMATELY 1km EAST OF HURONIA ROAD. N4910878.122 E60878.122 ELEV 211.834



MAPLEVIEW SOUTH (INNISFIL) LTD
953 MAPLEVIEW DRIVE EAST

CITY OF BARRIE

STORM SEWER
SUBCATCHMENT PLAN

**TD.
ERS** **229 Mapleview Dr. E, Unit 1
Barrie, ON L4N 0W5
P. 705.734.2538
F. 705.734.1056**

WATER BALANCE CALCULATIONS
 Mapleview South - Block 193
 Mapleview South (Innisfil) Ltd.
 Barrie, ON
 PROJECT No.300042309



TABLE F-3

Water Balance for Pre- and Post-Development Land Use Conditions (with no SWM/LID measures in place) Site Plan Block 193												
Land Use Description	Approx. Land Area* (m ²)	Estimated Impervious Fraction for Land Use*	Estimated Impervious Area (m ²)	Runoff from Impervious Area** (m/a)	Runoff Volume from Impervious Area (m ³ /a)	Estimated Pervious Area (m ²)	Runoff from Pervious Area** (m/a)	Runoff Volume from Pervious Area (m ³ /a)	Infiltration from Pervious Area** (m/a)	Infiltration Volume from Pervious Area (m ³ /a)	Total Runoff Volume (m ³ /a)	Total Infiltration Volume (m ³ /a)
Pre-Development Land Use												
Open Space /Agricultural	4,620	0.00	0	0.793	0	4,620	0.136	628	0.204	942	628	942
Rural Residential	1,680	0.25	420	0.793	333	1,260	0.132	167	0.246	310	500	310
TOTAL PRE-DEVELOPMENT	6,300		420		333	5,880		795		1,251	1,127	1,251
Post-Development Land Use (with no LID measures in place)												
Buildings	1,800	1.00	1,800	0.793	1,427	0	0.132	0	0.246	0	1,427	0
Pavement	3,000	1.00	3,000	0.793	2,379	0	0.132	0	0.246	0	2,379	0
Landscaped	1,400	0.00	0	0.793	0	1,400	0.132	185	0.246	344	185	344
Landscaped with Underground Parking	100	1.00	100	0.793	79	0	0.132	0	0.246	0	79	0
TOTAL POST-DEVELOPMENT	6,300		4,900		3,886	1,400		185		344	4,071	344
% Change from Pre to Post										361	73	
Effect of development (with no mitigation)										3.6 times increase in runoff	73% reduction of infiltration	

* data provided by Jones Consulting Group Ltd.

** figures from Tables F-1 and F-2

To balance pre- to post-,
the infiltration target (m³/a)=

907

WATER BALANCE CALCULATIONS

Mapleview South - Block 193
Mapleview South (Innisfil) Ltd.
Barrie, ON
PROJECT No.300042309

**TABLE F-4**

Water Balance Mitigation Strategy Direct Runoff to Infiltration Facility					
Total Area (m²)	Total Annual Precipitation (m)*	Runoff Volume from Impervious Area (m³/a)***	Runoff Volume from Pervious Area (m³/a)***	Total Runoff Volume (m³/a)	Potential Infiltration (m³/a) in Facility (assume 72% capture of annual runoff volume)**
6,300	0.933	3,886	185	4,071	2,931

* values from Barrie WPCC climate station

** based on data Lake Simcoe Watershed Precipitation Frequency

*** figures from Table F-3

Infiltration gallery - will accommodate up to a 25 mm storm; 25 mm storms account for 95% of total rainfall** (72% of total precipitation); therefore 72% of annual runoff from site will be captured for infiltration.