TOWN OF CALEDON
PLANNING
RECEIVED
November 18, 2024

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FIRST SUBMISSION - OCTOBER 2024

12100 Creditview Road, Town of Caledon
Proposed Commercial Development

KWA PROJECT: 24045

Report Prepared for:
12100 Creditview Developments Limited
5400 Yonge St, 1st floor
Toronto, ON M2N 5R5

Report Prepared by:
KWA Site Development Consulting Inc.
2453 Auckland Drive
Burlington, Ontario
L7L 7A9

This report reflects best engineering judgment based on the material available at the time of its preparation. KWA Site Development Consulting Inc. accepts no responsibility for any damages to a third party that may arise as a result of decisions made or actions taken based on this report.

Table of Contents

Tables

Figures

Appendices

1.0 INTRODUCTION

KWA Site Development Consulting Inc. (KWA) has been retained by 12100 Creditview Developments Limited to prepare a detailed Functional Servicing and Stormwater Management Report along with a corresponding grading and servicing design in support of the Site Plan Amendment (SPA) for the proposed development. The subject property is located at the northwest corner of Mayfield Road and Creditview Road at municipal addresses 12100 Creditview Road in the Town of Caledon, Refer to **Figure 1.1** below.

This report will:

- Provide background information regarding the subject property;
- Summarize the existing site conditions;
- Provide information regarding the proposed development conditions;
- Outline the proposed grading for the development; and
- Outline the existing and proposed municipal servicing.

The recommended servicing has been developed in accordance with the applicable design criteria and requirements of the Town of Caledon (the Town), the Region of Peel (the Region) and the Toronto Region Conservation Authority (TRCA).

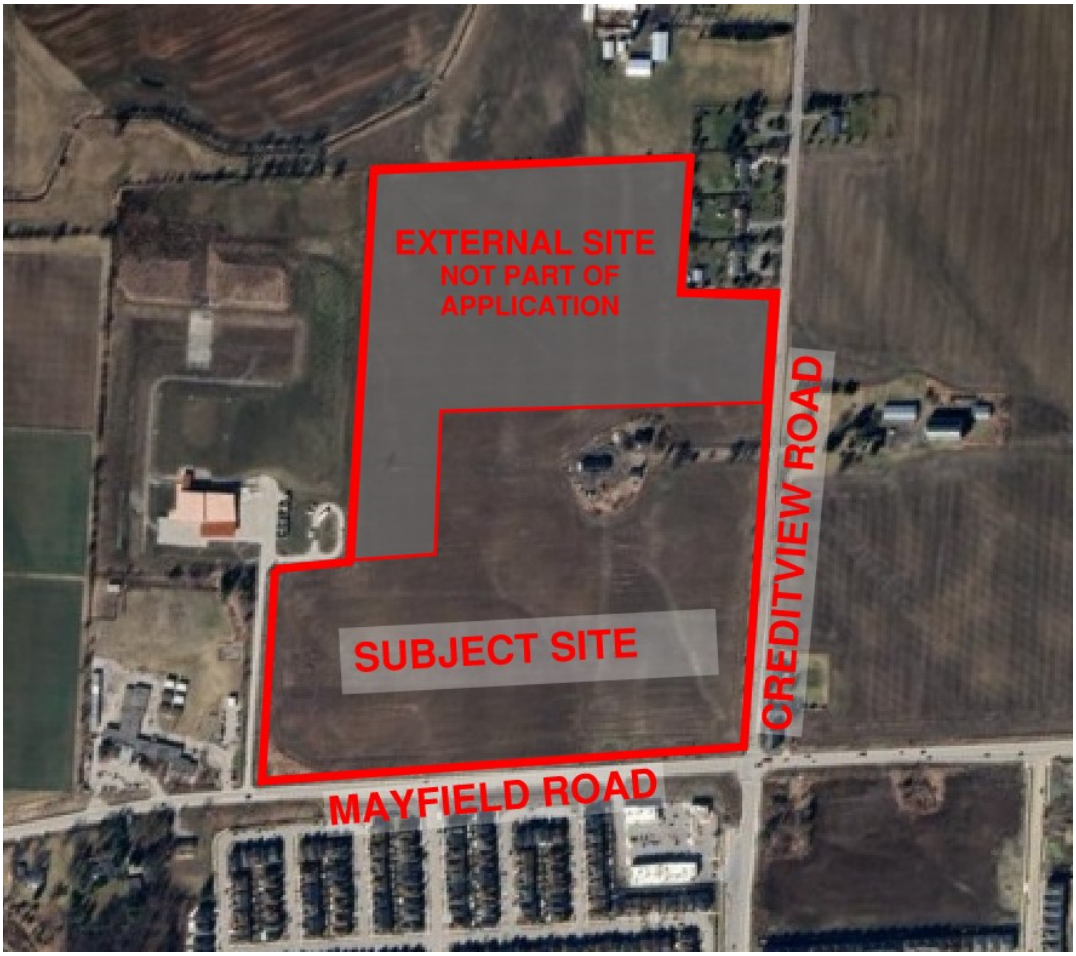


Figure 1-1: Location Plan

1.1 PROJECT BACKGROUND

The total property is approximately 25.6ha in area at municipal address 12100 Creditview Road in the Town of Caledon and is currently vacant and agricultural land. The proposed commercial development (the subject site) is within the southeastern portion of the site and is approximately 14.15ha in area. The remaining lands that are not part of this application and its ultimate land uses are expected to be determined through a future Secondary Plan planning process.

The subject site is bound by Creditview Road to the northeast, Mayfield Road to the southeast, and existing vacant and agricultural land to the northwest and southwest. The site is currently occupied by an existing dwelling and farm in the north corner of the site.

The existing topography of the site has a gentle slope from west to east, towards the ditch located at Creditview and Mayfield Road with elevation differences of approximately 5.0-6.0m across the length of the site.

1.2 PROPOSED DEVELOPMENT

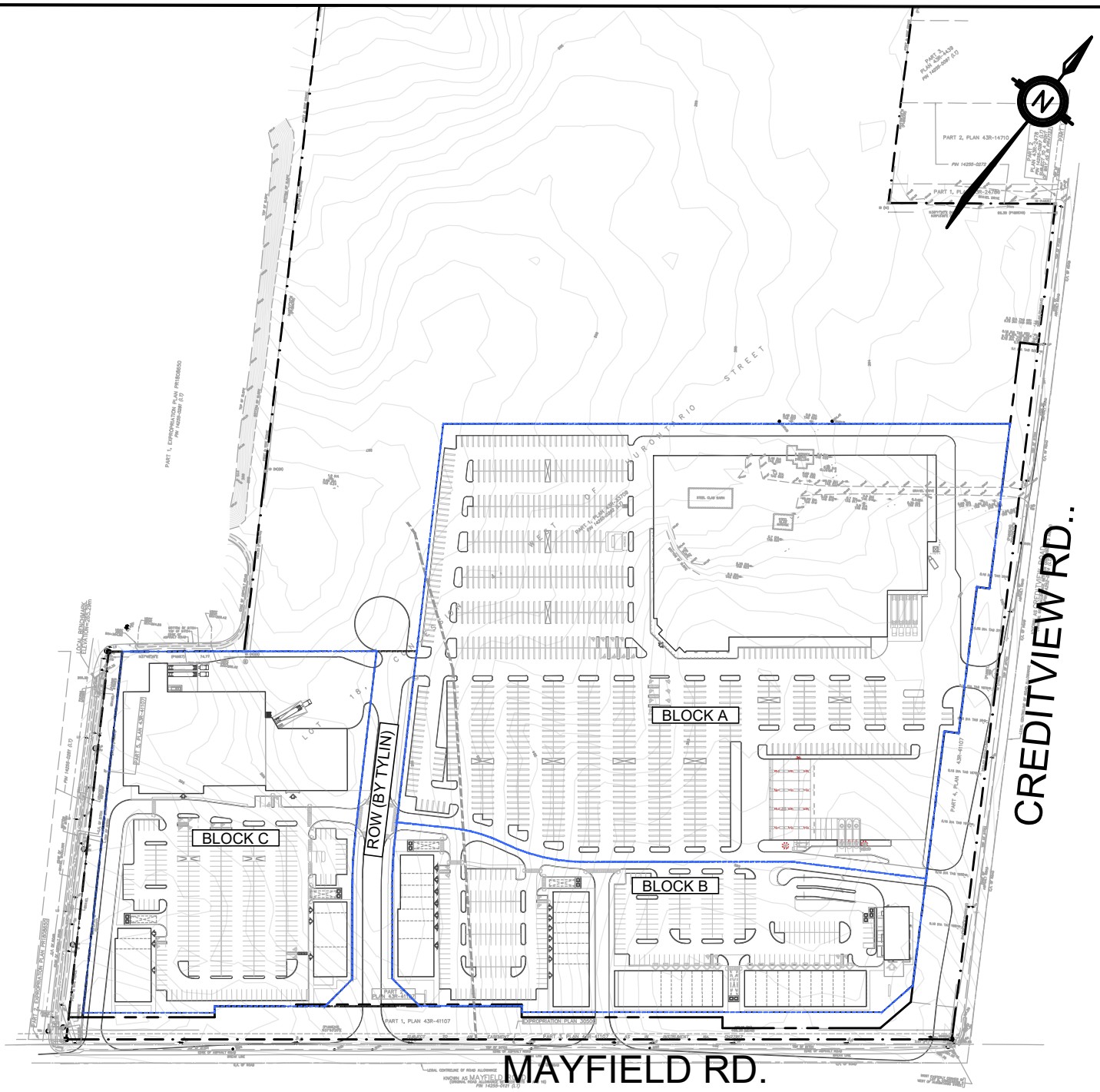
The proposed development of the site includes the construction of nine retail buildings with a total footprint of 27,200m^2. The largest retail building will be an anchor tenant (identified as Retail A) which has additional tenant specific requirements which includes additional parking and will be accommodated by two at-grade parking lots located south and west of the building. The development will also have a proposed gas station located to the southeast of Retail A. Refer to Figure 1-2 for the proposed development plan.

1.3 SITE ACCESS

The site's main vehicular accesses will be through two entrances along Creditview Road, one off Mayfield Road, and one off future road named Street A in this application. The proposed vehicular accesses to the site will require driveway culverts underneath the roadway entrances in order to maintain existing ditch flows while providing site vehicular access.

1.4 UTILITIES

As the proposed development is located within a developing area of Caledon, all utilities including telephone, cable, electricity and gas are readily available to service the subject property.



KWA SITE DEVELOPMENT CONSULTING INC. 2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

PROPOSED DEVELOPMENT

SCALE:	1:4000
DATE:	JULY 2024
DESIGNED BY:	TF/TG
CHECKED BY:	TF/RA

PROJECT No. 24045

FIGURE No. F1-1

File : \\kwa-dc02\Common\Projects\24045_Fieldgate Caledon\4. Drawings\5. Figures\24045 - PROPOSED DEVELOPMENT PLAN.dwg, Layout : F1-1 Date :Sep 30, 2024 - 11:11am, Edit By : Luan

2.0 STORMWATER MANAGEMENT

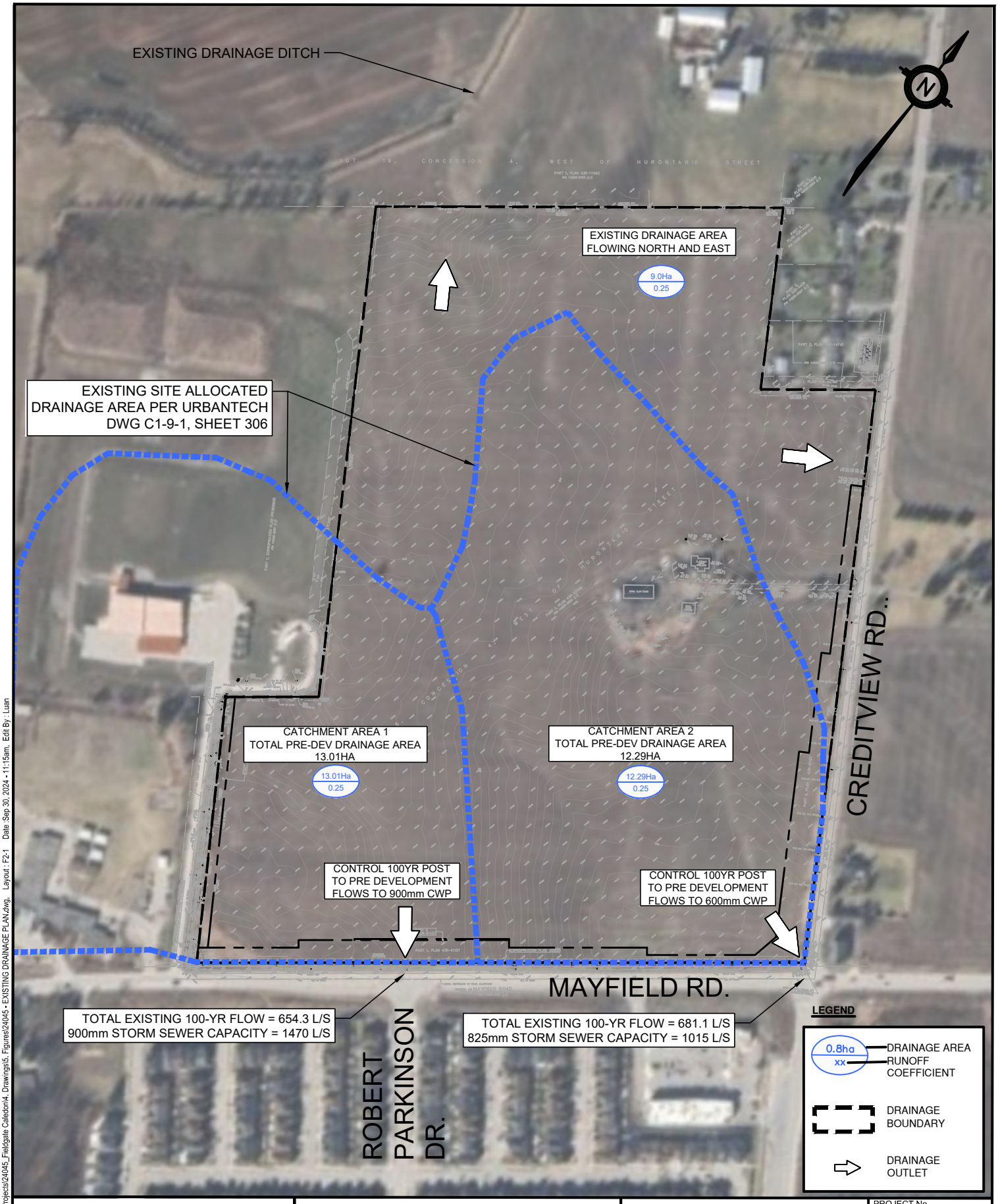
2.1 EXISTING DRAINAGE CONDITIONS

The existing topography of the site has a gentle slope from west to east, with low points along the site perimeter at Creditview and Mayfield along the roadway ditches. Under existing conditions, it appears that some drainage external to the proposed development site enters the site from the north. Refer to **Figure 2-1** for the Existing Drainage Area Plan, and the existing drainage area plans and design sheets for the receiving sewers in **Appendix D**.

The existing site servicing details obtained from the Region of Peel, Town of Caledon, and City of Brampton and a topographical survey completed of the area, indicate that it was envisioned that a 900mm CONC. CWP STM pipe would be installed from the corner of Creditview and Mayfield Road running southeast along Creditview Road and connect into an existing swale. However, based on the Proposed Reconstruction Plan (drawing 78524-D, dated March 21st, 2023) completed by R.V Anderson Associates Limited for the Region of Peel, a 750mm HDPE culvert is proposed to be installed from the southeast corner of the subject site, running under Mayfield Road, to connect to a proposed storm manhole at the southwest corner of Creditview and Mayfield Road. Based on the Foundation Drain Collector Drainage Plan (drawing No. C1-9-1, dated Feb, 2020), 12.29ha of the 12100 Creditview property with a runoff coefficient of 0.25 has been allocated to discharge into the proposed 750mm storm culvert.

Based on the Proposed Reconstruction Plan (drawing 78523-D, dated March 21st, 2023) completed by R.V Anderson Associates Limited for the Region of Peel, a 900mm HDPE culvert is proposed to be installed from the south side of the site across from Robert Parkinson Road, running under Mayfield Road, connecting to proposed storm manhole 16A at the southeast corner of Robert Parkinson Road and Mayfield Road. It is to be noted that the proposed invert of the 900mm DIA HDPE culvert shown on the Proposed Reconstruction Plan is proposed at an invert too high to accommodate the subject site. Subsequent discussions will be held with the Region of Peel to revise invert such that the subject site can be accommodated. Furthermore, based on the C-1-9-1 plan, 13.01ha of the 12100 Creditview property with a runoff coefficient of 0.25 has been allocated to discharge into the proposed 900mm storm culvert on Mayfield Road.

The existing sewer infrastructure is shown on the Servicing Plan (S1). Refer to **Appendix D** for more information regarding this existing storm design allocation plan. Refer to **Figure 2-1** below for the Existing Drainage Plan.



File : \\kwa-dc02\Common\Projects\24045_Fieldgate Caledon\4. Drawings\5. Figures\24045 - EXISTING DRAINAGE PLAN.dwg, Layout : F2-1 Date: Sep 30, 2024 - 11:15am, Edit By : Luan

KWA SITE DEVELOPMENT CONSULTING INC. 2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

PRE-DEVELOPMENT DRAINAGE AREA PLAN

SCALE:	1:4000
DATE:	JULY 2024
DESIGNED BY:	TF/TG
CHECKED BY:	TF/RA

PROJECT No. 24045

FIGURE No. F2-1

2.2 STORMWATER MANAGEMENT DESIGN CRITERIA

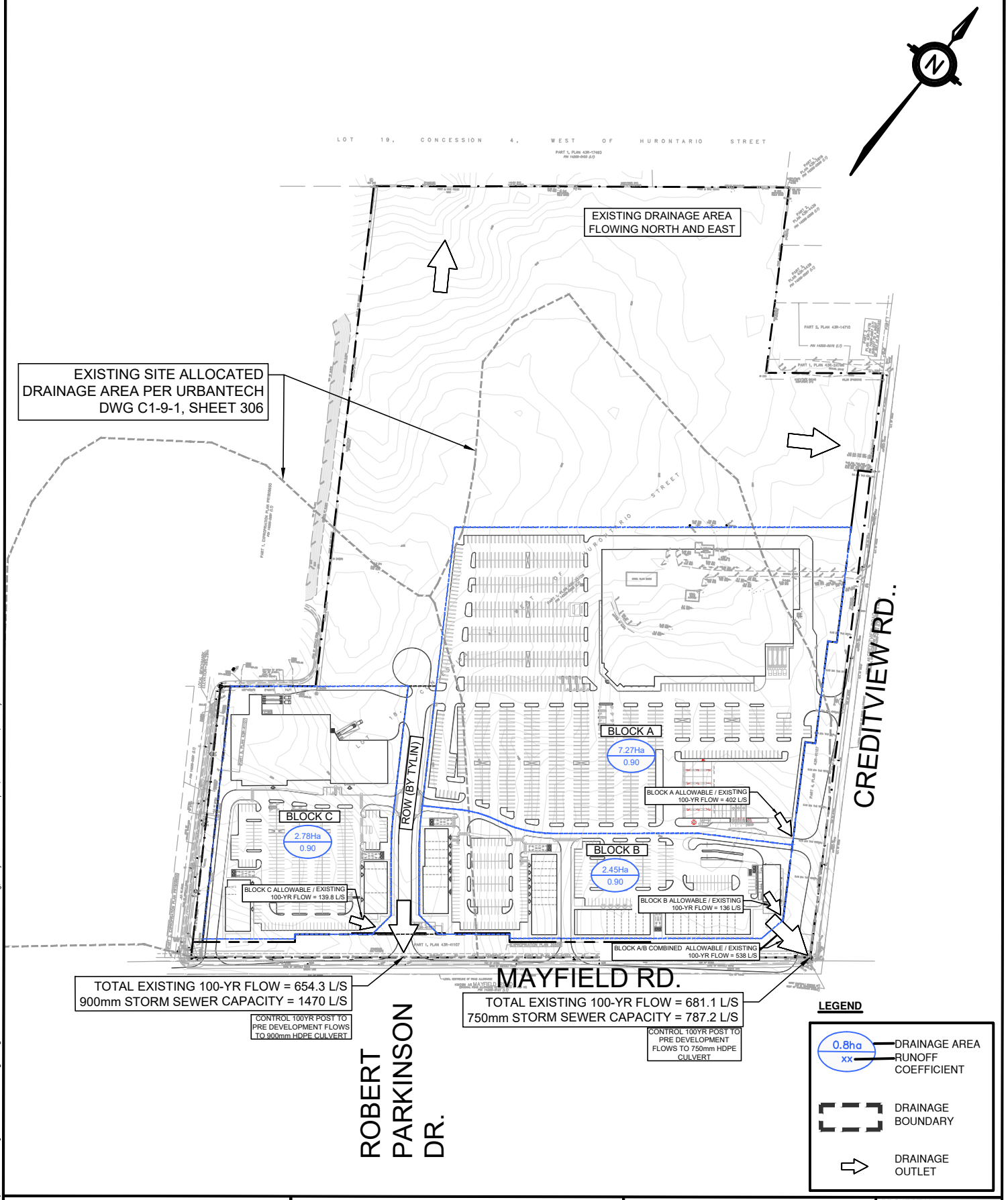
The proposed stormwater management design is based on the MOE 2003 Stormwater Management Planning & Design (SWMPD), The Town of Caledon Development Standards Manual (2019), and The Toronto Region Conservation Authority "Stormwater Management Criteria" (August 2012).

- **Stormwater Outlet:** Stormwater drainage systems shall discharge to municipal storm sewer system where feasible. In cases where this is not possible, stormwater drainage systems may discharge to natural watercourses.
- **Quantity Control:** Post-development 100-year peak flows to the pre-development 100-year peak flow at a runoff coefficient of 0.25, as prescribed in the drainage area plan for the respective receiving sewer as per the C-1-9-1 plan.
- **Water Balance:** An annual water budget shall be prepared for the development site as described in the MOE SWMPD Manual. Infiltration facilities shall be designed to ensure that under post-development conditions, infiltration volumes match the pre-development condition.
- **Quality Control:** Stormwater quality control measures will be provided to achieve, as a minimum, the Enhanced level of protection (i.e. 80% TSS removal) as described in the MOE SWMPD manual.
- **Construction Erosion and Sediment Control:** All applicants must include an Erosion and Sediment Control plan demonstrating that fish habitat and water quality are not affected by sediment from the property during or following site construction.

2.3 PROPOSED STORMWATER OUTFALL

There will be two proposed storm connections; one outlet will be for drainage area Block A and Block B and the other for drainage area Block C and ROW. The proposed storm connection for drainage area Block A and Block will be made to the future 750mm DIA HDPE culvert that runs perpendicular to Mayfield Road, at the southeast corner of the subject site. Drainage area Block C and ROW will be controlled by a storm connection into the future 900mm HDPE culvert across from Robert Parkinson Drive. The 750mm and 900mm HDPE culverts have an allocation to receive 12.29ha and 13.01ha of drainage, respectively, from the subject property based on the drainage area plan C-1-9-1 prepared by Urbantech. To discharge to these storm sewers, the proposed development sites will be required to match the post-development 100-year storm flows at a runoff coefficient of 0.90 to the pre-development 100-year storm flows at a runoff coefficient of 0.25 of its respective drainage areas and outfalls as outlined in the drainage area plan by Urbantech.

The proposed sewer infrastructure is shown on the Servicing Plan (S1). Refer to **Appendix D** for more information regarding this existing storm design allocation plan. Refer to **Figure 2-2** below for the Proposed Drainage Plan.



File : \\kwa-dc02\Common\Projects\24045_Fieldgate Caledon\4. Drawings\5. Figures\24045 - PROPOSED DRAINAGE PLAN.dwg Layout : F2-2 Date : Sep 30, 2024 - 11:16am Edit By : Luan

KWA SITE DEVELOPMENT CONSULTING INC. 2453 AUCKLAND DRIVE BURLINGTON, ON L7L 7A9

POST-DEVELOPMENT DRAINAGE AREA PLAN

SCALE:	1:4000
DATE:	JULY 2024
DESIGNED BY:	TF/TG
CHECKED BY:	TF/RA

PROJECT No. 24045

FIGURE No. F2-2

2.4 PROPOSED STORMWATER MANAGEMENT DESIGN STRATEGY

The proposed stormwater management system will include the capture and conveyance of the entire commercial block development (14.15ha) by a series of catchbasins spread out across the site. The storm sewers will be sized to convey 100-year flow rates downstream into a stormwater storage element prior to release into its respective outfalls. An orifice will be designed at the outlet of each Cultec chamber to provide the necessary attenuation to maximize the storage volume and ultimately allow the site to release post-development flows from the site to allowable levels. Total suspended solids treatment will be achieved primarily using Stormceptor OGS units and Inlet Separator Rows from the Cultec system.

2.5 STORMWATER QUANTITY CONTROL

The proposed quantity controls are based on the drainage allocation of the subject site as defined in the as-constructed drainage area plan drawing C-1-9-1 by Urbantech as found in Appendix D. This drainage area plan identifies the receiving 750mm HDPE culvert on Creditview Road to receive 12.29ha and the 900mm HDPE culvert on Mayfield Road to receive 13.01ha for the 100-year storm event at a runoff coefficient of 0.25 from the 12100 Creditview property, most of which is made up of the commercial block development as shown in the proposed drainage area plan (Figure 2-2).

In determining the rainfall intensity for the 100-year storm event, the Airport Equation was used to calculate the time of concentration for the large drainage area (where runoff coefficients are less than 0.40), as the standard 10 minutes would not be an accurate representation of time of concentration in this scenario based on the length of the catchment and surface type.

Block A & B (East Site) – Outfall to 750mm HDPE Culvert

For existing Catchment Area #2, a time of concentration of 51.9 minutes was calculated and used to determine a rainfall intensity of 79.80mm/hr for the 100-year storm event.

In determining the allowable release rate for the subject site, the Rational Method equation was used. For existing Catchment Area #2, based on the allowable drainage area of 12.29ha, runoff coefficient of 0.25, and the 79.80mm/hr rainfall intensity, the allowable release rate was calculated to be 681.1L/s.

It is important to note that of this total 12.29ha, the subject lands allocated to this outfall is divided into two separate areas: Block A and Block B. Block A consists of a drainage area of 7.27ha (approximately 59% of the total drainage area) while Block B consists of a drainage area of 2.45ha (approximately 20% of the total drainage area). The remaining 21% of area is external to the site. The resultant allowable release rate for the subject lands is therefore estimated to be based on the area share of the subject lands to the total drainage area to this outfall, which was calculated to be 402L/s (59% of the total 681.1L/s) for Block A and 136L/S (20% of the total 681.1L/s) for Block B. Therefore, the combined/allowable 100-year release rate Block A and B is 538L/s.

It is assumed that all retail buildings will have rooftop controls, except for Retail A within Block A which has specific tenant requirements for no rooftop controls. With a post-development runoff coefficient of 0.90, it was calculated that the drainage area for Block A would require a total site storage volume of 3,249.1m^3 to control the post-development release rate to the allowable 402L/s. Quantity controls will be achieved primarily using underground Cultec chambers within the parking lots, with supplementary storage provided through the controlled rooftops. Block A will be equipped with two separate underground Cultec chambers. The first (Cultec Chamber 1) underground chamber will be a Recharger 902HD system that can store 2,393.4m^3 of water. The second (Cultec Chamber 2) underground chamber will be a Recharger 360HD system that can store 869m^3 of water. In total, both underground chambers will store 3,262m^3 of water. This will satisfy the required storage volume of 3,249.1m^3 for Block A. Block A will also be equipped with a 380mm orifice just upstream from the control manhole, in order to achieve the attenuate site flows to the allowable release rate and achieve the required site storage

Block B would require a total site storage volume of 859m³ to control the post-development release rate to the allowable 136 L/s. A Recharger 902HD underground chamber (Cultec Chamber 3) will be equipped in Block B with a storage capacity of 907.6m³. Block B will also be equipped with a 240mm orifice upstream from the control manhole.

Block C (West Site) – Outfall to 900mm HDPE Culvert

For existing Catchment Area 1, a time of concentration of 59.2 minutes was calculated and used to determine a rainfall intensity of 72.42mm/hr for the 100-year storm event.

In determining the allowable release rate for the subject site, the Rational Method equation was used. For existing Catchment Area #1, based on the allowable drainage area of 13.01ha, runoff coefficient of 0.25, and the 72.42mm/hr rainfall intensity, the allowable release rate was calculated 654.3L/s.

It is important to note that of this total 13.01ha, the subject lands allocated to this outfall only makes up 2.78ha of the total 13.01ha (approximately 21% of the total drainage area). The resultant allowable release rate for the subject lands is therefore estimated to be based on the area share of the subject lands to the total drainage area to this outfall, which was calculated to be 139.81L/s (+/-21% of the total 654.3L/s).

Proposed drainage area Block C would require a total site storage volume of 923m³ to control the post- development release rate to the allowable 139.81 L/s. An underground Cultec chamber will be installed with a total storage volume of 929.2m³ provided. Block C will also be equipped with a 230mm orifice just upstream from the control manhole.

The ROW (Street) between Block C and Block A & B is not included as part of this design and will be completed by consultant TYLin.

2.6 WATER BALANCE

2.6.1 SITE CONSTRAINTS

At a minimum, it is expected that best efforts for water balance for the subject will be required. A hydrogeological investigation completed by Gemtec (dated September 30, 2024) rationalizes a rainfall retention of 12.3mm/event for the subject site in order to mitigate the annual infiltration deficit for the subject site from the pre-development scenario.

It should be noted that the subject site is also observed to have high groundwater levels throughout the course of the water level monitoring period between April 2024 and June 2024, which provides further constraint on siting infiltration galleries as a reasonable buffer from the high groundwater level to the bottom of the infiltration practice is required (typically and ideally 1.0m).

Given that the subject site is also required to match into existing surrounding grades while minimizing earthworks, raising the site to provide sufficient vertical clearances and covers are also limited.

2.6.2 INFILTRATION STRATEGY

For Block A, the developable area is 7.27ha. A volume of 894.2m³ would be required to meet the 12.3mm retention requirement. Block B, with a developable area of 2.49ha would require a volume of 306.3m³ for infiltration. Block C with a developable area of 2.78ha, would require a volume of 341.9m³ for infiltration. This totals 1542.4m³ for the total site.

As per the Hydrogeological Investigation Report completed by Gemtec, the infiltration rate for the Clayey Silt/Silty Clay Till on site is 32mm/hr. With a safety correction factor of 2.5, the design infiltration rate is taken as 12.8 mm/hr.

As discussed previously in this report, there is high groundwater elevations surrounding the site, which constrains and limits the locations and areas available for suitable infiltration of stormwater. To achieve the total water balance volume objective of 1542.4m³ for the entire site, each Block will be provided with its own infiltration chamber, and strategically placed in locations where reasonable buffer between the infiltration bottom and high groundwater levels can be met.

Block A will be served by two infiltration chambers (Gallery 1 and 2), combining for a total infiltration volume of 935.5m³. Block B will be served by two infiltration chambers (Gallery 3 and 4), combining for a total infiltration volume

of 324.7m^3. Block C will be served by a single infiltration chamber (Gallery 5) for a total infiltration volume of 341.9m^3. The infiltration chambers will be Cultec Contactor 100HD units with a total system depth of 775mm (inclusive of the stone bedding and backfill depths).

In order to ensure that the adequate volumes are retained, a weir wall installed at the downstream manhole of each infiltration chamber is installed with a weir elevation set to the stage elevation at which the retention volume is achieved. This ensures that only rainfall events beyond the 12.3mm event will bypass the infiltration chambers and continue conveying downstream to the storm system. Furthermore, infiltration calculations were completed to verify that the water retained within the depth in the system can be cleared within the recommended maximum allowable drawdown time of 72hours. Based on a design infiltration rate of 12.8mm/hr, a system void ratio of 40%, and the depth of the entire chamber system (the weir wall is set such that all water in the tank will be infiltrated), the calculated drawdown time for all systems is 24.2hrs, which meets the maximum drawdown requirement.

Lastly, it should also be noted that while the infiltration chambers have been sized to achieve the 12.3mm volume for the total site area, there are some drainage areas that cannot functionally drain into the infiltration chambers due to the aforementioned constraints. Therefore, the infiltration galleries have been designed to overcompensate on shortfalls from these areas that cannot be captured into the infiltration galleries. The overcompensation rainfall depth for the captured areas was calculated to be 24.7mm.

In total, between all three proposed Chambers, a total of 1608.5m^3 of infiltration is provided across the subject site. For Chamber sizing, water balance and drawdown times, please refer to **Appendix A**.

2.7 STORMWATER QUALITY CONTROL

The quality control objective is to provide an enhanced protection level, which corresponds to the removal of minimum 80% TSS. Although runoff from the rooftops and landscaped areas can be considered clean, all runoff on site, including rooftops, parking lots, and drive aisles, will be treated by the separator row within the CULTEC chamber. This provides a removal of 80%. Refer to **Appendix A** for CULTEC design calculations for quality control and the ETV verification statement.

Additionally, quality control is provided via infiltration. As per the requirements in Table 3.2 of the MOE SWMPD Manual (2003), a site with an overall 85% imperviousness must infiltrate a minimum of 40 m^3/ha in order to achieve an enhanced level of water quality treatment through infiltration practices. This results in a required infiltration volume of 290.8 m^3 for the developed areas of Block A (7.27 ha), 99.6 m^3 for the developed areas of Block B (2.49 ha), and 111.2 m^3 for the developed areas of Block C (2.78 ha). This amounts to a total of 501.6 m^3 of required infiltration across the entire developed site.

As stated in Section 2.8, an infiltration volume 660.4 m^3 is provided within the Infiltration Chambers (1,2, and 4), exceeding the required volume for infiltration to achieve **Level 1 Enhanced TSS Removal of 80%.**

Based on the requirements of the MOE, stormwater quality is required to achieve an average of 80% long-term removal of total suspended solids based on an annual loading basis from all runoffs leaving the site.

Much of the site is rooftop or parking lot asphalt. Runoff from rooftop areas is generally considered clean water. The rest of the site, which primarily consists of pavement, has the potential to generate contaminated runoff and would require further quality treatment to achieve the 80% long-term TSS removal. An analysis was completed using the New Jersey Department of Environmental Protection (NJDEP) to determine the total TSS removal rate.

Additional stormwater quality controls will be provided through a treatment train approach using technologies holding Environmental Technology Verification (ETV). ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the International Organization for Standardization (ISO). The objective of the ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that result in an

environmental added value of measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

Cultec storage chambers have been proposed which typically contains an inlet row, called the Separator Row that provides for initial pretreatment and TSS removal prior to entering the main chambers. This ensures that sediment loading takes place in the first row which can be easily flushed and maintained without having to clear the entire system.

Additionally, a Stormceptor OGS unit will be provided at the storm fallout of each Block. Flows from Block A will enter a Stormceptor EF012 unit which will provide 81% TSS removal with the ability to capture and treat more than 90% of the runoff volume. Flows from Block B and C will enter a Stormceptor EF08 unit which will provide 81% and 80% TSS removal, respectively, with the ability to capture and treat more than 90% of the runoff volume. All three OGS units have been sized for a "fine" particle size distribution. Refer to **Appendix A** for Stormceptor OGS unit sizing calculations.

With the use of a Stormceptor OGS units, the total TSS removal for the subject site is over 80%. This, in combination with the Separator Row within the Cultec storage chambers, and the infiltration galleries, would meet and surpass the MOE requirement of 80% TSS removal.

2.8 CONSTRUCTION EROSION AND SEDIMENT CONTROL

Best practices are implemented to control erosion and sedimentation during construction and prior to build-out of stormwater quantity and quality control measures. All measures will be designed in accordance with the TRCA "Erosion and Sediment Control Guideline for Urban Construction" 2019, and Township of Caledon's design criteria.

Erosion and sediment control measures during the topsoil stripping and pregrading stages of the site have been designed by TYLin (dated August 2024). As per the TYLin ESC design, the following ESC features will be established during these stages under the site alteration permit:

- Silt fencing installed around the site perimeter.
- A construction access (mud mat) is provided at the entrance off Creditview Road.
- Filling of existing headwater drainage features within the site
- A secured topsoil stockpile from the topsoil stripping is located at the west end of the site, complete with double silt fence.
- Cutoff swales to convey construction site drainage to a temporary ESC pond.
- The ESC pond is sized with a perforated vertical riser (hickenbottom) and orifice that will control the active pool to the existing 500mm CSP culvert located at the northwest corner of Creditview and Mayfield.

Following topsoil stripping and pregrading works, ESC measures during the site servicing and building construction stages will include the maintenance of all above ESC measures and as per the requirements outlined by TYLin. During servicing construction, catchbasins and other drainage structures that are capable of receiving runoff in and adjacent to the site will be equipped with a Terrafix 240R non-woven geotextile to filter out silt-laden runoff, as they are being constructed. These ESC measures should be regularly inspected and maintained to ensure they are operating as designed.

The ESC drawings and report by TYLin can be found in **Appendix D**.

2.9 STORMWATER MANAGEMENT SUMMARY

In summary the subject development will achieve or exceed all required wet weather flow management guidelines requirements. Refer to Table 2-1: Stormwater Management Summarybelow for a summary.

Table 2-1: Stormwater Management Summary

Existing Drainage Area ID	Catchment Area 2	Catchment Area 1	
Prop Drainage Area ID	Block C	Block A	Block B
Outfall	900mm CWP @ Robert Parkinson/Mayfield	750mm CWP @ Mayfield/Crestview Road	
Allowable Release Rate (L/s)	139.8	538	
Orifice Diameter (mm)	230mm Plate	380mm Plate	240mm Plate
Storage Required (m^3)	923	3,249.1	859
Storage Provided (m^3)	929.2	3,262	907.6
TSS Removal Required/Achieved	80%+	80%+	80%+
Water Balance Volume Provided (m^3)	341.9	894.2	306.3
Water Balance Volume Provided (m^3)	348.3	935.5	324.7

3.0 SANITARY SERVICING

3.1 EXISTING SANITARY SERVICING

The existing site servicing details obtained from The Region of Peel engineering plan and profiles and a topographical survey completed of the area indicate that there is sanitary sewer infrastructure in the vicinity of the site. The following sanitary infrastructure is adjacent to the subject site;

- A 250mm sanitary sewer located within the Robert Parkinson Drive right-of-way that flows southeast.

As the existing site is greenfield, the site area is anticipated to only generate extraneous flows to nearby sanitary sewers. Based on the infiltration allowance of 0.0002m^3/s/ha by the Region of Peel, this amounts to an existing flow of 1.94L/s and 0.56L/s for the east (Site A+B) and west (Site C) sites, respectively.

Refer to the Servicing Drawing (S1) for the existing sanitary sewer infrastructure and proposed sanitary service design.

3.2 PROPOSED SANITARY SERVICING

A comparative analysis was undertaken to determine peak flows under the existing conditions in comparison with projected peak flows based on the proposed re-development of the site. Design flows for the proposed development has been calculated using the Region of Peel Public Works Design, Specifications & Procedures Manual.

The total peak sanitary flow for the proposed development has been calculated as 3.43L/s for the east site (Site A+B) and 1.09L/s for the west site (Site C), inclusive of the infiltration allowance. This is an estimated peak increase of 1.49L/s and 0.53L/s for the east and west sites, from the existing sanitary flow rate of 1.94L/s and 0.56L/s for the east and west sites, respectively. Refer to Appendix B for details of the calculations.

Sanitary servicing for the proposed development will consist of a 200 mm diameter connection at a 0.5% slope. The connection will be made to a future sanitary sewer in the Street A (by TYLin and not part of this application) which is to be extended from the 250mm sanitary sewer within the upstream end of the Robert Parkinson Drive right-of-way.

3.3 DOWNSTREAM SANITARY ANALYSIS

Based on the available sanitary drainage area plan for the Paradise Homes development to the south (Block 51-1 – Phase 2), the subject site was not allocated sanitary drainage to the Robert Parkinson sewer. A review of the available, as-constructed sanitary sewer design sheets however, suggest that the addition of the proposed 4.56L/s flows from the subject development would increase the most upstream sanitary sewer leg (MH52A) from 17% to 23%, and last sanitary sewer leg of the Paradise Homes development (MH59A) from 23% to 26%, which is still within an acceptable limit. Therefore, no downstream sanitary sewer impacts are anticipated from the addition of the proposed sanitary flows of the subject site, based on the currently available information.

For the sanitary drainage area plan and design sheets for the Paradise Homes development, please refer to Appendix D.

4.0 WATER SERVICING

4.1 EXISTING WATER SERVICING

The existing site servicing details obtained from The Region of Peel engineering plan and profiles and a topographical survey completed of the area, indicate that there is watermain infrastructure in the vicinity of the site. The following watermain infrastructure is adjacent to the subject site;

- A 600mm diameter watermain on the southeast side of Mayfield Road,
- A 1050mm diameter watermain on the southeast side of Mayfield Road,
- Two existing fire hydrant one at on the southeast side of Mayfield Road and one on the southwest of Mayfield road located southeast of the site.

Refer to the Servicing Drawing (S1) for the location of the existing watermain infrastructure.

4.2 PROPOSED WATER SERVICING

The proposed water service connection for the two blocks will be made to a future watermain extended from the 600mm watermain located within the Mayfield Road right-of-way and into Street A. The connection will consist of a proposed 250mm main connection with 100mm domestic watermain branched at the property line and will be installed with a detector check valve in chamber at the property line and water meters to be installed within the mechanical rooms of each retail building as per Region of Peel standard drawing 1-8-5A.

Fire protection for the proposed development will be achieved through the existing and proposed hydrants surrounding the site and through internal sprinkler systems. The internal onsite water supply and distribution system will be design and specified to comply with the current standards and specifications of the Region of Peel and the Ontario Building Code and NFPA 13.

Under proposed conditions the development is anticipated to have a fire flow demand of 167L/s for the east site and 100L/s for the west site (based on the Fire Underwriters Survey). The anticipated maximum day and peak hour domestic demands for the development under proposed conditions has been calculated as 0.53L/s and 1.40L/s for the east site and 0.18L/s and 0.40L/s for the west site. It is expected that the 600 mm diameter watermain supply within Mayfield Road will adequately provide the required flow demands for the commercial block development.

A fire hydrant flow test was completed November 15, 2021 by Bruce Fire Engineering; see Appendix C for the complete report. Based on the results from the fire hydrant test, residual pressure within the watermain system will remain above the minimum pressure required of 20.3psi, both at the public main and up to the point of delivery to each of the blocks. A watermain of 300mm from the 600mm main will be extended into the 12100 Creditview property along Street A (designed by others), with a fire and domestic water branched service to each commercial block property of 250mm and 100mm, respectively.

The water demand calculations are shown in Appendix C and the proposed and existing watermain infrastructure are shown on the Servicing Drawing (S1).

4.3 FIRE HYDRANT COVERAGE

There are fire hydrants located along Mayfield Road which provides fire hydrant coverage to the site along Mayfield. It is currently unknown if Creditview has existing or future planned watermains and fire hydrants, as engineering drawings and mapping were not available from the Town of Caledon or Region of Peel at the time of this report.

5.0 CONCLUSION

The proposed development will see the construction of a twelve-building commercial development at 12100 Creditview Road in the Town of Caledon. The proposed development can be serviced utilizing the existing and proposed infrastructure outlined in the Servicing Drawing (S1). Our conclusions and recommendations for servicing of the proposed development is summarized as follows:

Stormwater Management Servicing:

- The proposed development will match its post-development 100-year flows to the pre- development 100-year flows, as prescribed for the site by the existing drainage area plan
- The proposed development site stormwater drainage will have no adverse impact to the downstream sewer infrastructure
- Stormwater quality will be achieved by a treatment train approach, primarily through an OGS filtration unit, and supplemented with Separator Rows and inlet quality controls
- Sediment and erosion control measures to be taken during construction have been presented in this report.
- Under post-development conditions it is expected that stormwater runoff will have had an improvement in quality and quantity as compared with predevelopment condition.

Sanitary Servicing:

- The anticipated peak sanitary peak flow for the proposed development is 3.43L/s for the east site and 1.09L/s for the west site.
- The downstream sewer infrastructure designed by Urbantech did not account for the subject site, however the sewer design sheets suggests there is sufficient capacity to service the development.
- The sanitary sewer on Robert Parkinson Drive is proposed to be extended into the private driveway within the 12100 Creditview property, with a 200 sanitary service provided to the subject site

Water Servicing:

- The calculated maximum day and peak hour demands were calculated as 0.53L/s and 1.40L/s for the east site and 0.18L/s and 0.40L/s for the west site.
- The fire flow was determined based on the largest building on each site and using the Fire Underwriters Survey, calculated as 167L/s for the east site and 100L/s for the west site.
- The watermain on Mayfield Road will be branched off and extended into the private driveway within the 12100 Creditview property, with a 250mm fire and 100mm domestic branch provided to the subject site.
- Under fire flow demand loading condition, water pressure will remain above the 20.3psi and 40psi minimum requirements during the max day+fire and peak hour scenarios. These residuals are maintained both at the source (i.e. at the public main on Mayfield Road) and to the point of delivery (i.e. to the building)
- Additional confirmation of the fire and domestic branch sizing and fire flow requirements should be provided by the Mechanical Consultant at the Building Permit stage of approval.

5.1 RECOMMENDATIONS:

The following recommendations are presented:

- The contractor shall locate and verify all dimensions, levels, inverts, and datums onsite and report any discrepancies or omissions to the engineer prior to construction.

In summary, the site can be adequately serviced in respect to water supply, sanitary drainage, stormwater drainage, and stormwater management. The stormwater quantity and quality controls can be implemented in accordance to The Toronto Region Conservation Authority "Stormwater Management Criteria" (August 2012).

Accordingly, we hereby recommend the adoption of this report as it relates to the provision of servicing works, and for the purposes of site plan application, and building permit application approvals. We trust that this Functional Servicing and Stormwater Management Report is sufficient for your purposes. If you have any questions or comments, please do not hesitate to contact the undersigned.

Yours very truly,

KWA Site Development Consulting Inc.

Ted Fair, P.Eng.
ted.fair@kwasitedev.com

Theodor Gheonea, E.I.T
theo.gheonea@kwasitedev.com

LICENSED PROFESSIONAL ENGINEER
T. FAIR
100176144
OCT 15, 2024
PROVINCE OF ONTARIO

APPENDIX A

STORMWATER CALCULATIONS

Stormwater Calculation Sheet - Catchment Area 1

Project:

12100 Creditview Road

Total Existing/Allowable Flows

Flows to 900 CWP on Robert Parkinson Drive

Prepared by: TF
Checked by: TF
Project No: 24045
Date: 9/30/2024

Runoff Equation

Q = 2.78CIA (l/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

$I = A(T+B)^c$
I= Rainfall Intensity (mm/hr)
T= Time of concentration (min)

Airport Equation for T

$$Tc = \frac{3.26(1.1-C)L^{0.5}}{Sw^{0.33}}$$

Total Area	C
130100 m^2	0.25

L = 360.56 Catchment Length
S = 0.70 Catchment Slope
Tc = 59.2 Time of Concentration

Return Period	A	B	C	T	I	Q	
2 year	1070	7.9	-0.8759	59.2	26.90 mm/hr	243.0	L/s
5 year	1593	11.0	-0.8789	59.2	37.98 mm/hr	343.1	L/s
10 year	2221	12.0	-0.9080	59.2	46.19 mm/hr	417.4	L/s
25 year	3158	15.0	-0.9335	59.2	56.68 mm/hr	512.2	L/s
50 year	3886	16.0	-0.9495	59.2	64.28 mm/hr	580.8	L/s
100 year	4688	17.0	-0.9624	59.2	72.42 mm/hr	**654.3**	L/s

Storm Sewer Capacity:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
900	0.66	2.31	1470.7	44%

Stormwater Calculation Sheet - Catchment Area 1

Project:	Prepared by: TF
12100 Creditview Road	Checked by: TF
Site Existing/Allowable Flows - Block C	Project No: 24045
Flows to 900 CWP on Robert Parkinson Drive	Date: 9/30/2024

Runoff Equation

Q = 2.78CIA (l/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

$I = A(T+B)^c$
I= Rainfall Intensity (mm/hr)
T= Time of concentration (min)

Airport Equation for T

$$Tc = \frac{3.26(1.1-C)L^{0.5}}{Sw^{0.33}}$$

Block C Site Area	C
27800 m^2	0.25

L =	360.56	Catchment Length
S =	0.70	Catchment Slope
Tc =	59.2	Time of Concentration

Return Period	A	B	C	T	I	Q	
2 year	1070	7.9	-0.8759	59.2	26.90 mm/hr	51.9	L/s
5 year	1593	11.0	-0.8789	59.2	37.98 mm/hr	73.3	L/s
10 year	2221	12.0	-0.9080	59.2	46.19 mm/hr	89.2	L/s
25 year	3158	15.0	-0.9335	59.2	56.68 mm/hr	109.4	L/s
50 year	3886	16.0	-0.9495	59.2	64.28 mm/hr	124.1	L/s
100 year	4688	17.0	-0.9624	59.2	72.42 mm/hr	**139.8**	L/s

	Area (m2)	Flows (L/s)	
Site	27800	139.8	
Total Catchment	130100	654.3	
Percentage	21.4%	21.4%	Fractional Percentage of overall catchment area

Stormwater Calculation Sheet - Catchment Area 2

Project:

12100 Creditview Road

Total Existing/Allowable Flows

Flows to 750mm HDPE culvert on Creditview Road

Prepared by: TF
Checked by: TF
Project No: 24045
Date: 9/30/2024

Runoff Equation

Q = 2.78CIA (l/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

$I = A(T+B)^c$
I= Rainfall Intensity (mm/hr)
T= Time of concentration (min)

Airport Equation for T

$$Tc = \frac{3.26(1.1-C)L^{0.5}}{Sw^{0.33}}$$

Total Area	C
122900 m^2	0.25

L = 350.571 Catchment Length
S = 1.00 Catchment Slope
Tc = 51.9 Time of Concentration

Return Period	A	B	C	T	I	Q
2 year	1070	7.9	-0.8759	51.9	29.76 mm/hr	254.0 L/s
5 year	1593	11.0	-0.8789	51.9	41.83 mm/hr	357.0 L/s
10 year	2221	12.0	-0.9080	51.9	50.96 mm/hr	435.0 L/s
25 year	3158	15.0	-0.9335	51.9	62.44 mm/hr	533.0 L/s
50 year	3886	16.0	-0.9495	51.9	70.83 mm/hr	604.6 L/s
100 year	4688	17.0	-0.9624	51.9	79.80 mm/hr	**681.1** L/s

Storm Sewer Capacity:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
600	0.5	1.54	434.2	157%
750	0.5	1.78	787.2	87%
825	0.5	1.90	1015.0	67%
900	0.5	2.01	1280.1	53%

Stormwater Calculation Sheet - Catchment Area 2

Project:	Prepared by: TF
12100 Creditview Road	Checked by: TF
Site Existing/Allowable Flows - Block A	Project No: 24045
Flows to 750mm HDPE culvert on Creditview Road	Date: 9/30/2024

Runoff Equation

Q = 2.78CIA (l/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

$I = A(T+B)^c$
I= Rainfall Intensity (mm/hr)
T= Time of concentration (min)

Airport Equation for T

$$Tc = \frac{3.26(1.1-C)L^{0.5}}{Sw^{0.33}}$$

Block A Site Area	C
72700 m^2	0.25

L = 350.57 Catchment Length
S = 1.00 Catchment Slope
Tc = 51.9 Time of Concentration

Return Period	A	B	C	T	I	Q
2 year	1070	7.9	-0.8759	51.9	29.76 mm/hr	150.2 L/s
5 year	1593	11.0	-0.8789	51.9	41.83 mm/hr	211.2 L/s
10 year	2221	12.0	-0.9080	51.9	50.96 mm/hr	257.3 L/s
25 year	3158	15.0	-0.9335	51.9	62.44 mm/hr	315.3 L/s
50 year	3886	16.0	-0.9495	51.9	70.83 mm/hr	357.6 L/s
100 year	4688	17.0	-0.9624	51.9	79.80 mm/hr	**402.9** L/s

	Area (m2)	Flows (L/s)	
Site	72700	402.9	
Total Catchment	122900	681.1	
Percentage	59.2%	59.2%	Fractional Percentage of overall catchment area

Stormwater Calculation Sheet - Catchment Area 2

Project:	Prepared by: TF
12100 Creditview Road	Checked by: TF
Site Existing/Allowable Flows - Block B	Project No: 24045
Flows to 750mm HDPE culvert on Creditview Road	Date: 9/30/2024

Runoff Equation

Q = 2.78CIA (l/s)
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

$I = A(T+B)^c$
I= Rainfall Intensity (mm/hr)
T= Time of concentration (min)

Airport Equation for T

$$Tc = \frac{3.26(1.1-C)L^{0.5}}{Sw^{0.33}}$$

Block B Site Area	C
24500 m^2	0.25

L = 350.57 Catchment Length
S = 1.00 Catchment Slope
Tc = 51.9 Time of Concentration

Return Period	A	B	C	T	I	Q	
2 year	1070	7.9	-0.8759	51.9	29.76 mm/hr	50.6	L/s
5 year	1593	11.0	-0.8789	51.9	41.83 mm/hr	71.2	L/s
10 year	2221	12.0	-0.9080	51.9	50.96 mm/hr	86.7	L/s
25 year	3158	15.0	-0.9335	51.9	62.44 mm/hr	106.2	L/s
50 year	3886	16.0	-0.9495	51.9	70.83 mm/hr	120.5	L/s
100 year	4688	17.0	-0.9624	51.9	79.80 mm/hr	**135.8**	L/s
					Combined a/b 100-yr flows	**538.7**	L/s

	Area (m2)	Flows (L/s)	
Site	24500	135.8	
Total Catchment	122900	681.1	
Percentage	19.9%	19.9%	Fractional Percentage of overall catchment area

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C ALLOWABLE RELEASE FLOW

1. Pre, External & Post Development Uncontrolled Area:

Note: Post Dev. Controlled Area is shown in Orifice Calculations

Table 1. a) Total Uncontrolled Area

			Uncontrolled Area (m^2)			
Type of Land	**T (min)**	**Runoff Coef. (C)**	**Pre Dev. Site (A)**	**Pre Dev. Incoming External (A)**	**Total Pre Dev. (A)**	**Post Dev. Uncontrolled (A)**
Total Unrestricted Area			**72700**	**-**	**72700**	**-**
Combined T (min)					**51.9**	**-**
Combined Runoff Coefficient			**0.25**	**-**	**0.25**	**-**
Landscape	51.9	0.25	72700	0	72700	0
Impervious	51.9	0.90	0	0	0	0
Gravel	51.9	0.75	0	0	0	0

2. Formulas, Coefficients & Average Rainfall Intensity:

$i = a(T+b)^{-c}$, where i (mm/h) ; T (min)

$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)

Note: a,b,c = coefficients as per municipal standards

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
a		1070	1593	2221	3158	3886	4688
b		7.85	11	12	15	16	17
c		0.8759	0.8789	0.908	0.9335	0.9495	0.9624
Total Unrestricted Area	i (mm/h)	29.75	41.82	50.95	62.43	70.82	79.78
Total Allottment Area	i (mm/h)	94.76	109.28	131.69	146.72	163.51	180.66

3. Pre Development Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	**Q (L/s)**	**150.20**	**211.13**	**257.23**	**315.17**	**357.53**	**402.77**

Summary: The Pre Development Flow is Q2=150.2L/s, Q5=211.1L/s, Q10=257.2L/s, Q25=315.2L/s, Q50=357.5L/s, Q100=402.8L/s.

4. Post Development Uncontrolled Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Flat Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Green Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Summary: The Post Development Uncontrolled Flow is Q2=0L/s, Q5=0L/s, Q10=0L/s, Q25=0L/s, Q50=0L/s, Q100=0L/s.

5. Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Pre Development Flow	Q (L/s)	150.20	211.13	257.23	315.17	357.53	402.77
Allowable Release Flow	**Q (L/s)**	**150.20**	**211.13**	**257.23**	**315.17**	**357.53**	**402.77**
Post Development Uncontrolled Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Uncontrolled Release Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Remaining Release Flow for Orifice	**Q (L/s)**	**150.20**	**211.13**	**257.23**	**315.17**	**357.53**	**402.77**

100-Year Pre-Dev allowable flow = **402.8 L/s**

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

6. Summary Table of Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Allowable Release Flow	Q (L/s)	150.20	211.13	257.23	315.17	357.53	402.77
Uncontrolled Release Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Remaining Release Flow for Orifice	**Q (L/s)**	**150.20**	**211.13**	**257.23**	**315.17**	**357.53**	**402.77**

Summary: The remaining release flow for the orifice is Q100=402.8L/s.

7. Total Post Development Area:

			Area (m^2)				
Types of Land	**T (min)**	**Runoff Coef. (C)**	**Post Dev. Uncontrolled (A)**	**Post Dev. Controlled (A)**	**Total Post Dev. (A)**	Note: Max. treatment inflow = 3573L/s.	
Total Area			**-**	**72700**	**72700**	**TSS Removal Rate without treatment**	**TSS Removal Rate with Oil Grit Separator**
Combined T (min)			**-**	**51.9**	**51.9**		
Combined Runoff Coefficient			**-**	**0.9**	**0.9**		
Total Area (Unrestricted)			**-**	**72700**	**72700**		
Combined T (min) (Unrestricted)			**-**	**51.9**	**51.9**		
Combined Runoff Coefficient (Unrestricted)			**-**	**0.9**	**0.9**		
Landscape	51.9	0.25	0	0	0	100%	100%
Impervious	51.9	0.9	0	72700	72700	0%	80%
Restricted Flat Roof (42L/s/ha)	51.9	0.9	0	0	0	90%	98%
					Total	**0%**	**80%**

Summary: The maximum storage facility inflow (Q) = 3573L/s.
Summary: The TSS removal rate without treatment < 80%, therefore an Oil Grit Separator is required to be constructed upstream of the storage facility to provide a TSS removal rate of 80%.

8. Orifice Design:

Orifice Details:

Post Development Return Period to be Controlled	=	100	year
Pre Development Return Period to Control to	=	100	year
Orifice Discharge Coefficient (C)	=	0.62	Plate
Orifice Inside Diameter	=	390	mm
Orifice Area	=	0.119	m^2
High Water Head from invert (h)	=	1.5	m
Allowable Orifice Flow (Q)	=	402.77	L/s
Actual Orifice Flow (Q)	=	$CA(2gh)^{1/2}$	
	=	401.59	L/s

Summary: The Orifice is a Plate with an Inside Diameter of 390mm.
Summary: The Actual Orifice Flow is Q100=401.6L/s.

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

9. Storage Facility Design:

Storage Facility	=	Cultec System	
Storage Volume Required (V_1)	=	**3249.1**	m^3 (Storage Calc's)
Cultec System Elevations:			
Surface Elevation	=	263.78	m
Top of Cultec System Elevation	=	263.41	m
High Water Level (HWL)	=	263.41	m
Orifice Invert Elevation	=	261.91	m
Bottom of Cultec System Elevation	=	261.91	m
Effective Cultec System Depth (h_2)	=	1.5	m
Cultec System Details:			
Freeboard Height	=	0	m
High Water Head from invert (h)	=	1.5	m
Cultec System Volume:			
Quantity Storage Volume Provided	=	**3262.1**	m^3
Retention Volume Provided	=	**369.8**	m^3
Total Cultec System Volume	=	**3631.9**	**m^3**

Storm Service Connection:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
450	0.3	0.98	156.2	257%
525	0.3	1.09	235.6	170%
600	0.3	1.19	336.3	119%
675	0.3	1.29	460.4	87%

Total Unrestricted Area	A =	72700	m^2
Storm Event to be Captured	E =	5	mm
Total Retained Volume	=	363.5	m^3
Total Volume for Chamber	=	**363.5**	m^3

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

STORAGE CALCULATIONS

10. Storage Calculations

Controlling the 100 Year Post Development Flow to the 100 Year Pre Development Flow.

i = a[(T+b)/60]$^{-c}$, where i (mm/h) ; T (min) — i = average rainfall intensity (mm/h)
Q = A(i)C/3600, where A (m^2) ; i (mm/h) — a,b,c = coefficients as per municipal standards
T = time of concentration (min)
a = 4688 — Q = flow (m^3/s)
b = 17 — A = area (m^2)
c = 0.9624 — C = runoff coefficient

Note: Restricted Flat Roof & Restricted Green Roof are controlled to 42L/s/ha.

	Total Site	Cultec System	Restricted Flat Roof	Restricted Green Roof
Area (m^2)	72700	72700	-	-
Runoff Coef.	0.90	0.90	-	-
$Q_{controlled}$ (m^3/s)	0.40277	0.40159	-	-

Note: 'Cultec System' Inflow calculation = 100 year flow + 'restricted flat roof' flow (0m³/s) + 'Green Roof' flow (0m³/s).
Note: Max. 'Cultec System' Inflow = 3.573m³/s

		Total Site Storage			Cultec System Storage			Restricted Flat Roof Storage			Restricted Green Roof Storage		
Time (min)	i (mm/h)	Inflow, Q (m^3/s)	Flow Stored, Q (m^3/s)	Req. Storage, V (m^3)	Inflow, Q_1 (m^3/s)	Flow Stored, Q_1 (m^3/s)	Req. Storage, V_1 (m^3)	Inflow, Q_2 (m^3/s)	Flow Stored, Q_2 (m^3/s)	Req. Storage, V_2 (m^3)	Inflow, Q_3 (m^3/s)	Flow Stored, Q_3 (m^3/s)	Req. Storage, V_3 (m^3)
Maximum	-	-	-	**3246.0**	**3.573**	-	**3249.1**	-	-	**0.0**	-	-	**0.0**
10	196.54	3.572	3.169	1901.568	3.572	3.170	1902.276	0.000	0.000	0.000	0.000	0.000	0.000
11	189.78	3.449	3.046	2010.637	3.449	3.048	2011.416	0.000	0.000	0.000	0.000	0.000	0.000
12	183.47	3.335	2.932	2110.953	3.335	2.933	2111.803	0.000	0.000	0.000	0.000	0.000	0.000
13	177.58	3.228	2.825	2203.372	3.228	2.826	2204.293	0.000	0.000	0.000	0.000	0.000	0.000
14	172.07	3.127	2.725	2288.641	3.127	2.726	2289.633	0.000	0.000	0.000	0.000	0.000	0.000
15	166.89	3.033	2.630	2367.416	3.033	2.632	2368.478	0.000	0.000	0.000	0.000	0.000	0.000
20	145.13	2.638	2.235	2681.911	2.638	2.236	2683.327	0.000	0.000	0.000	0.000	0.000	0.000
25	128.46	2.335	1.932	2898.023	2.335	1.933	2899.793	0.000	0.000	0.000	0.000	0.000	0.000
30	115.28	2.095	1.692	3046.457	2.095	1.694	3048.581	0.000	0.000	0.000	0.000	0.000	0.000
35	104.59	1.901	1.498	3146.267	1.901	1.499	3148.745	0.000	0.000	0.000	0.000	0.000	0.000
40	95.75	1.740	1.337	3209.918	1.740	1.339	3212.750	0.000	0.000	0.000	0.000	0.000	0.000
45	88.31	1.605	1.202	3245.913	1.605	1.203	3249.099	0.000	0.000	0.000	0.000	0.000	0.000
60	71.69	1.303	0.900	3240.384	1.303	0.901	3244.632	0.000	0.000	0.000	0.000	0.000	0.000
70	63.74	1.158	0.756	3173.760	1.158	0.757	3178.716	0.000	0.000	0.000	0.000	0.000	0.000
80	57.40	1.043	0.640	3074.356	1.043	0.642	3080.020	0.000	0.000	0.000	0.000	0.000	0.000
90	52.23	0.949	0.546	2951.021	0.949	0.548	2957.393	0.000	0.000	0.000	0.000	0.000	0.000
120	41.17	0.748	0.346	2487.895	0.748	0.347	2496.391	0.000	0.000	0.000	0.000	0.000	0.000
150	34.03	0.618	0.216	1941.313	0.618	0.217	1951.933	0.000	0.000	0.000	0.000	0.000	0.000
180	29.03	0.528	0.125	1347.678	0.528	0.126	1360.422	0.000	0.000	0.000	0.000	0.000	0.000

SWM Measure	Value	
Allowable Release Rate	402.77	L/s
Uncontrolled Release Flow (Q)	0	L/s
Actual Orifice Flow	401.59	L/s
Orifice Size	390	mm
Total Quantity Storage Required	3246.0	m³
Rooftop Storage Provided	0.0	m³
Underground Quantity Storage Provided	3262.113848	m³
Total Quantity Storage Provided	3262.1	m³
TSS Removal Rate without treatment	0%	
TSS Removal with treatment (Max. Inflow = 3573L/s)	80%	
Water Balance Volume Required	363.5	m³
Total Chamber Volume	3625.613848	m³

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK B ALLOWABLE RELEASE FLOW

1. Pre, External & Post Development Uncontrolled Area:

Note: Post Dev. Controlled Area is shown in Orifice Calculations

Table 1. a) Total Uncontrolled Area

			Uncontrolled Area (m^2)			
Type of Land	**T (min)**	**Runoff Coef. (C)**	**Pre Dev. Site (A)**	**Pre Dev. Incoming External (A)**	**Total Pre Dev. (A)**	**Post Dev. Uncontrolled (A)**
Total Unrestricted Area			**24900**	**-**	**24900**	**-**
Combined T (min)					**51.9**	**-**
Combined Runoff Coefficient			**0.25**	**-**	**0.25**	**-**
Landscape	51.9	0.25	24900	0	24900	0
Impervious	51.9	0.90	0	0	0	0
Gravel	51.9	0.75	0	0	0	0

2. Formulas, Coefficients & Average Rainfall Intensity:

$i = a(T+b)^{-c}$, where i (mm/h) ; T (min)

$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)

Note: a,b,c = coefficients as per municipal standards

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
a		1070	1593	2221	3158	3886	4688
b		7.85	11	12	15	16	17
c		0.8759	0.8789	0.908	0.9335	0.9495	0.9624
Total Unrestricted Area	i (mm/h)	29.75	41.82	50.95	62.43	70.82	79.78
Total Allottment Area	i (mm/h)	94.76	109.28	131.69	146.72	163.51	180.66

3. Pre Development Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	**Q (L/s)**	**51.44**	**72.31**	**88.10**	**107.95**	**122.46**	**137.95**

Summary: The Pre Development Flow is Q2=51.4L/s, Q5=72.3L/s, Q10=88.1L/s, Q25=107.9L/s, Q50=122.5L/s, Q100=138L/s.

4. Post Development Uncontrolled Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Flat Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Green Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Summary: The Post Development Uncontrolled Flow is Q2=0L/s, Q5=0L/s, Q10=0L/s, Q25=0L/s, Q50=0L/s, Q100=0L/s.

5. Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Pre Development Flow	Q (L/s)	51.44	72.31	88.10	107.95	122.46	137.95
Allowable Release Flow	**Q (L/s)**	**51.44**	**72.31**	**88.10**	**107.95**	**122.46**	**137.95**
Post Development Uncontrolled Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Uncontrolled Release Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Remaining Release Flow for Orifice	**Q (L/s)**	**51.44**	**72.31**	**88.10**	**107.95**	**122.46**	**137.95**

100-Year Pre-Dev allowable flow = **138.0 L/s**

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK B - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

6. Summary Table of Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Allowable Release Flow	Q (L/s)	51.44	72.31	88.10	107.95	122.46	137.95
Uncontrolled Release Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Remaining Release Flow for Orifice	**Q (L/s)**	**51.44**	**72.31**	**88.10**	**107.95**	**122.46**	**137.95**

Summary: The remaining release flow for the orifice is Q100=138L/s.

7. Total Post Development Area:

			Area (m^2)				
Types of Land	**T (min)**	**Runoff Coef. (C)**	**Post Dev. Uncontrolled (A)**	**Post Dev. Controlled (A)**	**Total Post Dev. (A)**	Note: Max. treatment inflow = 962L/s.	
Total Area			**-**	**24900**	**24900**		
Combined T (min)			**-**	**51.9**	**51.9**		
Combined Runoff Coefficient			**-**	**0.9**	**0.9**		
Total Area (Unrestricted)			**-**	**19078**	**19078**	**TSS Removal Rate without treatment**	**TSS Removal Rate with Oil Grit Separator**
Combined T (min) (Unrestricted)			**-**	**51.9**	**51.9**		
Combined Runoff Coefficient (Unrestricted)			**-**	**0.9**	**0.9**		
Landscape	51.9	0.25	0	0	0	100%	100%
Impervious	51.9	0.9	0	19078	19078	0%	80%
Restricted Flat Roof (42L/s/ha)	51.9	0.9	0	5822	5822	90%	98%
					Total	**21%**	**84%**

Summary: The maximum storage facility inflow (Q) = 962L/s.
Summary: The TSS removal rate without treatment < 80%, therefore an Oil Grit Separator is required to be constructed upstream of the storage facility to provide a TSS removal rate of 84%.

8. Orifice Design:

Orifice Details:

Post Development Return Period to be Controlled	=	100	year
Pre Development Return Period to Control to	=	100	year
Orifice Discharge Coefficient (C)	=	0.62	Plate
Orifice Inside Diameter	=	220	mm
Orifice Area	=	0.038	m^2
High Water Head from invert (h)	=	1.5	m
Allowable Orifice Flow (Q)	=	137.95	L/s
Actual Orifice Flow (Q)	=	$CA(2gh)^{1/2}$	
	=	127.79	L/s

Summary: The Orifice is a Plate with an Inside Diameter of 220mm.
Summary: The Actual Orifice Flow is Q100=127.8L/s.

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK B - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

9. Storage Facility Design:

Storage Facility	=	Cultec System	
Storage Volume Required (V_1)	=	**858.9**	m^3 (Storage Calc's)
Cultec System Elevations:			
Surface Elevation	=	264.6	m
Top of Cultec System Elevation	=	264	m
High Water Level (HWL)	=	264	m
Orifice Invert Elevation	=	262.5	m
Bottom of Cultec System Elevation	=	262.5	m
Effective Cultec System Depth (h_2)	=	1.5	m
Cultec System Details:			
Freeboard Height	=	0	m
High Water Head from invert (h)	=	1.5	m
Cultec System Volume:			
Quantity Storage Volume Provided	=	**907.6**	m^3
Retention Volume Provided	=	**139.8**	m^3
Total Cultec System Volume	=	**1047.4**	m^3

Storm Service Connection:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
450	0.3	0.98	156.2	82%
525	0.3	1.09	235.6	54%
600	0.3	1.19	336.3	38%
750	0.3	1.38	609.8	21%

Total Unrestricted Area	A =	24900	m^2
Storm Event to be Captured	E =	5	mm
Total Retained Volume	=	124.5	m^3
Total Volume for Chamber	=	**124.5**	m^3

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

STORAGE CALCULATIONS

10. Storage Calculations

Controlling the 100 Year Post Development Flow to the 100 Year Pre Development Flow.

$i = a[(T+b)/60]^{-c}$, where i (mm/h) ; T (min)
$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)

a = 4688
b = 17
c = 0.9624

i = average rainfall intensity (mm/h)
a,b,c = coefficients as per municipal standards
T = time of concentration (min)
Q = flow (m^3/s)
A = area (m^2)
C = runoff coefficient

Note: Restricted Flat Roof & Restricted Green Roof are controlled to 42L/s/ha.

	Total Site	Cultec System	Restricted Flat Roof	Restricted Green Roof
Area (m^2)	24900	19078	5822	-
Runoff Coef.	0.90	0.90	0.90	-
$Q_{controlled}$ (m^3/s)	0.13795	0.12779	0.0244524	-

Note: 'Cultec System' Inflow calculation = 100 year flow + 'restricted flat roof' flow (0.0245m³/s) + 'Green Roof' flow (0m³/s).
Note: Max. 'Cultec System' Inflow = 0.962m³/s

		Total Site Storage			Cultec System Storage			Restricted Flat Roof Storage			Restricted Green Roof Storage		
Time (min)	i (mm/h)	Inflow, Q (m^3/s)	Flow Stored, Q (m^3/s)	Req. Storage, V (m^3)	Inflow, Q_1 (m^3/s)	Flow Stored, Q_1 (m^3/s)	Req. Storage, V_1 (m^3)	Inflow, Q_2 (m^3/s)	Flow Stored, Q_2 (m^3/s)	Req. Storage, V_2 (m^3)	Inflow, Q_3 (m^3/s)	Flow Stored, Q_3 (m^3/s)	Req. Storage, V_3 (m^3)
Maximum	-	-	-	**1111.8**	**0.962**	-	**858.9**	-	-	**287.6**	-	-	**0.0**
10	196.54	1.223	1.085	651.294	0.962	0.834	500.426	0.286	0.262	156.964	0.000	0.000	0.000
11	189.78	1.181	1.043	688.650	0.930	0.802	529.189	0.276	0.252	166.167	0.000	0.000	0.000
12	183.47	1.142	1.004	723.009	0.900	0.772	555.656	0.267	0.243	174.668	0.000	0.000	0.000
13	177.58	1.105	0.968	754.663	0.871	0.744	580.050	0.258	0.234	182.538	0.000	0.000	0.000
14	172.07	1.071	0.933	783.868	0.845	0.717	602.568	0.250	0.226	189.834	0.000	0.000	0.000
15	166.89	1.039	0.901	810.848	0.820	0.693	623.381	0.243	0.218	196.611	0.000	0.000	0.000
20	145.13	0.903	0.765	918.564	0.717	0.589	706.619	0.211	0.187	224.137	0.000	0.000	0.000
25	128.46	0.800	0.662	992.583	0.637	0.509	764.038	0.187	0.163	243.785	0.000	0.000	0.000
30	115.28	0.718	0.580	1043.422	0.574	0.446	803.698	0.168	0.143	258.012	0.000	0.000	0.000
35	104.59	0.651	0.513	1077.608	0.523	0.396	830.597	0.152	0.128	268.346	0.000	0.000	0.000
40	95.75	0.596	0.458	1099.408	0.481	0.353	848.008	0.139	0.115	275.784	0.000	0.000	0.000
45	88.31	0.550	0.412	1111.737	0.446	0.318	858.161	0.129	0.104	281.008	0.000	0.000	0.000
60	71.69	0.446	0.308	1109.843	0.366	0.239	858.832	0.104	0.080	287.587	0.000	0.000	0.000
70	63.74	0.397	0.259	1087.024	0.328	0.201	842.763	0.093	0.068	286.933	0.000	0.000	0.000
80	57.40	0.357	0.219	1052.978	0.298	0.170	818.092	0.084	0.059	283.654	0.000	0.000	0.000
90	52.23	0.325	0.187	1010.735	0.274	0.146	787.141	0.076	0.052	278.458	0.000	0.000	0.000
120	41.17	0.256	0.118	852.114	0.221	0.093	669.851	0.060	0.035	255.415	0.000	0.000	0.000
150	34.03	0.212	0.074	664.908	0.187	0.059	530.660	0.050	0.025	225.687	0.000	0.000	0.000
180	29.03	0.181	0.043	461.585	0.163	0.035	379.122	0.042	0.018	192.192	0.000	0.000	0.000

SWM Measure	Value	
Allowable Release Rate	137.95	L/s
Uncontrolled Release Flow (Q)	0	L/s
Actual Orifice Flow	127.79	L/s
Orifice Size	220	mm
Total Quantity Storage Required	1111.8	m³
Rooftop Storage Provided	287.6	m³
Underground Quantity Storage Provided	907.6349169	m³
Total Quantity Storage Provided	1195.2	m³
TSS Removal Rate without treatment	21%	
TSS Removal with treatment (Max. Inflow = 962L/s)	84%	
Water Balance Volume Required	124.5	m³
Total Chamber Volume	1032.134917	m³

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C ALLOWABLE RELEASE FLOW

1. Pre, External & Post Development Uncontrolled Area:

Note: Post Dev. Controlled Area is shown in Orifice Calculations

Table 1. a) Total Uncontrolled Area

			Uncontrolled Area (m^2)			
Type of Land	**T (min)**	**Runoff Coef. (C)**	**Pre Dev. Site (A)**	**Pre Dev. Incoming External (A)**	**Total Pre Dev. (A)**	**Post Dev. Uncontrolled (A)**
Total Unrestricted Area			**27800**	**-**	**27800**	**-**
Combined T (min)					**59.2**	**-**
Combined Runoff Coefficient			**0.25**	**-**	**0.25**	**-**
Landscape	59.2	0.25	27800	0	27800	0
Impervious	59.2	0.90	0	0	0	0
Gravel	59.2	0.75	0	0	0	0

2. Formulas, Coefficients & Average Rainfall Intensity:

$i = a(T+b)^{-c}$, where i (mm/h) ; T (min)

$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)

Note: a,b,c = coefficients as per municipal standards

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
a		1070	1593	2221	3158	3886	4688
b		7.85	11	12	15	16	17
c		0.8759	0.8789	0.908	0.9335	0.9495	0.9624
Total Unrestricted Area	i (mm/h)	26.89	37.97	46.18	56.67	64.27	72.41
Total Allottment Area	i (mm/h)	93.17	107.15	129.05	143.52	159.88	176.57

3. Pre Development Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	**Q (L/s)**	**51.92**	**73.31**	**89.16**	**109.41**	**124.08**	**139.79**

Summary: The Pre Development Flow is Q2=51.9L/s, Q5=73.3L/s, Q10=89.2L/s, Q25=109.4L/s, Q50=124.1L/s, Q100=139.8L/s.

4. Post Development Uncontrolled Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Total Unrestricted Area	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Flat Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Restricted Green Roof (42L/s/ha)	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Cumulative Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Summary: The Post Development Uncontrolled Flow is Q2=0L/s, Q5=0L/s, Q10=0L/s, Q25=0L/s, Q50=0L/s, Q100=0L/s.

5. Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Pre Development Flow	Q (L/s)	51.92	73.31	89.16	109.41	124.08	139.79
Allowable Release Flow	**Q (L/s)**	**51.92**	**73.31**	**89.16**	**109.41**	**124.08**	**139.79**
Post Development Uncontrolled Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Uncontrolled Release Flow	**Q (L/s)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Remaining Release Flow for Orifice	**Q (L/s)**	**51.92**	**73.31**	**89.16**	**109.41**	**124.08**	**139.79**

100-Year Pre-Dev allowable flow = **139.8 L/s**

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

6. Summary Table of Allowable Flow:

		Return Period (years)					
Description	**Units**	**2**	**5**	**10**	**25**	**50**	**100**
Allowable Release Flow	Q (L/s)	51.92	73.31	89.16	109.41	124.08	139.79
Uncontrolled Release Flow	Q (L/s)	0.00	0.00	0.00	0.00	0.00	0.00
Remaining Release Flow for Orifice	**Q (L/s)**	**51.92**	**73.31**	**89.16**	**109.41**	**124.08**	**139.79**

Summary: The remaining release flow for the orifice is Q100=139.8L/s.

7. Total Post Development Area:

			Area (m^2)				
Types of Land	**T (min)**	**Runoff Coef. (C)**	**Post Dev. Uncontrolled (A)**	**Post Dev. Controlled (A)**	**Total Post Dev. (A)**	Note: Max. treatment inflow = 1032L/s.	
Total Area			**-**	**27800**	**27800**		
Combined T (min)			**-**	**59.2**	**59.2**		
Combined Runoff Coefficient			**-**	**0.9**	**0.9**		
Total Area (Unrestricted)			**-**	**20359**	**20359**	**TSS Removal Rate without treatment**	**TSS Removal Rate with Oil Grit Separator**
Combined T (min) (Unrestricted)			**-**	**59.2**	**59.2**		
Combined Runoff Coefficient (Unrestricted)			**-**	**0.9**	**0.9**		
Landscape	59.2	0.25	0	0	0	100%	100%
Impervious	59.2	0.9	0	20359	20359	0%	80%
Restricted Flat Roof (42L/s/ha)	59.2	0.9	0	7441	7441	90%	98%
					Total	**24%**	**85%**

Summary: The maximum storage facility inflow (Q) = 1032L/s.
Summary: The TSS removal rate without treatment < 80%, therefore an Oil Grit Separator is required to be constructed upstream of the storage facility to provide a TSS removal rate of 85%.

8. Orifice Design:

Orifice Details:

Post Development Return Period to be Controlled	=	100	year
Pre Development Return Period to Control to	=	100	year
Orifice Discharge Coefficient (C)	=	0.62	Plate
Orifice Inside Diameter	=	230	mm
Orifice Area	=	0.042	m^2
High Water Head from invert (h)	=	1.5	m
Allowable Orifice Flow (Q)	=	139.79	L/s
Actual Orifice Flow (Q)	=	$CA(2gh)^{1/2}$	
	=	139.67	L/s

Summary: The Orifice is a Plate with an Inside Diameter of 230mm.
Summary: The Actual Orifice Flow is Q100=139.7L/s.

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

BLOCK C - ORIFICE CALCULATIONS - POST DEV. CONTROLLED FLOWS

9. Storage Facility Design:

Storage Facility	=	Cultec System	
Storage Volume Required (V_1)	=	**923.2**	m^3 (Storage Calc's)
Cultec System Elevations:			
Surface Elevation	=	264.6	m
Top of Cultec System Elevation	=	264	m
High Water Level (HWL)	=	264	m
Orifice Invert Elevation	=	262.5	m
Bottom of Cultec System Elevation	=	262.5	m
Effective Cultec System Depth (h_2)	=	1.5	m
Cultec System Details:			
Freeboard Height	=	0	m
High Water Head from invert (h)	=	1.5	m
Cultec System Volume:			
Quantity Storage Volume Provided	=	**929.2**	m^3
Retention Volume Provided	=	**150.8**	m^3
Total Cultec System Volume	=	**1080.1**	m^3

Storm Service Connection:

Diameter (mm)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Actual Flow (%)
450	0.3	0.98	156.2	89%
525	0.3	1.09	235.6	59%
600	0.3	1.19	336.3	42%
675	0.3	1.29	460.4	30%
750	0.3	1.38	609.8	23%

Total Unrestricted Area	A =	27800	m^2
Storm Event to be Captured	E =	5	mm
Total Retained Volume	=	139.0	m^3
Total Volume for Chamber	=	**139.0**	m^3

Project Name: 12100 Creditview Road	
Project #: 24045	Prepared by: TG/TF
Date: 9/30/2024	Checked by: TF

STORAGE CALCULATIONS

10. Storage Calculations

Controlling the 100 Year Post Development Flow to the 100 Year Pre Development Flow.

$i = a[(T+b)/60]^{-c}$, where i (mm/h) ; T (min)	i = average rainfall intensity (mm/h)
$Q = A(i)C/3600$, where A (m^2) ; i (mm/h)	a,b,c = coefficients as per municipal standards
	T = time of concentration (min)
a = 4688	Q = flow (m^3/s)
b = 17	A = area (m^2)
c = 0.9624	C = runoff coefficient

Note: Restricted Flat Roof & Restricted Green Roof are controlled to 42L/s/ha.

	Total Site	Cultec System	Restricted Flat Roof	Restricted Green Roof
Area (m^2)	27800	20359	7441	-
Runoff Coef.	0.90	0.90	0.90	-
$Q_{controlled}$ (m^3/s)	0.13979	0.13967	0.0312522	-

Note: 'Cultec System' Inflow calculation = 100 year flow + 'restricted flat roof' flow (0.0313m³/s) + 'Green Roof' flow (0m³/s).
Note: Max. 'Cultec System' Inflow = 1.032m³/s

		Total Site Storage			Cultec System Storage			Restricted Flat Roof Storage			Restricted Green Roof Storage		
Time (min)	i (mm/h)	Inflow, Q (m^3/s)	Flow Stored, Q (m^3/s)	Req. Storage, V (m^3)	Inflow, Q_1 (m^3/s)	Flow Stored, Q_1 (m^3/s)	Req. Storage, V_1 (m^3)	Inflow, Q_2 (m^3/s)	Flow Stored, Q_2 (m^3/s)	Req. Storage, V_2 (m^3)	Inflow, Q_3 (m^3/s)	Flow Stored, Q_3 (m^3/s)	Req. Storage, V_3 (m^3)
Maximum	-	-	-	**1290.4**	**1.032**	-	**923.2**	-	-	**367.6**	-	-	**0.0**
10	196.54	1.366	1.226	735.683	1.032	0.892	535.142	0.366	0.334	200.613	0.000	0.000	0.000
11	189.78	1.319	1.179	778.244	0.997	0.857	565.949	0.353	0.322	212.375	0.000	0.000	0.000
12	183.47	1.275	1.135	817.458	0.965	0.825	594.304	0.341	0.310	223.241	0.000	0.000	0.000
13	177.58	1.234	1.094	853.652	0.935	0.795	620.447	0.330	0.299	233.298	0.000	0.000	0.000
14	172.07	1.196	1.056	887.112	0.907	0.767	644.589	0.320	0.289	242.624	0.000	0.000	0.000
15	166.89	1.160	1.020	918.088	0.881	0.741	666.911	0.310	0.279	251.285	0.000	0.000	0.000
20	145.13	1.009	0.869	1042.617	0.770	0.630	756.295	0.270	0.239	286.466	0.000	0.000	0.000
25	128.46	0.893	0.753	1129.525	0.685	0.545	818.128	0.239	0.208	311.577	0.000	0.000	0.000
30	115.28	0.801	0.661	1190.553	0.618	0.478	861.008	0.214	0.183	329.761	0.000	0.000	0.000
35	104.59	0.727	0.587	1232.988	0.564	0.424	890.271	0.195	0.163	342.969	0.000	0.000	0.000
40	95.75	0.665	0.526	1261.595	0.519	0.379	909.408	0.178	0.147	352.475	0.000	0.000	0.000
45	88.31	0.614	0.474	1279.628	0.481	0.341	920.801	0.164	0.133	359.151	0.000	0.000	0.000
60	71.69	0.498	0.358	1290.317	0.396	0.256	923.189	0.133	0.102	367.560	0.000	0.000	0.000
70	63.74	0.443	0.303	1273.376	0.356	0.216	907.156	0.119	0.087	366.724	0.000	0.000	0.000
80	57.40	0.399	0.259	1243.901	0.323	0.184	881.944	0.107	0.076	362.533	0.000	0.000	0.000
90	52.23	0.363	0.223	1205.275	0.297	0.157	850.030	0.097	0.066	355.893	0.000	0.000	0.000
120	41.17	0.286	0.146	1053.786	0.241	0.101	728.209	0.077	0.045	326.441	0.000	0.000	0.000
150	34.03	0.236	0.097	870.385	0.204	0.065	583.018	0.063	0.032	288.447	0.000	0.000	0.000
180	29.03	0.202	0.062	668.990	0.179	0.039	424.649	0.054	0.023	245.637	0.000	0.000	0.000

SWM Measure	Value	
Allowable Release Rate	139.79	L/s
Uncontrolled Release Flow (Q)	0	L/s
Actual Orifice Flow	139.67	L/s
Orifice Size	230	mm
Total Quantity Storage Required	1290.4	m³
Rooftop Storage Provided	367.6	m³
Underground Quantity Storage Provided	929.2448639	m³
Total Quantity Storage Provided	1296.8	m³
TSS Removal Rate without treatment	24%	
TSS Removal with treatment (Max. Inflow = 1032L/s)	85%	
Water Balance Volume Required	139	m³
Total Chamber Volume	1068.244864	m³

CULTEC Stormwater Design Calculator

Date:	September 30, 2024

Project Information:

Calculations Performed By:

RECHARGER 902HD

Recharger 902HD Chamber Specifications		
Height	**1219**	mm
Width	**1981**	mm
Length	**1.25**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.80**	cu. meters
Installed Chamber Volume	**2.99**	cu. meters

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**1,404.79**	cu. meters
Within Stone	**988.59**	cu. meters
Total Storage Provided	**2,393.4**	**cu. meters**
Total Storage Required	2330.00	cu. meters

Materials List

Recharger 902HD		
Total Number of Chambers Required	**768**	**pieces**
Separator Row Chambers	**32**	pieces
Chamber Units	**768**	pieces
End Caps	**48**	pieces
HVLV FC-48 Feed Connectors	**46**	pieces
CULTEC No. 410 Non-Woven Geotextile	**5459**	sq. meters
CULTEC AFAB-HPF Woven Geotextile	**146**	meters
Stone	**2471**	cu. meters

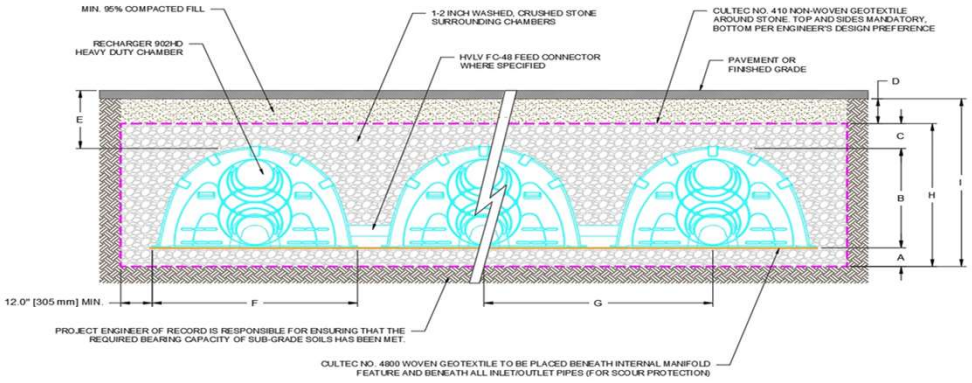
Separator Row Qty Included in Total

Based on 2 Internal Manifolds

Bed Detail

Bed Layout Information		
Number of Rows Wide	**24**	pieces
Number of Chambers Long	**32**	pieces
Chamber Row Width	**52.81**	meters
Chamber Row Length	**36.98**	meters
Bed Width	**53.42**	meters
Bed Length	**37.59**	meters
Bed Area Required	**2008.02**	sq. meters
Length of Separator Row	**36.98**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**400**	mm
B	Chamber Height	**1219**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**2.54**	meters
F	Chamber Width	**1981**	mm
G	Center to Center Spacing	**2.21**	meters
H	Effective Depth	**1.93**	meters
I	Bed Depth	**2.24**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date: September 30, 2024

Project Information:

Project Number: 0

Chamber Model -	**Recharger 902HD**	
Number of Rows-	24	units
Total Number of Chambers -	768	units
Stone Void -	40	%
Stone Base -	400	mm
Stone Above Units -	305	mm
Area -	2008.02	m2
Base of Stone Elevation -	260.67	

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft²	m²	ft	m	
76.0	1930	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	84540.74	2393.92	8645.67	803.18	267.00	262.60	Top of Stone Elevation
75.0	1905	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	83820.27	2373.52	8645.67	803.18	266.92	262.58	
74.0	1880	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	83099.80	2353.12	8645.67	803.18	266.84	262.55	
73.0	1854	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	82379.32	2332.72	8645.67	803.18	266.75	262.52	
72.0	1829	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	81658.85	2312.32	8645.67	803.18	266.67	262.50	
71.0	1803	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	80938.38	2291.92	8645.67	803.18	266.59	262.47	
70.0	1778	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	80217.91	2271.51	8645.67	803.18	266.50	262.45	
69.0	1753	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	79497.43	2251.11	8645.67	803.18	266.42	262.42	
68.0	1727	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	78776.96	2230.71	8645.67	803.18	266.34	262.40	
67.0	1702	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	78056.49	2210.31	8645.67	803.18	266.25	262.37	
66.0	1676	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	77336.02	2189.91	8645.67	803.18	266.17	262.35	
65.0	1651	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	76615.55	2169.51	8645.67	803.18	266.09	262.32	
64.0	1626	57.3	1.6	0.0	0.0	697.6	19.8	754.840	21.4	75895.07	2149.11	9058.08	841.50	266.00	262.30	Top of Chamber Elevation
63.0	1600	142.2	4.0	0.0	0.0	663.6	18.8	805.816	22.8	75140.23	2127.73	9669.79	898.32	265.92	262.27	
62.0	1575	199.0	5.6	0.0	0.0	640.9	18.1	839.896	23.8	74334.42	2104.91	10078.75	936.32	265.84	262.24	
61.0	1549	340.3	9.6	0.0	0.0	584.3	16.5	924.664	26.2	73494.52	2081.13	11095.97	1030.82	265.75	262.22	
60.0	1524	453.4	12.8	0.0	0.0	539.1	15.3	992.536	28.1	72569.86	2054.95	11910.43	1106.48	265.67	262.19	
59.0	1499	567.0	16.1	0.0	0.0	493.7	14.0	1,060.696	30.0	71577.32	2026.84	12728.35	1182.46	265.59	262.17	
58.0	1473	624.3	17.7	0.0	0.0	470.7	13.3	1,095.064	31.0	70516.62	1996.81	13140.77	1220.78	265.50	262.14	
57.0	1448	681.1	19.3	0.0	0.0	448.0	12.7	1,129.144	32.0	69421.56	1965.80	13549.73	1258.77	265.42	262.12	
56.0	1422	766.6	21.7	0.0	0.0	413.8	11.7	1,180.408	33.4	68292.42	1933.82	14164.90	1315.92	265.34	262.09	
55.0	1397	767.0	21.7	0.0	0.0	413.7	11.7	1,180.696	33.4	67112.01	1900.40	14168.35	1316.24	265.25	262.07	
54.0	1372	824.3	23.3	0.0	0.0	390.7	11.1	1,215.064	34.4	65931.31	1866.96	14580.77	1354.55	265.17	262.04	
53.0	1346	853.0	24.2	0.0	0.0	379.3	10.7	1,232.248	34.9	64716.25	1832.56	14786.98	1373.71	265.09	262.02	
52.0	1321	882.1	25.0	0.0	0.0	367.6	10.4	1,249.720	35.4	63484.00	1797.66	14996.64	1393.19	265.00	261.99	
51.0	1295	939.4	26.6	0.0	0.0	344.7	9.8	1,284.088	36.4	62234.28	1762.28	15409.06	1431.50	264.92	261.97	
50.0	1270	968.5	27.4	0.0	0.0	333.1	9.4	1,301.560	36.9	60950.19	1725.91	15618.72	1450.98	264.84	261.94	
49.0	1245	998.1	28.3	0.0	0.0	321.2	9.1	1,319.320	37.4	59648.63	1689.06	15831.84	1470.78	264.75	261.91	
48.0	1219	999.0	28.3	0.0	0.0	320.9	9.1	1,319.896	37.4	58329.31	1651.70	15838.75	1471.42	264.67	261.89	
47.0	1194	1,028.2	29.1	0.0	0.0	309.2	8.8	1,337.368	37.9	57009.41	1614.32	16048.42	1490.90	264.59	261.86	
46.0	1168	1,056.8	29.9	0.0	0.0	297.8	8.4	1,354.552	38.4	55672.05	1576.45	16254.63	1510.05	264.50	261.84	
45.0	1143	1,085.9	30.7	0.0	0.0	286.1	8.1	1,372.024	38.9	54317.49	1538.10	16464.29	1529.53	264.42	261.81	
44.0	1118	1,115.0	31.6	0.0	0.0	274.5	7.8	1,389.496	39.3	52945.47	1499.25	16673.95	1549.01	264.34	261.79	
43.0	1092	1,115.5	31.6	0.0	0.0	274.3	7.8	1,389.784	39.4	51555.97	1459.90	16677.41	1549.33	264.25	261.76	
42.0	1067	1,144.6	32.4	0.0	0.0	262.6	7.4	1,407.256	39.8	50166.19	1420.55	16887.07	1568.81	264.17	261.74	
41.0	1041	1,145.1	32.4	0.0	0.0	262.4	7.4	1,407.544	39.9	48758.93	1380.70	16890.53	1569.13	264.09	261.71	
40.0	1016	1,173.8	33.2	0.0	0.0	251.0	7.1	1,424.728	40.3	47351.39	1340.84	17096.74	1588.29	264.00	261.69	
39.0	991	1,174.7	33.3	0.0	0.0	250.6	7.1	1,425.304	40.4	45926.66	1300.50	17103.65	1588.93	263.92	261.66	
38.0	965	1,175.2	33.3	0.0	0.0	250.4	7.1	1,425.592	40.4	44501.36	1260.14	17107.11	1589.25	263.84	261.64	
37.0	940	1,204.3	34.1	0.0	0.0	238.7	6.8	1,443.064	40.9	43075.76	1219.77	17316.77	1608.73	263.75	261.61	
36.0	914	1,204.8	34.1	0.0	0.0	238.6	6.8	1,443.352	40.9	41632.70	1178.90	17320.23	1609.05	263.67	261.58	
35.0	889	1,205.8	34.1	0.0	0.0	238.2	6.7	1,443.928	40.9	40189.35	1138.03	17327.14	1609.69	263.59	261.56	
34.0	864	1,234.4	35.0	0.0	0.0	226.7	6.4	1,461.112	41.4	38745.42	1097.15	17533.35	1628.85	263.50	261.53	
33.0	838	1,234.9	35.0	0.0	0.0	226.5	6.4	1,461.400	41.4	37284.31	1055.77	17536.80	1629.17	263.42	261.51	
32.0	813	1,263.5	35.8	0.0	0.0	215.1	6.1	1,478.584	41.9	35822.91	1014.39	17743.01	1648.33	263.34	261.48	
31.0	787	1,264.5	35.8	0.0	0.0	214.7	6.1	1,479.160	41.9	34344.32	972.52	17749.92	1648.97	263.25	261.46	
30.0	762	1,293.1	36.6	0.0	0.0	203.2	5.8	1,496.344	42.4	32865.16	930.64	17956.13	1668.12	263.17	261.43	
29.0	737	1,293.6	36.6	0.0	0.0	203.0	5.7	1,496.632	42.4	31368.82	888.26	17959.59	1668.45	263.09	261.41	
28.0	711	1,294.1	36.6	0.1	0.0	202.8	5.7	1,497.003	42.4	29872.19	845.88	17964.04	1668.86	263.00	261.38	
27.0	686	1,294.6	36.7	1.1	0.0	202.2	5.7	1,497.850	42.4	28375.18	803.49	17974.20	1669.80	262.92	261.36	
26.0	660	1,323.7	37.5	2.1	0.1	190.2	5.4	1,515.922	42.9	26877.33	761.08	18191.07	1689.95	262.84	261.33	
25.0	635	1,324.2	37.5	2.5	0.1	189.8	5.4	1,516.479	42.9	25361.41	718.15	18197.75	1690.57	262.75	261.31	
24.0	610	1,325.1	37.5	2.8	0.1	189.3	5.4	1,517.221	43.0	23844.93	675.21	18206.65	1691.40	262.67	261.28	
23.0	584	1,325.6	37.5	2.9	0.1	189.1	5.4	1,517.592	43.0	22327.71	632.25	18211.10	1691.81	262.59	261.25	
22.0	559	1,354.2	38.3	3.1	0.1	177.5	5.0	1,534.859	43.5	20810.12	589.28	18418.30	1711.06	262.50	261.23	
21.0	533	1,354.7	38.4	3.2	0.1	177.3	5.0	1,535.229	43.5	19275.26	545.81	18422.75	1711.47	262.42	261.20	
20.0	508	1,382.9	39.2	3.3	0.1	166.0	4.7	1,552.167	44.0	17740.03	502.34	18626.00	1730.36	262.34	261.18	
19.0	483	1,383.4	39.2	3.3	0.1	165.8	4.7	1,552.496	44.0	16187.86	458.39	18629.95	1730.72	262.25	261.15	
18.0	457	1,383.8	39.2	3.4	0.1	165.6	4.7	1,552.826	44.0	14635.37	414.43	18633.91	1731.09	262.17	261.13	
17.0	432	1,387.2	39.3	3.7	0.1	164.1	4.6	1,554.986	44.0	13082.54	370.46	18659.84	1733.50	262.09	261.10	
16.0	406	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	11527.56	326.42	8645.67	803.18	262.00	261.08	Bottom of Chamber Elevation
15.0	381	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	10807.08	306.02	8645.67	803.18	261.92	261.05	
14.0	356	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	10086.61	285.62	8645.67	803.18	261.84	261.03	
13.0	330	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	9366.14	265.22	8645.67	803.18	261.75	261.00	
12.0	305	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	8645.67	244.82	8645.67	803.18	261.67	260.97	
11.0	279	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	7925.19	224.42	8645.67	803.18	261.59	260.95	
10.0	254	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	7204.72	204.01	8645.67	803.18	261.50	260.92	
9.0	229	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	6484.25	183.61	8645.67	803.18	261.42	260.90	
8.0	203	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	5763.78	163.21	8645.67	803.18	261.34	260.87	
7.0	178	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	5043.31	142.81	8645.67	803.18	261.25	260.85	
6.0	152	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	4322.83	122.41	8645.67	803.18	261.17	260.82	
5.0	127	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	3602.36	102.01	8645.67	803.18	261.09	260.80	
4.0	102	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	2881.89	81.61	8645.67	803.18	261.00	260.77	
3.0	76	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	2161.42	61.20	8645.67	803.18	260.92	260.75	
2.0	51	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	1440.94	40.80	8645.67	803.18	260.84	260.72	
1.0	25	0.0	0.0	0.0	0.0	720.5	20.4	720.472	20.4	720.47	20.40	8645.67	803.18	260.75	260.70	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	260.67	260.67	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																

CULTEC Stormwater Design Calculator

Date:	September 30, 2024

Project Information:

Calculations Performed By:

RECHARGER 360HD

Recharger 360HD Chamber Specifications		
Height	**914**	mm
Width	**1524**	mm
Length	**1.27**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.04**	cu. meters
Installed Chamber Volume	**1.70**	cu. meters

Breakdown of Storage Provided by Recharger 360HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**518.31**	cu. meters
Within Stone	**350.41**	cu. meters
Total Storage Provided	**868.7**	**cu. meters**
Total Storage Required	856.00	cu. meters

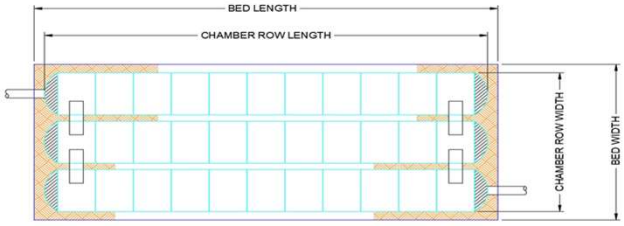
Materials List

Recharger 360HD		
Total Number of Chambers Required	**495**	**pieces**
Separator Row Chambers	**45**	pieces
Chamber Units	**495**	pieces
End Caps	**22**	pieces
HVLV FC-48 Feed Connectors	**20**	pieces
CULTEC No. 410 Non-Woven Geotextile	**2786**	sq. meters
CULTEC AFAB-HPF Woven Geotextile	**93**	meters
Stone	**876**	cu. meters

Separator Row Qty Included in Total

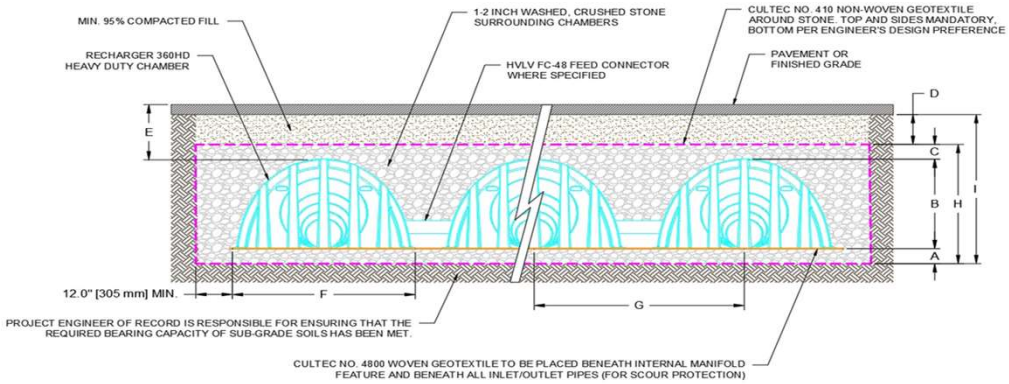
Based on 2 Internal Manifolds

Bed Detail



Bed Layout Information		
Number of Rows Wide	**11**	pieces
Number of Chambers Long	**45**	pieces
Chamber Row Width	**19.05**	meters
Chamber Row Length	**51.10**	meters
Bed Width	**19.66**	meters
Bed Length	**51.71**	meters
Bed Area Required	**1016.58**	sq. meters
Length of Separator Row	**51.10**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**300**	mm
B	Chamber Height	**914**	mm
C	Depth of Stone Above Units	**152**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**1524**	mm
G	Center to Center Spacing	**1.75**	meters
H	Effective Depth	**1.37**	meters
I	Bed Depth	**1.68**	meters

CULTEC Stage-Storage Calculations

Date:	September 30, 2024

Project Information:

Project Number: 0

Chamber Model -	**Recharger 360HD**	
Number of Rows-	11	units
Total Number of Chambers -	495	units
Stone Void -	40	%
Stone Base -	300	mm
Stone Above Units -	152	mm
Area -	1016.58	m2
Base of Stone Elevation -	260.27	

Recharger 360HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
54.0	1372	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	30687.06	868.96	4376.97	406.62	264.77	261.64	Top of Stone Elevation
53.0	1346	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	30322.31	858.63	4376.97	406.62	264.69	261.62	
52.0	1321	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	29957.56	848.30	4376.97	406.62	264.60	261.59	
51.0	1295	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	29592.82	837.97	4376.97	406.62	264.52	261.57	
50.0	1270	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	29228.07	827.65	4376.97	406.62	264.44	261.54	
49.0	1245	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	28863.32	817.32	4376.97	406.62	264.35	261.51	
48.0	1219	40.0	1.1	0.0	0.0	348.8	9.9	388.721	11.0	28498.57	806.99	4664.65	433.35	264.27	261.49	Top of Chamber Elevation
47.0	1194	84.7	2.4	0.0	0.0	330.9	9.4	415.577	11.8	28109.85	795.98	4986.93	463.29	264.19	261.46	
46.0	1168	126.0	3.6	0.0	0.0	314.4	8.9	440.323	12.5	27694.28	784.21	5283.88	490.87	264.10	261.44	
45.0	1143	213.1	6.0	0.0	0.0	279.5	7.9	492.626	13.9	27253.95	771.74	5911.51	549.18	264.02	261.41	
44.0	1118	269.1	7.6	0.0	0.0	257.1	7.3	526.231	14.9	26761.33	757.80	6314.77	586.64	263.94	261.39	
43.0	1092	311.2	8.8	0.0	0.0	240.3	6.8	551.452	15.6	26235.10	742.89	6617.43	614.76	263.85	261.36	
42.0	1067	346.1	9.8	0.0	0.0	226.3	6.4	572.423	16.2	25683.64	727.28	6869.07	638.14	263.77	261.34	
41.0	1041	376.4	10.7	0.0	0.0	214.2	6.1	590.569	16.7	25111.22	711.07	7086.83	658.37	263.69	261.31	
40.0	1016	403.1	11.4	0.0	0.0	203.5	5.8	606.635	17.2	24520.65	694.35	7279.62	676.28	263.60	261.29	
39.0	991	427.2	12.1	0.0	0.0	193.9	5.5	621.066	17.6	23914.02	677.17	7452.79	692.36	263.52	261.26	
38.0	965	449.1	12.7	0.0	0.0	185.1	5.2	634.188	18.0	23292.95	659.58	7610.26	706.99	263.44	261.24	
37.0	940	469.0	13.3	0.0	0.0	177.1	5.0	646.152	18.3	22658.76	641.62	7753.82	720.33	263.35	261.21	
36.0	914	487.6	13.8	0.0	0.0	169.7	4.8	657.296	18.6	22012.61	623.33	7887.55	732.75	263.27	261.18	
35.0	889	504.5	14.3	0.0	0.0	162.9	4.6	667.476	18.9	21355.32	604.71	8009.71	744.10	263.19	261.16	
34.0	864	520.2	14.7	0.0	0.0	156.7	4.4	676.882	19.2	20687.84	585.81	8122.59	754.59	263.10	261.13	
33.0	838	534.9	15.1	0.0	0.0	150.8	4.3	685.665	19.4	20010.96	566.65	8227.98	764.38	263.02	261.11	
32.0	813	548.6	15.5	0.0	0.0	145.3	4.1	693.883	19.6	19325.29	547.23	8326.59	773.54	262.94	261.08	
31.0	787	561.4	15.9	0.0	0.0	140.2	4.0	701.595	19.9	18631.41	527.58	8419.14	782.14	262.85	261.06	
30.0	762	573.5	16.2	0.0	0.0	135.4	3.8	708.832	20.1	17929.81	507.71	8505.98	790.21	262.77	261.03	
29.0	737	584.7	16.6	0.0	0.0	130.9	3.7	715.550	20.3	17220.98	487.64	8586.60	797.70	262.69	261.01	
28.0	711	595.4	16.9	0.0	0.0	126.6	3.6	721.984	20.4	16505.43	467.38	8663.81	804.87	262.60	260.98	
27.0	686	605.6	17.1	0.0	0.0	122.5	3.5	728.091	20.6	15783.45	446.94	8737.10	811.68	262.52	260.96	
26.0	660	615.2	17.4	0.0	0.0	118.7	3.4	733.842	20.8	15055.36	426.32	8806.10	818.09	262.44	260.93	
25.0	635	624.2	17.7	0.0	0.0	115.1	3.3	739.265	20.9	14321.52	405.54	8871.18	824.13	262.35	260.91	
24.0	610	632.5	17.9	0.1	0.0	111.7	3.2	744.295	21.1	13582.25	384.61	8931.54	829.74	262.27	260.88	
23.0	584	640.6	18.1	0.5	0.0	108.3	3.1	749.397	21.2	12837.95	363.53	8992.76	835.43	262.19	260.85	
22.0	559	648.3	18.4	0.9	0.0	105.1	3.0	754.249	21.4	12088.56	342.31	9050.99	840.84	262.10	260.83	
21.0	533	655.3	18.6	1.1	0.0	102.2	2.9	758.587	21.5	11334.31	320.95	9103.05	845.67	262.02	260.80	
20.0	508	662.1	18.7	1.2	0.0	99.4	2.8	762.745	21.6	10575.72	299.47	9152.94	850.31	261.94	260.78	
19.0	483	668.6	18.9	1.3	0.0	96.8	2.7	766.658	21.7	9812.98	277.87	9199.90	854.67	261.85	260.75	
18.0	457	674.6	19.1	1.3	0.0	94.4	2.7	770.334	21.8	9046.32	256.16	9244.01	858.77	261.77	260.73	
17.0	432	680.2	19.3	1.4	0.0	92.1	2.6	773.700	21.9	8275.98	234.35	9284.40	862.52	261.69	260.70	
16.0	406	685.6	19.4	1.4	0.0	90.0	2.5	776.941	22.0	7502.28	212.44	9323.30	866.13	261.60	260.68	
15.0	381	690.4	19.6	1.5	0.0	88.0	2.5	779.873	22.1	6725.34	190.44	9358.47	869.40	261.52	260.65	
14.0	356	695.2	19.7	1.5	0.0	86.1	2.4	782.787	22.2	5945.47	168.36	9393.45	872.65	261.44	260.63	
13.0	330	700.0	19.8	1.6	0.0	84.1	2.4	785.714	22.2	5162.68	146.19	9428.56	875.91	261.35	260.60	
12.0	305	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	4376.97	123.94	4376.97	406.62	261.27	260.57	Bottom of Chamber Elevation
11.0	279	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	4012.22	113.61	4376.97	406.62	261.19	260.55	
10.0	254	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	3647.48	103.28	4376.97	406.62	261.10	260.52	
9.0	229	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	3282.73	92.96	4376.97	406.62	261.02	260.50	
8.0	203	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	2917.98	82.63	4376.97	406.62	260.94	260.47	
7.0	178	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	2553.23	72.30	4376.97	406.62	260.85	260.45	
6.0	152	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	2188.49	61.97	4376.97	406.62	260.77	260.42	
5.0	127	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	1823.74	51.64	4376.97	406.62	260.69	260.40	
4.0	102	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	1458.99	41.31	4376.97	406.62	260.60	260.37	
3.0	76	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	1094.24	30.99	4376.97	406.62	260.52	260.35	
2.0	51	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	729.50	20.66	4376.97	406.62	260.44	260.32	
1.0	25	0.0	0.0	0.0	0.0	364.7	10.3	364.748	10.3	364.75	10.33	4376.97	406.62	260.35	260.30	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	260.27	260.27	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																

CULTEC Stormwater Design Calculator

Date:	September 30, 2024

Project Information:

Calculations Performed By:

RECHARGER 902HD

Recharger 902HD Chamber Specifications		
Height	**1219**	mm
Width	**1981**	mm
Length	**1.25**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.80**	cu. meters
Installed Chamber Volume	**3.09**	cu. meters

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**493.82**	cu. meters
Within Stone	**413.81**	cu. meters
Total Storage Provided	**907.6**	**cu. meters**
Total Storage Required	859.00	cu. meters

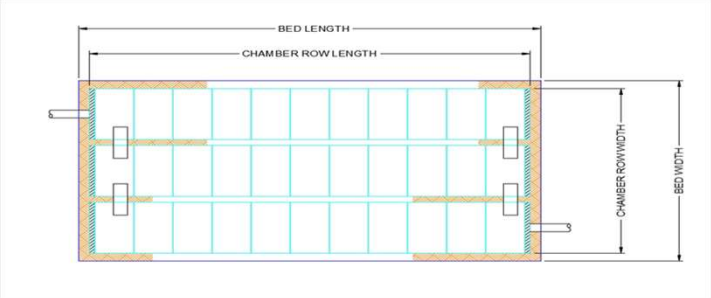
Materials List

Recharger 902HD		
Total Number of Chambers Required	**260**	**pieces**
Separator Row Chambers	**10**	pieces
Chamber Units	**260**	pieces
End Caps	**52**	pieces
HVLV FC-48 Feed Connectors	**50**	pieces
CULTEC No. 410 Non-Woven Geotextile	**2240**	sq. meters
CULTEC AFAB-HPF Woven Geotextile	**129**	meters
Stone	**1035**	cu. meters

Separator Row Qty Included in Total

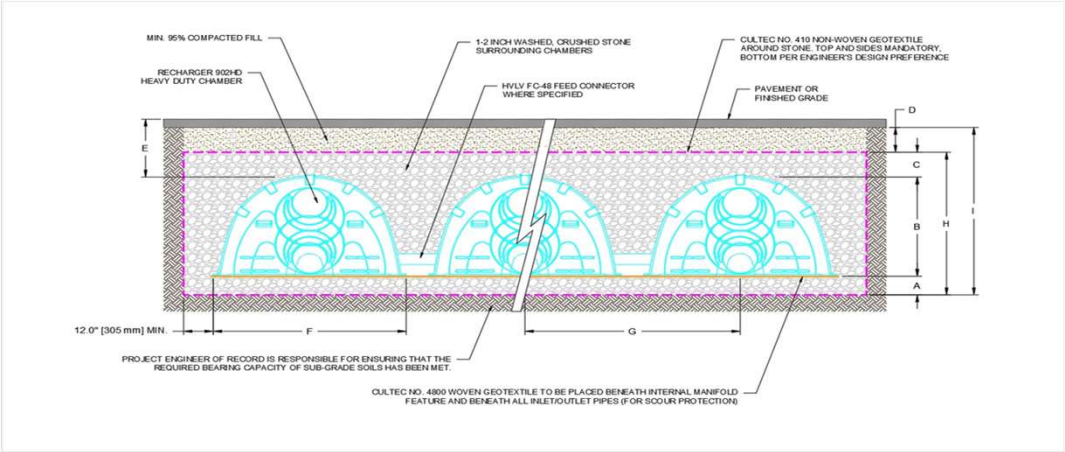
Based on 2 Internal Manifolds

Bed Detail



Bed Layout Information		
Number of Rows Wide	**26**	pieces
Number of Chambers Long	**10**	pieces
Chamber Row Width	**57.23**	meters
Chamber Row Length	**12.40**	meters
Bed Width	**57.84**	meters
Bed Length	**13.00**	meters
Bed Area Required	**752.14**	sq. meters
Length of Separator Row	**12.40**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**500**	mm
B	Chamber Height	**1219**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**2.54**	meters
F	Chamber Width	**1981**	mm
G	Center to Center Spacing	**2.21**	meters
H	Effective Depth	**2.03**	meters
I	Bed Depth	**2.34**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	September 30, 2024

Project Information:

Project Number: 0

Chamber Model -	**Recharger 902HD**	
Number of Rows-	26	units
Total Number of Chambers -	260	units
Stone Void -	40	%
Stone Base -	500	mm
Stone Above Units -	305	mm
Area -	752.14	m2
Base of Stone Elevation -	260.33	

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft²	m²	ft	m	
80.0	2032	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	32073.42	908.22	3238.40	300.85	267.00	262.36	Top of Stone Elevation
79.0	2007	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	31803.55	900.57	3238.40	300.85	266.91	262.34	
78.0	1981	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	31533.69	892.93	3238.40	300.85	266.83	262.31	
77.0	1956	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	31263.82	885.29	3238.40	300.85	266.75	262.29	
76.0	1930	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	30993.95	877.65	3238.40	300.85	266.66	262.26	
75.0	1905	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	30724.09	870.01	3238.40	300.85	266.58	262.24	
74.0	1880	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	30454.22	862.37	3238.40	300.85	266.50	262.21	
73.0	1854	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	30184.35	854.72	3238.40	300.85	266.41	262.18	
72.0	1829	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	29914.49	847.08	3238.40	300.85	266.33	262.16	
71.0	1803	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	29644.62	839.44	3238.40	300.85	266.25	262.13	
70.0	1778	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	29374.75	831.80	3238.40	300.85	266.16	262.11	
69.0	1753	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	29104.89	824.16	3238.40	300.85	266.08	262.08	
68.0	1727	20.1	0.6	0.0	0.0	261.8	7.4	281.931	8.0	28835.02	816.52	3383.17	314.30	266.00	262.06	Top of Chamber Elevation
67.0	1702	49.2	1.4	0.0	0.0	250.2	7.1	299.403	8.5	28553.09	808.53	3592.83	333.77	265.91	262.03	
66.0	1676	68.8	1.9	0.0	0.0	242.3	6.9	311.155	8.8	28253.69	800.05	3733.86	346.88	265.83	262.01	
65.0	1651	117.0	3.3	0.0	0.0	223.1	6.3	340.067	9.6	27942.53	791.24	4080.80	379.11	265.75	261.98	
64.0	1626	155.7	4.4	0.0	0.0	207.6	5.9	363.259	10.3	27602.47	781.61	4359.10	404.96	265.66	261.96	
63.0	1600	194.8	5.5	0.0	0.0	191.9	5.4	386.763	11.0	27239.21	771.33	4641.15	431.16	265.58	261.93	
62.0	1575	214.9	6.1	0.0	0.0	183.9	5.2	398.827	11.3	26852.44	760.38	4785.92	444.61	265.50	261.90	
61.0	1549	234.5	6.6	0.0	0.0	176.1	5.0	410.579	11.6	26453.62	749.08	4926.94	457.71	265.41	261.88	
60.0	1524	264.2	7.5	0.0	0.0	164.2	4.6	428.363	12.1	26043.04	737.46	5140.35	477.54	265.33	261.85	
59.0	1499	264.7	7.5	0.0	0.0	164.0	4.6	428.675	12.1	25614.68	725.33	5144.10	477.89	265.25	261.83	
58.0	1473	284.8	8.1	0.0	0.0	156.0	4.4	440.739	12.5	25186.00	713.19	5288.86	491.34	265.16	261.80	
57.0	1448	294.8	8.3	0.0	0.0	151.9	4.3	446.771	12.7	24745.26	700.71	5361.25	498.06	265.08	261.78	
56.0	1422	305.4	8.6	0.0	0.0	147.7	4.2	453.115	12.8	24298.49	688.06	5437.38	505.13	265.00	261.75	
55.0	1397	325.5	9.2	0.0	0.0	139.7	4.0	465.179	13.2	23845.38	675.22	5582.14	518.58	264.91	261.73	
54.0	1372	336.1	9.5	0.0	0.0	135.4	3.8	471.523	13.4	23380.20	662.05	5658.27	525.65	264.83	261.70	
53.0	1346	347.2	9.8	0.0	0.0	131.0	3.7	478.179	13.5	22908.68	648.70	5738.14	533.07	264.75	261.68	
52.0	1321	348.2	9.9	0.0	0.0	130.6	3.7	478.803	13.6	22430.50	635.16	5745.63	533.77	264.66	261.65	
51.0	1295	358.8	10.2	0.0	0.0	126.3	3.6	485.147	13.7	21951.69	621.60	5821.76	540.84	264.58	261.63	
50.0	1270	368.9	10.4	0.0	0.0	122.3	3.5	491.179	13.9	21466.55	607.86	5894.14	547.57	264.50	261.60	
49.0	1245	379.4	10.7	0.0	0.0	118.1	3.3	497.523	14.1	20975.37	593.96	5970.27	554.64	264.41	261.57	
48.0	1219	390.0	11.0	0.0	0.0	113.9	3.2	503.867	14.3	20477.85	579.87	6046.40	561.71	264.33	261.55	
47.0	1194	390.5	11.1	0.0	0.0	113.7	3.2	504.179	14.3	19973.98	565.60	6050.14	562.06	264.25	261.52	
46.0	1168	401.1	11.4	0.0	0.0	109.4	3.1	510.523	14.5	19469.80	551.32	6126.27	569.13	264.16	261.50	
45.0	1143	401.6	11.4	0.0	0.0	109.2	3.1	510.835	14.5	18959.28	536.87	6130.02	569.48	264.08	261.47	
44.0	1118	411.7	11.7	0.0	0.0	105.2	3.0	516.867	14.6	18448.44	522.40	6202.40	576.20	264.00	261.45	
43.0	1092	412.7	11.7	0.0	0.0	104.8	3.0	517.491	14.7	17931.58	507.76	6209.89	576.90	263.91	261.42	
42.0	1067	413.2	11.7	0.0	0.0	104.6	3.0	517.803	14.7	17414.09	493.11	6213.63	577.25	263.83	261.40	
41.0	1041	423.8	12.0	0.0	0.0	100.3	2.8	524.147	14.8	16896.28	478.45	6289.76	584.32	263.75	261.37	
40.0	1016	424.3	12.0	0.0	0.0	100.1	2.8	524.459	14.9	16372.14	463.61	6293.50	584.67	263.66	261.35	
39.0	991	425.4	12.0	0.0	0.0	99.7	2.8	525.083	14.9	15847.68	448.76	6300.99	585.36	263.58	261.32	
38.0	965	435.4	12.3	0.0	0.0	95.7	2.7	531.115	15.0	15322.60	433.89	6373.38	592.09	263.50	261.30	
37.0	940	435.9	12.3	0.0	0.0	95.5	2.7	531.427	15.0	14791.48	418.85	6377.12	592.43	263.41	261.27	
36.0	914	446.0	12.6	0.0	0.0	91.5	2.6	537.459	15.2	14260.05	403.80	6449.50	599.16	263.33	261.24	
35.0	889	447.0	12.7	0.0	0.0	91.1	2.6	538.083	15.2	13722.60	388.58	6456.99	599.85	263.25	261.22	
34.0	864	457.1	12.9	0.0	0.0	87.0	2.5	544.115	15.4	13184.51	373.34	6529.38	606.58	263.16	261.19	
33.0	838	457.6	13.0	0.0	0.0	86.8	2.5	544.427	15.4	12640.40	357.94	6533.12	606.93	263.08	261.17	
32.0	813	458.1	13.0	0.2	0.0	86.6	2.5	544.829	15.4	12095.97	342.52	6537.94	607.37	263.00	261.14	
31.0	787	458.6	13.0	1.2	0.0	85.9	2.4	545.748	15.5	11551.14	327.09	6548.98	608.40	262.91	261.12	
30.0	762	469.2	13.3	2.3	0.1	81.3	2.3	552.745	15.7	11005.40	311.64	6632.94	616.20	262.83	261.09	
29.0	737	469.7	13.3	2.7	0.1	80.9	2.3	553.349	15.7	10452.65	295.99	6640.19	616.87	262.75	261.07	
28.0	711	470.8	13.3	3.0	0.1	80.3	2.3	554.153	15.7	9899.30	280.32	6649.84	617.77	262.66	261.04	
27.0	686	471.3	13.3	3.2	0.1	80.1	2.3	554.555	15.7	9345.15	264.62	6654.66	618.22	262.58	261.02	
26.0	660	481.3	13.6	3.3	0.1	76.0	2.2	560.677	15.9	8790.59	248.92	6728.13	625.04	262.50	260.99	
25.0	635	481.9	13.6	3.5	0.1	75.7	2.1	561.079	15.9	8229.92	233.04	6732.95	625.49	262.41	260.97	
24.0	610	491.4	13.9	3.6	0.1	71.9	2.0	566.844	16.1	7668.84	217.16	6802.13	631.92	262.33	260.94	
23.0	584	491.9	13.9	3.6	0.1	71.6	2.0	567.201	16.1	7101.99	201.11	6806.41	632.32	262.25	260.91	
22.0	559	492.4	13.9	3.7	0.1	71.4	2.0	567.558	16.1	6534.79	185.04	6810.70	632.71	262.16	260.89	
21.0	533	496.1	14.0	4.0	0.1	69.8	2.0	569.900	16.1	5967.23	168.97	6838.80	635.32	262.08	260.86	
20.0	508	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	5397.33	152.84	3238.40	300.85	262.00	260.84	Bottom of Chamber Elevation
19.0	483	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	5127.47	145.19	3238.40	300.85	261.91	260.81	
18.0	457	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	4857.60	137.55	3238.40	300.85	261.83	260.79	
17.0	432	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	4587.73	129.91	3238.40	300.85	261.75	260.76	
16.0	406	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	4317.87	122.27	3238.40	300.85	261.66	260.74	
15.0	381	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	4048.00	114.63	3238.40	300.85	261.58	260.71	
14.0	356	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	3778.13	106.98	3238.40	300.85	261.50	260.69	
13.0	330	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	3508.27	99.34	3238.40	300.85	261.41	260.66	
12.0	305	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	3238.40	91.70	3238.40	300.85	261.33	260.63	
11.0	279	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	2968.53	84.06	3238.40	300.85	261.25	260.61	
10.0	254	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	2698.67	76.42	3238.40	300.85	261.16	260.58	
9.0	229	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	2428.80	68.78	3238.40	300.85	261.08	260.56	
8.0	203	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	2158.93	61.13	3238.40	300.85	261.00	260.53	
7.0	178	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	1889.07	53.49	3238.40	300.85	260.91	260.51	
6.0	152	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	1619.20	45.85	3238.40	300.85	260.83	260.48	
5.0	127	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	1349.33	38.21	3238.40	300.85	260.75	260.46	
4.0	102	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	1079.47	30.57	3238.40	300.85	260.66	260.43	
3.0	76	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	809.60	22.93	3238.40	300.85	260.58	260.41	
2.0	51	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	539.73	15.28	3238.40	300.85	260.50	260.38	
1.0	25	0.0	0.0	0.0	0.0	269.9	7.6	269.867	7.6	269.87	7.64	3238.40	300.85	260.41	260.36	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	260.33	260.33	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																

CULTEC Stormwater Design Calculator

Date:	September 30, 2024

Project Information:

Calculations Performed By:

RECHARGER 902HD

Recharger 902HD Chamber Specifications		
Height	**1219**	mm
Width	**1981**	mm
Length	**1.25**	meters
Installed Length	**1.12**	meters
Bare Chamber Volume	**1.80**	cu. meters
Installed Chamber Volume	**3.09**	cu. meters

Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**523.74**	cu. meters
Within Stone	**405.51**	cu. meters
Total Storage Provided	**929.2**	**cu. meters**
Total Storage Required	923.00	cu. meters

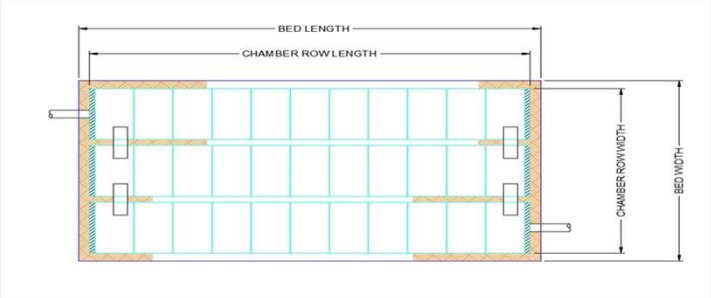
Materials List

Recharger 902HD		
Total Number of Chambers Required	**288**	**pieces**
Separator Row Chambers	**48**	pieces
Chamber Units	**288**	pieces
End Caps	**12**	pieces
HVLV FC-48 Feed Connectors	**10**	pieces
CULTEC No. 410 Non-Woven Geotextile	**2243**	sq. meters
CULTEC AFAB-HPF Woven Geotextile	**85**	meters
Stone	**1014**	cu. meters

Separator Row Qty Included in Total

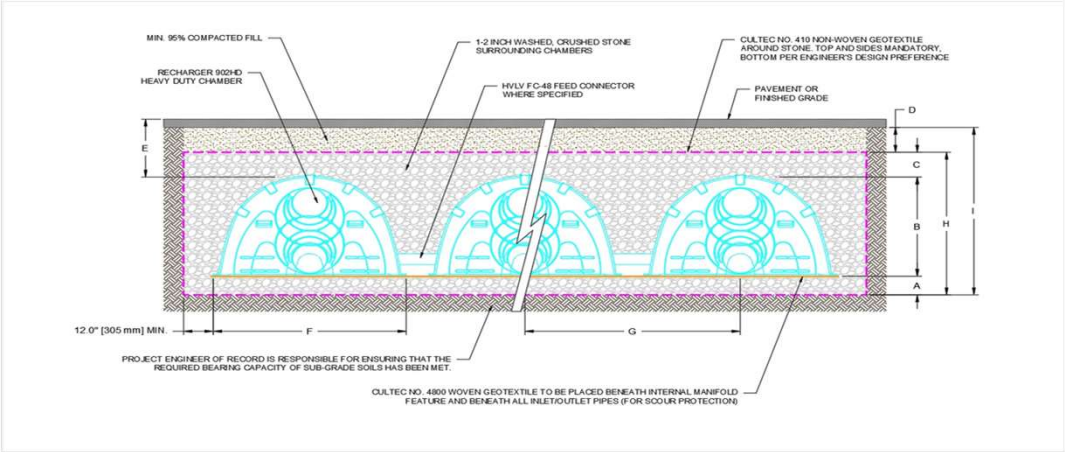
Based on 2 Internal Manifolds

Bed Detail



Bed Layout Information		
Number of Rows Wide	**6**	pieces
Number of Chambers Long	**48**	pieces
Chamber Row Width	**13.03**	meters
Chamber Row Length	**54.86**	meters
Bed Width	**13.64**	meters
Bed Length	**55.47**	meters
Bed Area Required	**756.65**	sq. meters
Length of Separator Row	**54.86**	meters

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**500**	mm
B	Chamber Height	**1219**	mm
C	Depth of Stone Above Units	**305**	mm
D	Depth of 95% Compacted Fill	**305**	mm
E	Max. Depth Allowed Above the Chamber	**2.54**	meters
F	Chamber Width	**1981**	mm
G	Center to Center Spacing	**2.21**	meters
H	Effective Depth	**2.03**	meters
I	Bed Depth	**2.34**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	September 30, 2024

Project Information:

Project Number: 0

Chamber Model -	**Recharger 902HD**	
Number of Rows-	6	units
Total Number of Chambers -	288	units
Stone Void -	40	%
Stone Base -	500	mm
Stone Above Units -	305	mm
Area -	756.65	m2
Base of Stone Elevation -	261.00	

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft³	m³	ft3	m3	ft³	m³	ft³	m³	ft³	m³	ft²	m²	ft	m	
80.0	2032	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	32820.14	929.36	3257.80	302.65	267.67	263.03	Top of Stone Elevation
79.0	2007	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	32548.65	921.67	3257.80	302.65	267.58	263.01	
78.0	1981	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	32277.17	913.99	3257.80	302.65	267.50	262.98	
77.0	1956	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	32005.69	906.30	3257.80	302.65	267.42	262.96	
76.0	1930	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	31734.20	898.61	3257.80	302.65	267.33	262.93	
75.0	1905	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	31462.72	890.92	3257.80	302.65	267.25	262.91	
74.0	1880	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	31191.24	883.24	3257.80	302.65	267.17	262.88	
73.0	1854	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	30919.75	875.55	3257.80	302.65	267.08	262.85	
72.0	1829	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	30648.27	867.86	3257.80	302.65	267.00	262.83	
71.0	1803	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	30376.79	860.17	3257.80	302.65	266.92	262.80	
70.0	1778	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	30105.30	852.49	3257.80	302.65	266.83	262.78	
69.0	1753	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	29833.82	844.80	3257.80	302.65	266.75	262.75	
68.0	1727	21.4	0.6	0.0	0.0	262.9	7.4	284.299	8.1	29562.34	837.11	3411.59	316.94	266.67	262.73	Top of Chamber Elevation
67.0	1702	53.2	1.5	0.0	0.0	250.2	7.1	303.379	8.6	29278.04	829.06	3640.55	338.21	266.58	262.70	
66.0	1676	74.4	2.1	0.0	0.0	241.7	6.8	316.123	9.0	28974.66	820.47	3793.48	352.41	266.50	262.68	
65.0	1651	127.3	3.6	0.0	0.0	220.6	6.2	347.875	9.9	28658.53	811.52	4174.50	387.81	266.42	262.65	
64.0	1626	169.7	4.8	0.0	0.0	203.6	5.8	373.291	10.6	28310.66	801.67	4479.50	416.15	266.33	262.63	
63.0	1600	212.2	6.0	0.0	0.0	186.6	5.3	398.779	11.3	27937.37	791.10	4785.35	444.56	266.25	262.60	
62.0	1575	233.5	6.6	0.0	0.0	178.1	5.0	411.595	11.7	27538.59	779.80	4939.14	458.85	266.17	262.57	
61.0	1549	254.8	7.2	0.0	0.0	169.6	4.8	424.339	12.0	27126.99	768.15	5092.07	473.05	266.08	262.55	
60.0	1524	286.7	8.1	0.0	0.0	156.8	4.4	443.491	12.6	26702.65	756.13	5321.90	494.40	266.00	262.52	
59.0	1499	286.8	8.1	0.0	0.0	156.8	4.4	443.563	12.6	26259.16	743.58	5322.76	494.48	265.92	262.50	
58.0	1473	308.2	8.7	0.0	0.0	148.2	4.2	456.379	12.9	25815.60	731.02	5476.55	508.77	265.83	262.47	
57.0	1448	318.8	9.0	0.0	0.0	143.9	4.1	462.787	13.1	25359.22	718.09	5553.45	515.92	265.75	262.45	
56.0	1422	329.6	9.3	0.0	0.0	139.6	4.0	469.267	13.3	24896.43	704.99	5631.21	523.14	265.67	262.42	
55.0	1397	351.0	9.9	0.0	0.0	131.1	3.7	482.083	13.7	24427.16	691.70	5785.00	537.43	265.58	262.40	
54.0	1372	361.8	10.2	0.0	0.0	126.8	3.6	488.563	13.8	23945.08	678.05	5862.76	544.65	265.50	262.37	
53.0	1346	372.7	10.6	0.0	0.0	122.4	3.5	495.115	14.0	23456.52	664.21	5941.38	551.95	265.42	262.35	
52.0	1321	373.0	10.6	0.0	0.0	122.3	3.5	495.259	14.0	22961.40	650.19	5943.11	552.12	265.33	262.32	
51.0	1295	383.8	10.9	0.0	0.0	118.0	3.3	501.739	14.2	22466.14	636.17	6020.87	559.34	265.25	262.30	
50.0	1270	394.4	11.2	0.0	0.0	113.7	3.2	508.147	14.4	21964.40	621.96	6097.77	566.48	265.17	262.27	
49.0	1245	405.2	11.5	0.0	0.0	109.4	3.1	514.627	14.6	21456.26	607.57	6175.53	573.71	265.08	262.24	
48.0	1219	416.0	11.8	0.0	0.0	105.1	3.0	521.107	14.8	20941.63	593.00	6253.29	580.93	265.00	262.22	
47.0	1194	416.2	11.8	0.0	0.0	105.0	3.0	521.179	14.8	20420.52	578.24	6254.15	581.01	264.92	262.19	
46.0	1168	427.0	12.1	0.0	0.0	100.7	2.9	527.659	14.9	19899.34	563.49	6331.91	588.23	264.83	262.17	
45.0	1143	427.1	12.1	0.0	0.0	100.7	2.9	527.731	14.9	19371.68	548.54	6332.78	588.31	264.75	262.14	
44.0	1118	437.8	12.4	0.0	0.0	96.4	2.7	534.139	15.1	18843.95	533.60	6409.67	595.46	264.67	262.12	
43.0	1092	438.0	12.4	0.0	0.0	96.3	2.7	534.283	15.1	18309.81	518.48	6411.40	595.62	264.58	262.09	
42.0	1067	438.1	12.4	0.0	0.0	96.2	2.7	534.355	15.1	17775.53	503.35	6412.26	595.70	264.50	262.07	
41.0	1041	448.9	12.7	0.0	0.0	91.9	2.6	540.835	15.3	17241.17	488.21	6490.02	602.92	264.42	262.04	
40.0	1016	449.0	12.7	0.0	0.0	91.9	2.6	540.907	15.3	16700.34	472.90	6490.89	603.00	264.33	262.02	
39.0	991	449.3	12.7	0.0	0.0	91.8	2.6	541.051	15.3	16159.43	457.58	6492.62	603.16	264.25	261.99	
38.0	965	460.0	13.0	0.0	0.0	87.5	2.5	547.459	15.5	15618.38	442.26	6569.51	610.31	264.17	261.97	
37.0	940	460.1	13.0	0.0	0.0	87.5	2.5	547.531	15.5	15070.92	426.76	6570.38	610.39	264.08	261.94	
36.0	914	470.8	13.3	0.0	0.0	83.2	2.4	553.939	15.7	14523.39	411.26	6647.27	617.53	264.00	261.91	
35.0	889	471.0	13.3	0.0	0.0	83.1	2.4	554.083	15.7	13969.45	395.57	6649.00	617.69	263.92	261.89	
34.0	864	481.7	13.6	0.0	0.0	78.8	2.2	560.491	15.9	13415.37	379.88	6725.90	624.84	263.83	261.86	
33.0	838	481.8	13.6	0.0	0.0	78.8	2.2	560.563	15.9	12854.87	364.01	6726.76	624.92	263.75	261.84	
32.0	813	481.9	13.6	0.0	0.0	78.7	2.2	560.653	15.9	12294.31	348.14	6727.84	625.02	263.67	261.81	
31.0	787	482.0	13.6	0.2	0.0	78.6	2.2	560.847	15.9	11733.66	332.26	6730.16	625.23	263.58	261.79	
30.0	762	492.8	14.0	0.5	0.0	74.2	2.1	567.457	16.1	11172.81	316.38	6809.49	632.60	263.50	261.76	
29.0	737	493.0	14.0	0.5	0.0	74.1	2.1	567.588	16.1	10605.35	300.31	6811.05	632.75	263.42	261.74	
28.0	711	493.2	14.0	0.6	0.0	74.0	2.1	567.768	16.1	10037.77	284.24	6813.21	632.95	263.33	261.71	
27.0	686	493.3	14.0	0.6	0.0	73.9	2.1	567.858	16.1	9470.00	268.16	6814.29	633.05	263.25	261.69	
26.0	660	504.0	14.3	0.7	0.0	69.6	2.0	574.284	16.3	8902.14	252.08	6891.41	640.21	263.17	261.66	
25.0	635	504.1	14.3	0.7	0.0	69.6	2.0	574.374	16.3	8327.86	235.82	6892.49	640.31	263.08	261.64	
24.0	610	514.7	14.6	0.7	0.0	65.3	1.8	580.719	16.4	7753.48	219.55	6968.63	647.39	263.00	261.61	
23.0	584	514.8	14.6	0.7	0.0	65.3	1.8	580.800	16.4	7172.76	203.11	6969.60	647.48	262.92	261.58	
22.0	559	514.9	14.6	0.7	0.0	65.2	1.8	580.881	16.4	6591.96	186.66	6970.57	647.57	262.83	261.56	
21.0	533	515.8	14.6	0.8	0.0	64.9	1.8	581.416	16.5	6011.08	170.21	6977.00	648.16	262.75	261.53	
20.0	508	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	5429.67	153.75	3257.80	302.65	262.67	261.51	Bottom of Chamber Elevation
19.0	483	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	5158.18	146.06	3257.80	302.65	262.58	261.48	
18.0	457	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	4886.70	138.38	3257.80	302.65	262.50	261.46	
17.0	432	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	4615.22	130.69	3257.80	302.65	262.42	261.43	
16.0	406	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	4343.73	123.00	3257.80	302.65	262.33	261.41	
15.0	381	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	4072.25	115.31	3257.80	302.65	262.25	261.38	
14.0	356	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	3800.77	107.63	3257.80	302.65	262.17	261.36	
13.0	330	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	3529.28	99.94	3257.80	302.65	262.08	261.33	
12.0	305	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	3257.80	92.25	3257.80	302.65	262.00	261.30	
11.0	279	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	2986.32	84.56	3257.80	302.65	261.92	261.28	
10.0	254	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	2714.83	76.88	3257.80	302.65	261.83	261.25	
9.0	229	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	2443.35	69.19	3257.80	302.65	261.75	261.23	
8.0	203	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	2171.87	61.50	3257.80	302.65	261.67	261.20	
7.0	178	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	1900.38	53.81	3257.80	302.65	261.58	261.18	
6.0	152	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	1628.90	46.13	3257.80	302.65	261.50	261.15	
5.0	127	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	1357.42	38.44	3257.80	302.65	261.42	261.13	
4.0	102	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	1085.93	30.75	3257.80	302.65	261.33	261.10	
3.0	76	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	814.45	23.06	3257.80	302.65	261.25	261.08	
2.0	51	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	542.97	15.38	3257.80	302.65	261.17	261.05	
1.0	25	0.0	0.0	0.0	0.0	271.5	7.7	271.483	7.7	271.48	7.69	3257.80	302.65	261.08	261.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	261.00	261.00	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																

Recharger 902HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation	
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m
-14.0															
-15.0															
-16.0															
-17.0															
-18.0															
-19.0															
-20.0															
-21.0															
-22.0															
-23.0															
-24.0															
-25.0															
-26.0															
-27.0															
-28.0															
-29.0															
-30.0															
-31.0															
-32.0															
-33.0															
-34.0															
-35.0															
-36.0															
-37.0															
-38.0															
-39.0															
-40.0															
-41.0															
-42.0															
-43.0															
-44.0															

Project:	**Fieldgate Caledon**
Project #:	24045
Designed By:	T.G
Checked By:	T.F
Date:	8-Oct-2024

Infiltration Gallery - Infiltration Rate & Drawdown Time (Block A)

Infiltration Rate

Based on in-suti testing completed using a Guelph Permeameter, the mesaured field saturated hydraulic condutivity is approx $2.5x10^{-7}$ (Clayey Silt to Silty Clay)

From Gemtec Hydrogeological Investigation Report (dated June 19th) --> infiltration rate = 32 mm/hr

Design infiltration Rate has been used with a safety correction factor of 2.5

Design Infiltration Rate = 12.8 mm/hr

Infiltration Storage Required

Drainage Area	**7.27**	ha
Rainfall Depth (mm)	**12.30**	mm
Total Target Water Balance Volume	**894.21**	m^3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*	Effective Depth of Water (m)**	Weir Elevation (masl)***
Infiltration Gallery 1	782.68	0.0128	1959.96	25.09	24.2	0.31	264.27
Infiltration Gallery 2	152.83	0.0128	386.13	4.94	24.2	0.31	264.17
Total	**935.50**						

*Max allowable drawdown time = 72 hours (3 days)

**depth interpolated from Cultec stage-storage sheet and multiplied by void ratio (0.40)

***stage elevation at which infiltrated volume is achieved

Project:	**Fieldgate Caledon**
Project #:	24045
Designed By:	T.G
Checked By:	T.F
Date:	8-Oct-2024

Infiltration Gallery - Infiltration Rate & Drawdown Time (Block B)

Infiltration Rate

Based on in-suti testing completed using a Guelph Permeameter, the mesaured field saturated hydraulic condutivity is approx $2.5x10^{-7}$ (Clayey Silt to Silty Clay)

From Gemtec Hydrogeological Investigation Report (dated June 19th) --> infiltration rate = 32 mm/hr

Design infiltration Rate has been used with a safety correction factor of 2.5

Design Infiltration Rate = 12.8 mm/hr

Infiltration Storage Required

Drainage Area	**2.49**	ha
Rainfall Depth (mm)	**12.30**	mm
Total Target Water Balance Volume	**306.27**	m^3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*	Effective Depth of Water (m)**	Weir Elevation (masl)***
Infiltration Gallery 3	192.90	0.0128	485.42	6.21	24.2	0.31	263.27
Infiltration Gallery 4	131.80	0.0128	332.13	4.25	24.2	0.31	263.27
Total	**324.71**						

*Max allowable drawdown time = 72 hours (3 days)

**depth interpolated from Cultec stage-storage sheet and multiplied by void ratio (0.40)

***stage elevation at which infiltrated volume is achieved

Project:	**Fieldgate Caledon**
Project #:	24045
Designed By:	T.G
Checked By:	T.F
Date:	8-Oct-2024

Infiltration Gallery - Infiltration Rate & Drawdown Time (Block C)

Infiltration Rate

Based on in-suti testing completed using a Guelph Permeameter, the mesaured field saturated hydraulic condutivity is approx 2.5x10^-7 (Clayey Silt to Silty Clay)

From Gemtec Hydrogeological Investigation Report (dated June 19th) --> infiltration rate = 32 mm/hr

Design infiltration Rate has been used with a safety correction factor of 2.5

Design Infiltration Rate = 12.8 mm/hr

Infiltration Storage Required

Drainage Area	**2.78**	ha
Rainfall Depth (mm)	**12.30**	mm
Total Target Water Balance Volume	**341.94**	m^3

	Vol of Infiltration (m^3)	Infiltration Rate (m/hr)	Area of Infiltration (m^2)	Infiltration Vol. Rate (m^3/hr)	Drawdown Time (hrs)*	Effective Depth of Water (m)**	Weir Elevation (masl)***
Infiltration Gallery 5	348.27	0.0128	873.87	11.19	24.2	0.31	264.77
Total	**348.27**						

*Max allowable drawdown time = 72 hours (3 days)

**depth interpolated from Cultec stage-storage sheet and multiplied by void ratio (0.40)

***stage elevation at which infiltrated volume is achieved

Project:	**Fieldgate Caledon**
Project #:	24045
Designed By:	L.P.
Checked By:	T.F
Date:	8-Oct-2024

Overcompensating Shortfalls

	Total Area (ha)	Captured Area (ha)	Retained Volume (m3)	Required Retention Depth (mm)	Retention Depth of Captured Area (mm)
Block A	7.27	3.12	935.50	12.3	30.0
Block B	2.49	2.12	324.71	12.3	15.3
Block C	2.78	1.28	348.27	12.3	27.2
Total	**12.54**	**6.52**	**1608.48**	**12.3**	**24.7**

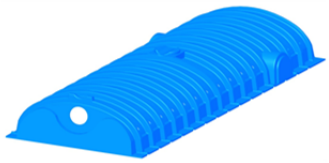
CULTEC Stormwater Design Calculator

Date:	October 08, 2024

Project Information:

Calculations Performed By:

CONTACTOR 100HD



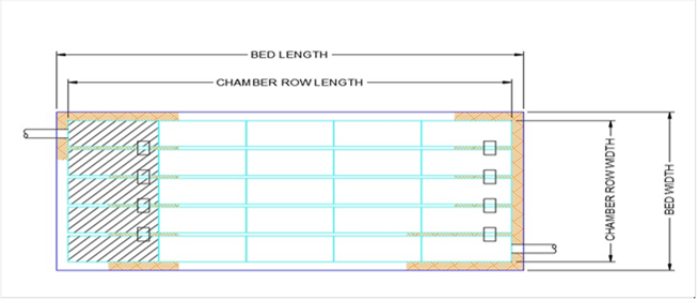
Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**1.05**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**292.21**	cu. meters
Within Stone	**490.47**	cu. meters
Total Storage Provided	**782.7**	**cu. meters**
Total Storage Required	730.00	cu. meters

Materials List

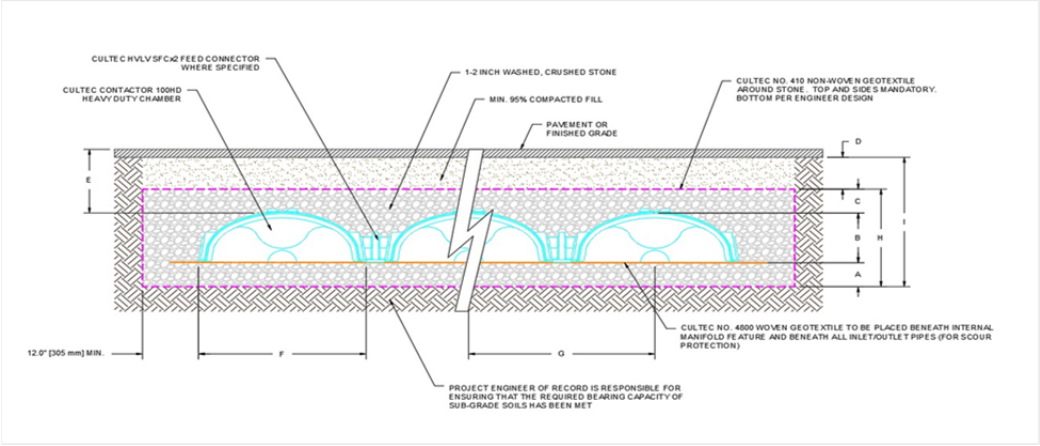
Contactor 100HD			
Total Number of Chambers Required	**728**	**pieces**	
Separator Row Chambers	**14**	pieces	Separator Row Qty Included in Total
Starter Chambers	**52**	pieces	
End Chambers	**676**	pieces	
HVLV SFCx2 Feed Connectors	**102**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**5079**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**153**	meters	
Stone	**1226**	cu. meters	

Bed Detail



Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**52**	pieces
Number of Chambers Long	**14**	pieces
Chamber Row Width	**59.21**	meters
Chamber Row Length	**32.16**	meters
Bed Width	**59.82**	meters
Bed Length	**32.77**	meters
Bed Area Required	**1959.96**	sq. meters
Length of Separator Row	**32.16**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**300**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.14**	meters
H	Effective Depth	**0.77**	meters
I	Bed Depth	**0.98**	meters

CULTEC Stage-Storage Calculations

Date:	October 8, 2024

Project Information:

Project Number: 0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	52	units
Total Number of Chambers -	728	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	300	mm
Area -	1959.96	m2
Base of Stone Elevation -	263.50	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
30.5	775	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	27650.33	782.97	8438.75	783.96	266.04	264.27	Top of Stone Elevation
29.5	749	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	26947.10	763.06	8438.75	783.96	265.96	264.25	
28.5	724	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	26243.87	743.14	8438.75	783.96	265.88	264.22	
27.5	699	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	25540.64	723.23	8438.75	783.96	265.79	264.20	
26.5	673	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	24837.41	703.32	8438.75	783.96	265.71	264.17	
25.5	648	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	24134.18	683.40	8438.75	783.96	265.63	264.15	
24.5	622	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	23430.95	663.49	8438.75	783.96	265.54	264.12	
23.5	597	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	22727.72	643.58	8438.75	783.96	265.46	264.10	
22.5	572	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	22024.49	623.66	8438.75	783.96	265.38	264.07	
21.5	546	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	21321.27	603.75	8438.75	783.96	265.29	264.05	
20.5	521	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	20618.04	583.84	8438.75	783.96	265.21	264.02	
19.5	495	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	19914.81	563.92	8438.75	783.96	265.13	264.00	
18.5	470	0.5	0.0	0.0	0.0	351.4	10.0	351.944	10.0	19211.58	544.01	4223.32	392.35	265.04	263.97	Top of Chamber Elevation
18.0	457	131.7	3.7	0.0	0.0	650.6	18.4	782.228	22.2	18859.63	534.04	9386.73	872.03	265.00	263.96	
17.0	432	367.6	10.4	0.0	0.0	556.2	15.7	923.766	26.2	18077.41	511.89	11085.20	1029.81	264.92	263.93	
16.0	406	603.5	17.1	0.0	0.0	461.8	13.1	1,065.305	30.2	17153.64	485.74	12783.66	1187.60	264.83	263.91	
15.0	381	762.6	21.6	0.0	0.0	398.2	11.3	1,160.762	32.9	16088.34	455.57	13929.14	1294.02	264.75	263.88	
14.0	356	872.3	24.7	0.0	0.0	354.3	10.0	1,226.639	34.7	14927.57	422.70	14719.67	1367.46	264.67	263.86	
13.0	330	954.6	27.0	0.3	0.0	321.4	9.1	1,276.255	36.1	13700.93	387.97	15315.06	1422.77	264.58	263.83	
12.0	305	1,009.4	28.6	1.0	0.0	299.5	8.5	1,309.929	37.1	12424.68	351.83	15719.14	1460.31	264.50	263.80	
11.0	279	1,053.3	29.8	1.4	0.0	281.9	8.0	1,336.611	37.8	11114.75	314.73	16039.33	1490.05	264.42	263.78	
10.0	254	1,113.7	31.5	1.5	0.0	257.8	7.3	1,372.959	38.9	9778.14	276.89	16475.50	1530.57	264.33	263.75	
9.0	229	1,113.7	31.5	1.6	0.0	257.8	7.3	1,373.041	38.9	8405.18	238.01	16476.49	1530.67	264.25	263.73	
8.0	203	1,113.7	31.5	1.7	0.0	257.8	7.3	1,373.122	38.9	7032.14	199.13	16477.46	1530.76	264.17	263.70	
7.0	178	1,223.4	34.6	2.4	0.1	213.9	6.1	1,439.644	40.8	5659.02	160.25	17275.72	1604.91	264.08	263.68	
6.0	152	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	4219.38	119.48	8438.75	783.96	264.00	263.65	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	3516.15	99.57	8438.75	783.96	263.92	263.63	
4.0	102	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	2812.92	79.65	8438.75	783.96	263.83	263.60	
3.0	76	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	2109.69	59.74	8438.75	783.96	263.75	263.58	
2.0	51	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	1406.46	39.83	8438.75	783.96	263.67	263.55	
1.0	25	0.0	0.0	0.0	0.0	703.2	19.9	703.229	19.9	703.23	19.91	8438.75	783.96	263.58	263.53	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	263.50	263.50	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																
-40.0																
-41.0																
-42.0																
-43.0																
-44.0																
-45.0																
-46.0																
-47.0																
-48.0																
-49.0																
-50.0																
-51.0																
-52.0																
-53.0																
-54.0																
-55.0																
-56.0																
-57.0																
-58.0																
-59.0																
-60.0																
-61.0																
-62.0																
-63.0																
-64.0																
-65.0																

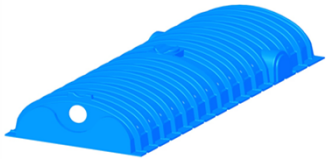
CULTEC Stormwater Design Calculator

Date:	October 08, 2024

Project Information:

Calculations Performed By:

CONTACTOR 100HD



Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**1.05**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**55.29**	cu. meters
Within Stone	**97.54**	cu. meters
Total Storage Provided	**152.8**	**cu. meters**
Total Storage Required	150.00	cu. meters

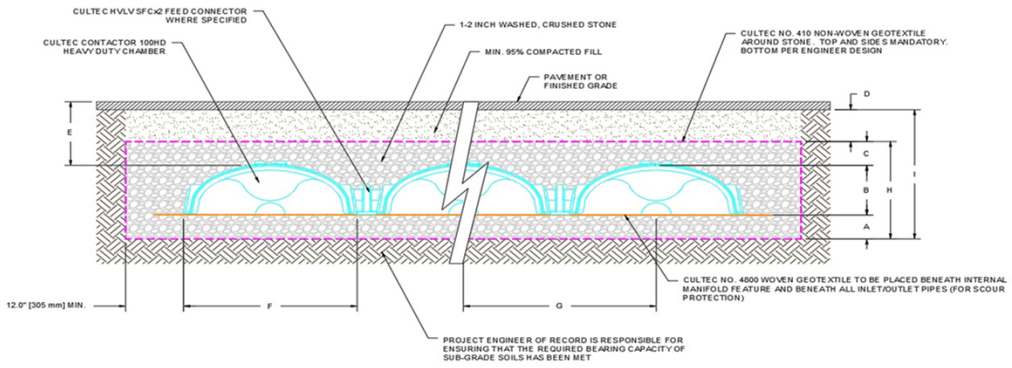
Materials List

Contactor 100HD			
Total Number of Chambers Required	**138**	**pieces**	
Separator Row Chambers	**23**	pieces	Separator Row Qty Included in Total
Starter Chambers	**6**	pieces	
End Chambers	**132**	pieces	
HVLV SFCx2 Feed Connectors	**10**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1083**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**70**	meters	
Stone	**244**	cu. meters	

Bed Detail

Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**6**	pieces
Number of Chambers Long	**23**	pieces
Chamber Row Width	**6.63**	meters
Chamber Row Length	**52.73**	meters
Bed Width	**7.24**	meters
Bed Length	**53.34**	meters
Bed Area Required	**386.13**	sq. meters
Length of Separator Row	**52.73**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**300**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.14**	meters
H	Effective Depth	**0.77**	meters
I	Bed Depth	**0.98**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	October 8, 2024

Project Information:

Project Number: 0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	6	units
Total Number of Chambers -	138	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	300	mm
Area -	386.13	m2
Base of Stone Elevation -	263.40	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
30.5	775	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	5398.05	152.86	1662.50	154.45	265.94	264.17	Top of Stone Elevation
29.5	749	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	5259.51	148.93	1662.50	154.45	265.86	264.15	
28.5	724	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	5120.97	145.01	1662.50	154.45	265.78	264.12	
27.5	699	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4982.43	141.09	1662.50	154.45	265.69	264.10	
26.5	673	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4843.88	137.16	1662.50	154.45	265.61	264.07	
25.5	648	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4705.34	133.24	1662.50	154.45	265.53	264.05	
24.5	622	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4566.80	129.32	1662.50	154.45	265.44	264.02	
23.5	597	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4428.26	125.39	1662.50	154.45	265.36	264.00	
22.5	572	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4289.72	121.47	1662.50	154.45	265.28	263.97	
21.5	546	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4151.18	117.55	1662.50	154.45	265.19	263.95	
20.5	521	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	4012.63	113.62	1662.50	154.45	265.11	263.92	
19.5	495	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	3874.09	109.70	1662.50	154.45	265.03	263.90	
18.5	470	0.1	0.0	0.0	0.0	69.2	2.0	69.333	2.0	3735.55	105.78	832.00	77.29	264.94	263.87	Top of Chamber Elevation
18.0	457	24.9	0.7	0.0	0.0	128.6	3.6	153.489	4.3	3666.22	103.82	1841.87	171.11	264.90	263.86	
17.0	432	69.5	2.0	0.0	0.0	110.7	3.1	180.269	5.1	3512.73	99.47	2163.23	200.96	264.82	263.83	
16.0	406	114.2	3.2	0.0	0.0	92.9	2.6	207.050	5.9	3332.46	94.36	2484.60	230.82	264.73	263.81	
15.0	381	144.3	4.1	0.0	0.0	80.8	2.3	225.111	6.4	3125.41	88.50	2701.33	250.95	264.65	263.78	
14.0	356	165.0	4.7	0.0	0.0	72.5	2.1	237.571	6.7	2900.30	82.13	2850.86	264.84	264.57	263.76	
13.0	330	180.6	5.1	0.0	0.0	66.3	1.9	246.937	7.0	2662.73	75.40	2963.24	275.29	264.48	263.73	
12.0	305	191.0	5.4	0.1	0.0	62.1	1.8	253.239	7.2	2415.79	68.41	3038.87	282.31	264.40	263.70	
11.0	279	199.3	5.6	0.1	0.0	58.8	1.7	258.256	7.3	2162.55	61.24	3099.07	287.90	264.32	263.68	
10.0	254	210.7	6.0	0.2	0.0	54.3	1.5	265.121	7.5	1904.30	53.92	3181.45	295.56	264.23	263.65	
9.0	229	210.7	6.0	0.2	0.0	54.3	1.5	265.129	7.5	1639.18	46.42	3181.54	295.57	264.15	263.63	
8.0	203	210.7	6.0	0.2	0.0	54.3	1.5	265.137	7.5	1374.05	38.91	3181.64	295.57	264.07	263.60	
7.0	178	231.5	6.6	0.2	0.0	46.0	1.3	277.660	7.9	1108.91	31.40	3331.92	309.54	263.98	263.58	
6.0	152	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	831.25	23.54	1662.50	154.45	263.90	263.55	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	692.71	19.62	1662.50	154.45	263.82	263.53	
4.0	102	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	554.17	15.69	1662.50	154.45	263.73	263.50	
3.0	76	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	415.63	11.77	1662.50	154.45	263.65	263.48	
2.0	51	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	277.08	7.85	1662.50	154.45	263.57	263.45	
1.0	25	0.0	0.0	0.0	0.0	138.5	3.9	138.542	3.9	138.54	3.92	1662.50	154.45	263.48	263.43	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	263.40	263.40	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																
-40.0																
-41.0																
-42.0																
-43.0																
-44.0																
-45.0																
-46.0																
-47.0																
-48.0																
-49.0																
-50.0																
-51.0																
-52.0																
-53.0																
-54.0																
-55.0																
-56.0																
-57.0																
-58.0																
-59.0																
-60.0																
-61.0																
-62.0																
-63.0																
-64.0																
-65.0																

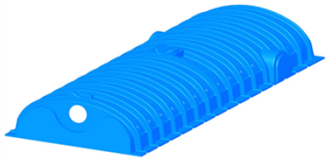
CULTEC Stormwater Design Calculator

Date:	October 08, 2024

Project Information:

Calculations Performed By:

CONTACTOR 100HD



Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**1.05**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**70.57**	cu. meters
Within Stone	**122.19**	cu. meters
Total Storage Provided	**192.8**	**cu. meters**
Total Storage Required	181.00	cu. meters

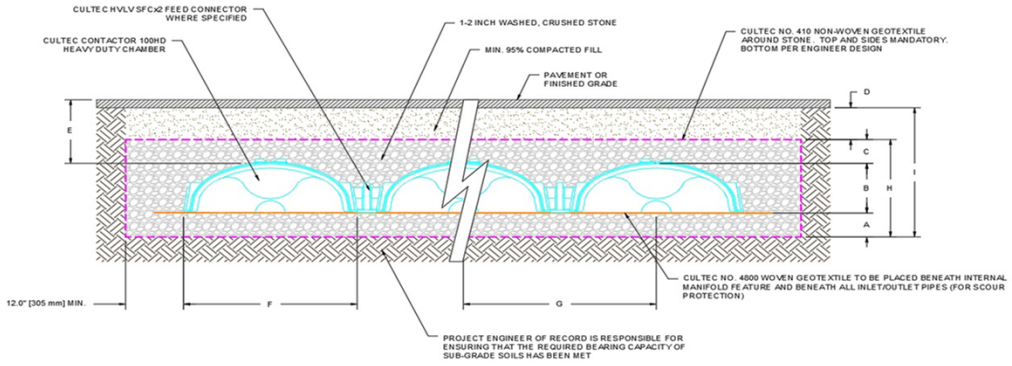
Materials List

Contactor 100HD			
Total Number of Chambers Required	**175**	**pieces**	
Separator Row Chambers	**7**	pieces	Separator Row Qty Included in Total
Starter Chambers	**25**	pieces	
End Chambers	**150**	pieces	
HVLV SFCx2 Feed Connectors	**48**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**1302**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**75**	meters	
Stone	**305**	cu. meters	

Bed Detail

Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**25**	pieces
Number of Chambers Long	**7**	pieces
Chamber Row Width	**28.35**	meters
Chamber Row Length	**16.15**	meters
Bed Width	**28.96**	meters
Bed Length	**16.76**	meters
Bed Area Required	**485.42**	sq. meters
Length of Separator Row	**16.15**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**300**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.14**	meters
H	Effective Depth	**0.77**	meters
I	Bed Depth	**0.98**	meters

CULTEC Stage-Storage Calculations

Date:	October 8, 2024

Project Information:

Project Number: 0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	25	units
Total Number of Chambers -	175	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	300	mm
Area -	485.42	m2
Base of Stone Elevation -	262.50	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
30.5	775	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	6812.27	192.90	2090.00	194.16	265.04	263.27	Top of Stone Elevation
29.5	749	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	6638.10	187.97	2090.00	194.16	264.96	263.25	
28.5	724	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	6463.93	183.04	2090.00	194.16	264.88	263.22	
27.5	699	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	6289.77	178.11	2090.00	194.16	264.79	263.20	
26.5	673	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	6115.60	173.17	2090.00	194.16	264.71	263.17	
25.5	648	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5941.43	168.24	2090.00	194.16	264.63	263.15	
24.5	622	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5767.27	163.31	2090.00	194.16	264.54	263.12	
23.5	597	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5593.10	158.38	2090.00	194.16	264.46	263.10	
22.5	572	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5418.93	153.45	2090.00	194.16	264.38	263.07	
21.5	546	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5244.77	148.52	2090.00	194.16	264.29	263.05	
20.5	521	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	5070.60	143.58	2090.00	194.16	264.21	263.02	
19.5	495	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	4896.43	138.65	2090.00	194.16	264.13	263.00	
18.5	470	0.1	0.0	0.0	0.0	87.0	2.5	87.163	2.5	4722.27	133.72	1045.95	97.17	264.04	262.97	Top of Chamber Elevation
18.0	457	31.8	0.9	0.0	0.0	161.4	4.6	193.247	5.5	4635.11	131.25	2318.96	215.43	264.00	262.96	
17.0	432	88.8	2.5	0.0	0.0	138.7	3.9	227.432	6.4	4441.86	125.78	2729.18	253.54	263.92	262.93	
16.0	406	145.8	4.1	0.0	0.0	115.9	3.3	261.617	7.4	4214.43	119.34	3139.40	291.65	263.83	262.91	
15.0	381	184.2	5.2	0.0	0.0	100.5	2.8	284.672	8.1	3952.81	111.93	3416.06	317.35	263.75	262.88	
14.0	356	210.7	6.0	0.0	0.0	89.9	2.5	300.593	8.5	3668.14	103.87	3607.12	335.10	263.67	262.86	
13.0	330	230.6	6.5	0.1	0.0	81.9	2.3	312.632	8.9	3367.55	95.36	3751.58	348.52	263.58	262.83	
12.0	305	243.8	6.9	0.5	0.0	76.6	2.2	320.938	9.1	3054.91	86.51	3851.26	357.78	263.50	262.80	
11.0	279	254.4	7.2	0.7	0.0	72.4	2.1	327.463	9.3	2733.98	77.42	3929.55	365.06	263.42	262.78	
10.0	254	269.0	7.6	0.7	0.0	66.6	1.9	336.274	9.5	2406.51	68.14	4035.29	374.88	263.33	262.75	
9.0	229	269.0	7.6	0.8	0.0	66.6	1.9	336.312	9.5	2070.24	58.62	4035.75	374.92	263.25	262.73	
8.0	203	269.0	7.6	0.8	0.0	66.6	1.9	336.351	9.5	1733.93	49.10	4036.21	374.96	263.17	262.70	
7.0	178	295.5	8.4	1.1	0.0	56.0	1.6	352.575	10.0	1397.58	39.57	4230.90	393.05	263.08	262.68	
6.0	152	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	1045.00	29.59	2090.00	194.16	263.00	262.65	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	870.83	24.66	2090.00	194.16	262.92	262.63	
4.0	102	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	696.67	19.73	2090.00	194.16	262.83	262.60	
3.0	76	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	522.50	14.80	2090.00	194.16	262.75	262.58	
2.0	51	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	348.33	9.86	2090.00	194.16	262.67	262.55	
1.0	25	0.0	0.0	0.0	0.0	174.2	4.9	174.167	4.9	174.17	4.93	2090.00	194.16	262.58	262.53	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	262.50	262.50	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																
-40.0																
-41.0																
-42.0																
-43.0																
-44.0																
-45.0																
-46.0																
-47.0																
-48.0																
-49.0																
-50.0																
-51.0																
-52.0																
-53.0																
-54.0																
-55.0																
-56.0																
-57.0																
-58.0																
-59.0																
-60.0																
-61.0																
-62.0																
-63.0																
-64.0																
-65.0																

CULTEC Stormwater Design Calculator

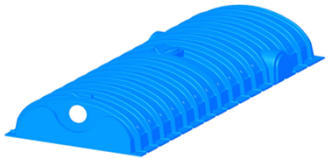
Date:	October 08, 2024

Project Information:

Calculations Performed By:

CONTACTOR 100HD

Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**1.05**	cu. meters



Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**47.99**	cu. meters
Within Stone	**83.72**	cu. meters
Total Storage Provided	**131.7**	**cu. meters**
Total Storage Required	125.00	cu. meters

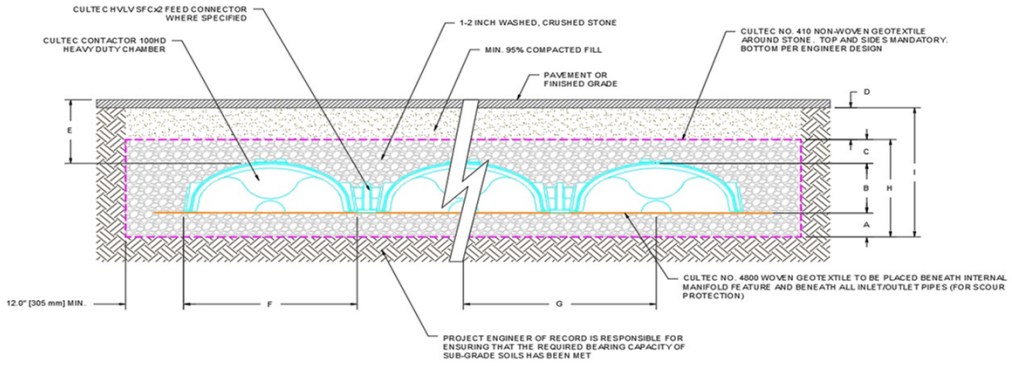
Materials List

Contactor 100HD			
Total Number of Chambers Required	**119**	**pieces**	
Separator Row Chambers	**7**	pieces	Separator Row Qty Included in Total
Starter Chambers	**17**	pieces	
End Chambers	**102**	pieces	
HVLV SFCx2 Feed Connectors	**32**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**901**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**57**	meters	
Stone	**209**	cu. meters	

Bed Detail

Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**17**	pieces
Number of Chambers Long	**7**	pieces
Chamber Row Width	**19.20**	meters
Chamber Row Length	**16.15**	meters
Bed Width	**19.81**	meters
Bed Length	**16.76**	meters
Bed Area Required	**332.13**	sq. meters
Length of Separator Row	**16.15**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**300**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.14**	meters
H	Effective Depth	**0.77**	meters
I	Bed Depth	**0.98**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	October 8, 2024

Project Information:

Project Number: 0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	17	units
Total Number of Chambers -	119	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	300	mm
Area -	332.13	m2
Base of Stone Elevation -	263.00	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
30.5	775	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4654.65	131.80	1430.00	132.85	265.54	263.77	Top of Stone Elevation
29.5	749	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4535.48	128.43	1430.00	132.85	265.46	263.75	
28.5	724	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4416.31	125.06	1430.00	132.85	265.38	263.72	
27.5	699	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4297.15	121.68	1430.00	132.85	265.29	263.70	
26.5	673	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4177.98	118.31	1430.00	132.85	265.21	263.67	
25.5	648	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	4058.81	114.93	1430.00	132.85	265.13	263.65	
24.5	622	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3939.65	111.56	1430.00	132.85	265.04	263.62	
23.5	597	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3820.48	108.18	1430.00	132.85	264.96	263.60	
22.5	572	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3701.31	104.81	1430.00	132.85	264.88	263.57	
21.5	546	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3582.15	101.43	1430.00	132.85	264.79	263.55	
20.5	521	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3462.98	98.06	1430.00	132.85	264.71	263.52	
19.5	495	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	3343.81	94.69	1430.00	132.85	264.63	263.50	
18.5	470	0.1	0.0	0.0	0.0	59.5	1.7	59.637	1.7	3224.65	91.31	715.65	66.48	264.54	263.47	Top of Chamber Elevation
18.0	457	21.6	0.6	0.0	0.0	110.5	3.1	132.141	3.7	3165.01	89.62	1585.69	147.31	264.50	263.46	
17.0	432	60.4	1.7	0.0	0.0	95.0	2.7	155.387	4.4	3032.87	85.88	1864.64	173.23	264.42	263.43	
16.0	406	99.1	2.8	0.0	0.0	79.5	2.3	178.633	5.1	2877.48	81.48	2143.59	199.14	264.33	263.41	
15.0	381	125.2	3.5	0.0	0.0	69.1	2.0	194.310	5.5	2698.85	76.42	2331.72	216.62	264.25	263.38	
14.0	356	143.3	4.1	0.0	0.0	61.9	1.8	205.136	5.8	2504.54	70.92	2461.64	228.69	264.17	263.36	
13.0	330	156.8	4.4	0.1	0.0	56.5	1.6	213.321	6.0	2299.40	65.11	2559.86	237.81	264.08	263.33	
12.0	305	165.8	4.7	0.3	0.0	52.9	1.5	218.965	6.2	2086.08	59.07	2627.58	244.10	264.00	263.30	
11.0	279	173.0	4.9	0.4	0.0	50.0	1.4	223.399	6.3	1867.12	52.87	2680.79	249.05	263.92	263.28	
10.0	254	182.9	5.2	0.5	0.0	46.0	1.3	229.390	6.5	1643.72	46.54	2752.68	255.72	263.83	263.25	
9.0	229	182.9	5.2	0.5	0.0	46.0	1.3	229.416	6.5	1414.33	40.05	2752.99	255.75	263.75	263.23	
8.0	203	182.9	5.2	0.5	0.0	46.0	1.3	229.441	6.5	1184.91	33.55	2753.29	255.78	263.67	263.20	
7.0	178	200.9	5.7	0.7	0.0	38.8	1.1	240.470	6.8	955.47	27.06	2885.63	268.08	263.58	263.18	
6.0	152	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	715.00	20.25	1430.00	132.85	263.50	263.15	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	595.83	16.87	1430.00	132.85	263.42	263.13	
4.0	102	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	476.67	13.50	1430.00	132.85	263.33	263.10	
3.0	76	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	357.50	10.12	1430.00	132.85	263.25	263.08	
2.0	51	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	238.33	6.75	1430.00	132.85	263.17	263.05	
1.0	25	0.0	0.0	0.0	0.0	119.2	3.4	119.167	3.4	119.17	3.37	1430.00	132.85	263.08	263.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	263.00	263.00	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																
-40.0																
-41.0																
-42.0																
-43.0																
-44.0																
-45.0																
-46.0																
-47.0																
-48.0																
-49.0																
-50.0																
-51.0																
-52.0																
-53.0																
-54.0																
-55.0																
-56.0																
-57.0																
-58.0																
-59.0																
-60.0																
-61.0																
-62.0																
-63.0																
-64.0																
-65.0																

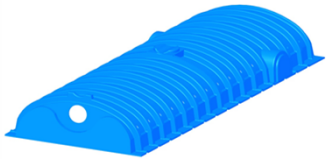
CULTEC Stormwater Design Calculator

Date:	October 08, 2024

Project Information:

Calculations Performed By:

CONTACTOR 100HD



Contactor 100HD Chamber Specifications		
Height	**318**	mm
Width	**914**	mm
Length	**2.44**	meters
Installed Length	**2.29**	meters
Bare Chamber Volume	**0.40**	cu. meters
Installed Chamber Volume	**1.05**	cu. meters

Breakdown of Storage Provided by Contactor 100HD Stormwater System		
Stone Porosity	**40.0**	%
Within Chambers	**129.01**	cu. meters
Within Stone	**219.19**	cu. meters
Total Storage Provided	**348.2**	**cu. meters**
Total Storage Required	342.00	cu. meters

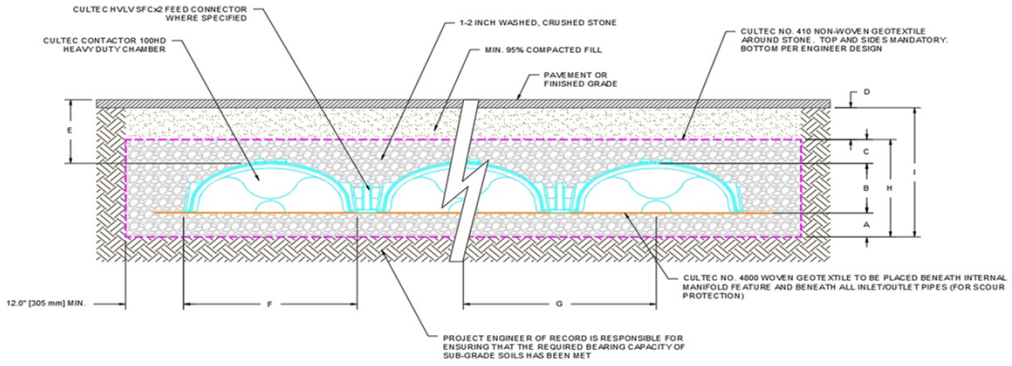
Materials List

Contactor 100HD			
Total Number of Chambers Required	**322**	**pieces**	
Separator Row Chambers	**23**	pieces	Separator Row Qty Included in Total
Starter Chambers	**14**	pieces	
End Chambers	**308**	pieces	
HVLV SFCx2 Feed Connectors	**26**	pieces	*Based on 2 Internal Manifolds*
CULTEC No. 410 Non-Woven Geotextile	**2320**	sq. meters	
CULTEC AFAB-HPF Woven Geotextile	**88**	meters	
Stone	**548**	cu. meters	

Bed Detail

Bed detail for reference only. Not project specific. Not to scale.

Bed Layout Information		
Number of Rows Wide	**14**	pieces
Number of Chambers Long	**23**	pieces
Chamber Row Width	**15.77**	meters
Chamber Row Length	**52.73**	meters
Bed Width	**16.38**	meters
Bed Length	**53.34**	meters
Bed Area Required	**873.87**	sq. meters
Length of Separator Row	**52.73**	meters



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**152**	mm
B	Chamber Height	**318**	mm
C	Depth of Stone Above Units	**300**	mm
D	Depth of 95% Compacted Fill	**203**	mm
E	Max. Depth Allowed Above the Chamber	**3.66**	meters
F	Chamber Width	**914**	mm
G	Center to Center Spacing	**1.14**	meters
H	Effective Depth	**0.77**	meters
I	Bed Depth	**0.98**	meters

CULTEC, Inc.
P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
tech@cultec.com
www.cultec.com

CULTEC Stage-Storage Calculations

Date:	October 8, 2024

Project Information:

Project Number: 0

Chamber Model -	**Contactor 100HD**	
Number of Rows-	14	units
Total Number of Chambers -	322	units
Stone Void -	40	%
Stone Base -	152	mm
Stone Above Units -	300	mm
Area -	873.87	m2
Base of Stone Elevation -	264.00	

Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Stage / Area		Elevation		
in	mm	ft^3	m^3	ft3	m3	ft^3	m^3	ft^3	m^3	ft^3	m^3	ft^2	m^2	ft	m	
30.5	775	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	12299.19	348.27	3762.50	349.54	266.54	264.77	Top of Stone Elevation
29.5	749	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	11985.65	339.40	3762.50	349.54	266.46	264.75	
28.5	724	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	11672.10	330.52	3762.50	349.54	266.38	264.72	
27.5	699	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	11358.56	321.64	3762.50	349.54	266.29	264.70	
26.5	673	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	11045.02	312.76	3762.50	349.54	266.21	264.67	
25.5	648	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	10731.48	303.88	3762.50	349.54	266.13	264.65	
24.5	622	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	10417.94	295.00	3762.50	349.54	266.04	264.62	
23.5	597	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	10104.40	286.12	3762.50	349.54	265.96	264.60	
22.5	572	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	9790.85	277.25	3762.50	349.54	265.88	264.57	
21.5	546	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	9477.31	268.37	3762.50	349.54	265.79	264.55	
20.5	521	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	9163.77	259.49	3762.50	349.54	265.71	264.52	
19.5	495	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	8850.23	250.61	3762.50	349.54	265.63	264.50	
18.5	470	0.2	0.0	0.0	0.0	156.7	4.4	156.916	4.4	8536.69	241.73	1882.99	174.93	265.54	264.47	Top of Chamber Elevation
18.0	457	58.1	1.6	0.0	0.0	290.3	8.2	348.418	9.9	8379.77	237.29	4181.02	388.42	265.50	264.46	
17.0	432	162.3	4.6	0.0	0.0	248.6	7.0	410.906	11.6	8031.35	227.42	4930.87	458.08	265.42	264.43	
16.0	406	266.4	7.5	0.0	0.0	207.0	5.9	473.394	13.4	7620.45	215.79	5680.72	527.74	265.33	264.41	
15.0	381	336.7	9.5	0.0	0.0	178.9	5.1	515.536	14.6	7147.05	202.38	6186.44	574.72	265.25	264.38	
14.0	356	385.1	10.9	0.0	0.0	159.5	4.5	544.612	15.4	6631.52	187.78	6535.35	607.13	265.17	264.36	
13.0	330	421.4	11.9	0.1	0.0	145.0	4.1	566.472	16.0	6086.90	172.36	6797.66	631.50	265.08	264.33	
12.0	305	445.6	12.6	0.3	0.0	135.3	3.8	581.197	16.5	5520.43	156.32	6974.36	647.92	265.00	264.30	
11.0	279	465.0	13.2	0.4	0.0	127.5	3.6	592.911	16.8	4939.24	139.86	7114.94	660.98	264.92	264.28	
10.0	254	491.7	13.9	0.4	0.0	116.9	3.3	608.932	17.2	4346.32	123.07	7307.19	678.84	264.83	264.25	
9.0	229	491.7	13.9	0.4	0.0	116.9	3.3	608.953	17.2	3737.39	105.83	7307.44	678.86	264.75	264.23	
8.0	203	491.7	13.9	0.4	0.0	116.9	3.3	608.974	17.2	3128.44	88.59	7307.69	678.88	264.67	264.20	
7.0	178	540.1	15.3	0.6	0.0	97.5	2.8	638.214	18.1	2519.46	71.34	7658.57	711.48	264.58	264.18	
6.0	152	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	1881.25	53.27	3762.50	349.54	264.50	264.15	Bottom of Chamber Elevation
5.0	127	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	1567.71	44.39	3762.50	349.54	264.42	264.13	
4.0	102	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	1254.17	35.51	3762.50	349.54	264.33	264.10	
3.0	76	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	940.63	26.64	3762.50	349.54	264.25	264.08	
2.0	51	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	627.08	17.76	3762.50	349.54	264.17	264.05	
1.0	25	0.0	0.0	0.0	0.0	313.5	8.9	313.542	8.9	313.54	8.88	3762.50	349.54	264.08	264.03	
0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.000	0.0	0.00	0.00	0.00	0.00	264.00	264.00	Bottom of Stone Elevation
-1.0																
-2.0																
-3.0																
-4.0																
-5.0																
-6.0																
-7.0																
-8.0																
-9.0																
-10.0																
-11.0																
-12.0																
-13.0																
-14.0																
-15.0																
-16.0																
-17.0																
-18.0																
-19.0																
-20.0																
-21.0																
-22.0																
-23.0																
-24.0																
-25.0																
-26.0																
-27.0																
-28.0																
-29.0																
-30.0																
-31.0																
-32.0																
-33.0																
-34.0																
-35.0																
-36.0																
-37.0																
-38.0																
-39.0																
-40.0																
-41.0																
-42.0																
-43.0																
-44.0																
-45.0																
-46.0																
-47.0																
-48.0																
-49.0																
-50.0																
-51.0																
-52.0																
-53.0																
-54.0																
-55.0																
-56.0																
-57.0																
-58.0																
-59.0																
-60.0																
-61.0																
-62.0																
-63.0																
-64.0																
-65.0																

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/18/2024

Province:	Ontario
City:	Caledon
Nearest Rainfall Station:	TRENTON AP
Climate Station Id:	6158875
Years of Rainfall Data:	19

Site Name:	

Drainage Area (ha):	7.27
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	191.39
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	402.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	6773

Project Name:	Fieldgate Caledon
Project Number:	24045
Designer Name:	Theodor Gheonea
Designer Company:	KWA Site Development Consulting Inc.
Designer Email:	theo.gheonea@kwasitedev.com
Designer Phone:	647-886-0146
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	35
EFO6	52
EFO8	63
EFO10	72
EFO12	81

Recommended Stormceptor EFO Model: EFO12

Estimated Net Annual Sediment (TSS) Load Reduction (%): 81

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

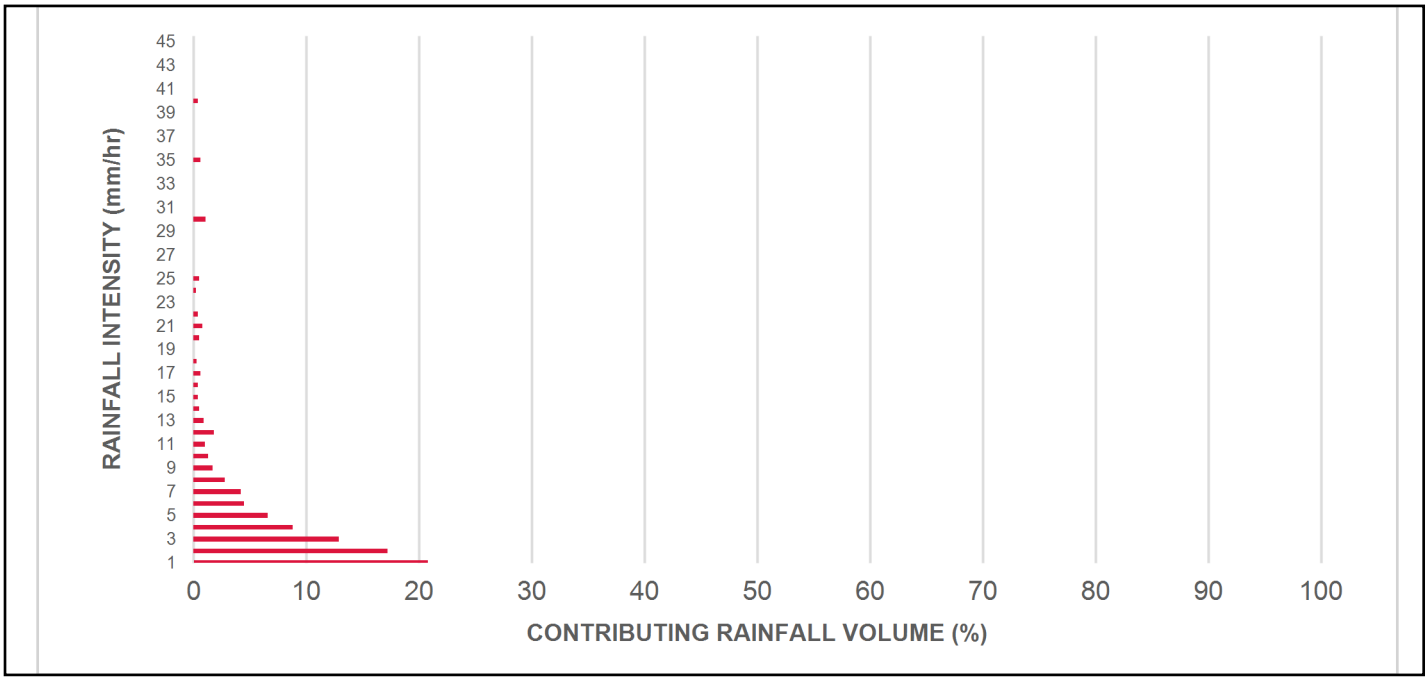
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

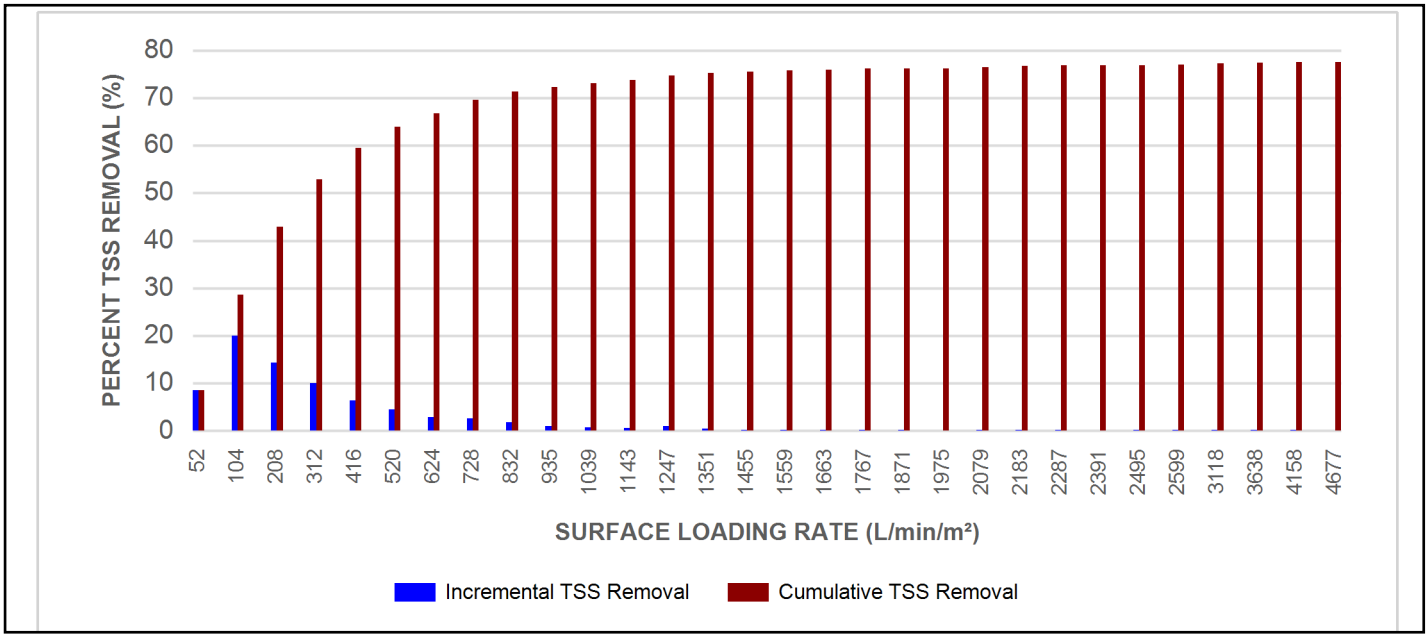
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	9.09	546.0	44.0	100	8.6	8.6
1.00	20.8	29.4	18.19	1091.0	87.0	98	20.5	29.1
2.00	17.2	46.7	36.38	2183.0	175.0	87	15.0	44.1
3.00	12.9	59.5	54.57	3274.0	262.0	80	10.3	54.4
4.00	8.8	68.3	72.76	4365.0	349.0	76	6.7	61.1
5.00	6.6	74.9	90.95	5457.0	437.0	72	4.8	65.9
6.00	4.5	79.4	109.14	6548.0	524.0	68	3.1	69.0
7.00	4.2	83.6	127.33	7640.0	611.0	65	2.7	71.7
8.00	2.8	86.5	145.52	8731.0	698.0	64	1.8	73.5
9.00	1.7	88.2	163.71	9822.0	786.0	63	1.1	74.6
10.00	1.3	89.5	181.90	10914.0	873.0	63	0.8	75.4
11.00	1.0	90.5	200.08	12005.0	960.0	62	0.6	76.0
12.00	1.8	92.3	218.27	13096.0	1048.0	61	1.1	77.1
13.00	0.9	93.3	236.46	14188.0	1135.0	59	0.5	77.7
14.00	0.5	93.8	254.65	15279.0	1222.0	56	0.3	78.0
15.00	0.4	94.2	272.84	16371.0	1310.0	54	0.2	78.2
16.00	0.4	94.6	291.03	17462.0	1397.0	53	0.2	78.4
17.00	0.6	95.2	309.22	18553.0	1484.0	49	0.3	78.7
18.00	0.3	95.6	327.41	19645.0	1572.0	47	0.2	78.9
19.00	0.0	95.6	345.60	20736.0	1659.0	44	0.0	78.9
20.00	0.5	96.1	363.79	21827.0	1746.0	42	0.2	79.1
21.00	0.8	96.9	381.98	22919.0	1834.0	40	0.3	79.4
22.00	3.1	100.0	400.17	24010.0	1921.0	38	1.2	80.6
23.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
24.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
25.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
30.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
35.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
40.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
45.00	0.0	100.0	402.00	24120.0	1930.0	38	0.0	80.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**81 %**

Climate Station ID: 6158875 *Years of Rainfall Data*: 19

RAINFALL DATA FROM TRENTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

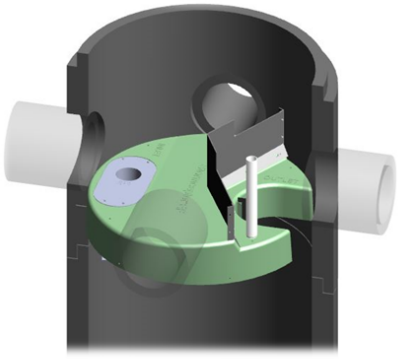
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

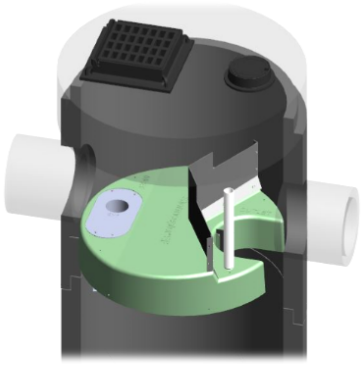
DESIGN FLEXIBILITY

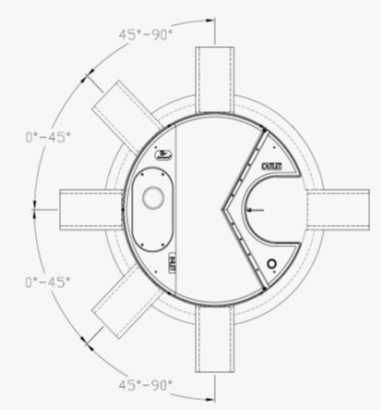
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/18/2024

Province:	Ontario
City:	Caledon
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	2.49
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	69.69
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	136.00
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	2013

Project Name:	Fieldgate Caledon - B
Project Number:	24045
Designer Name:	Theodor Gheonea
Designer Company:	KWA Site Development Consulting Inc.
Designer Email:	theo.gheonea@kwasitedev.com
Designer Phone:	647-886-0146
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	56
EFO6	72
EFO8	81
EFO10	87
EFO12	92

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 81

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

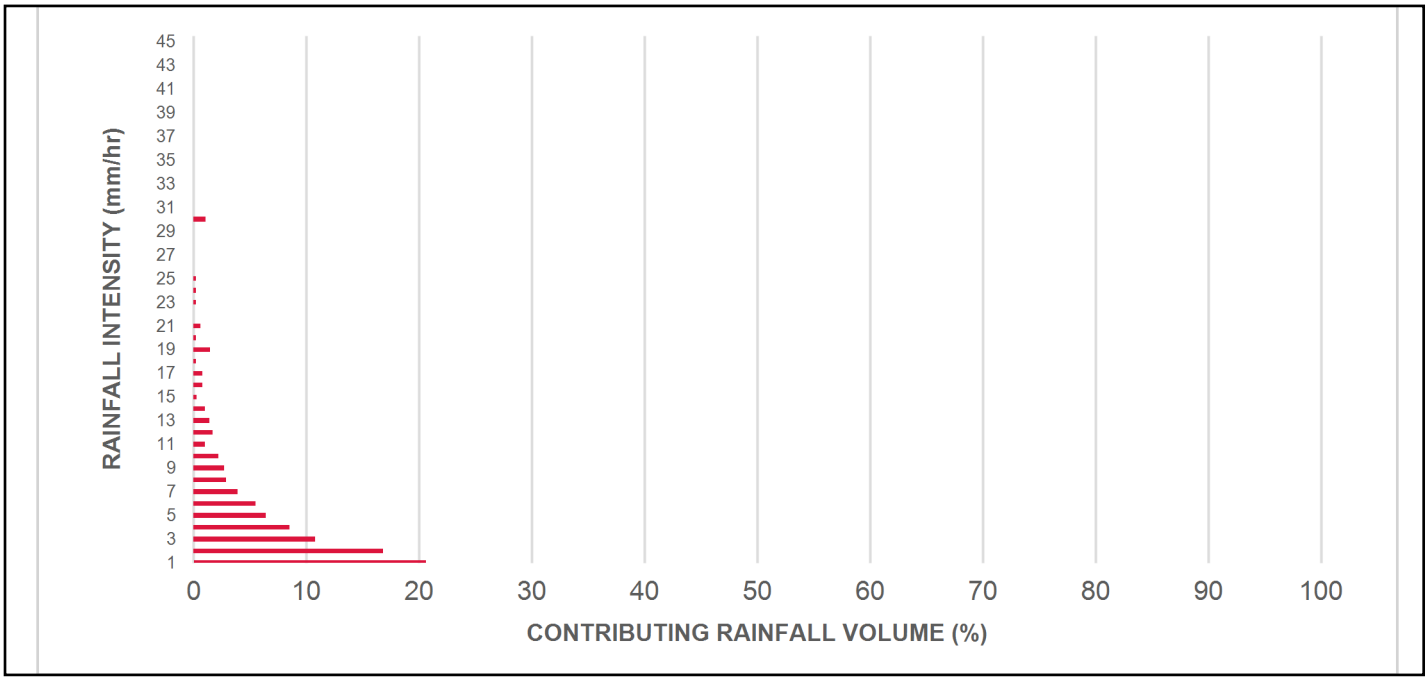
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

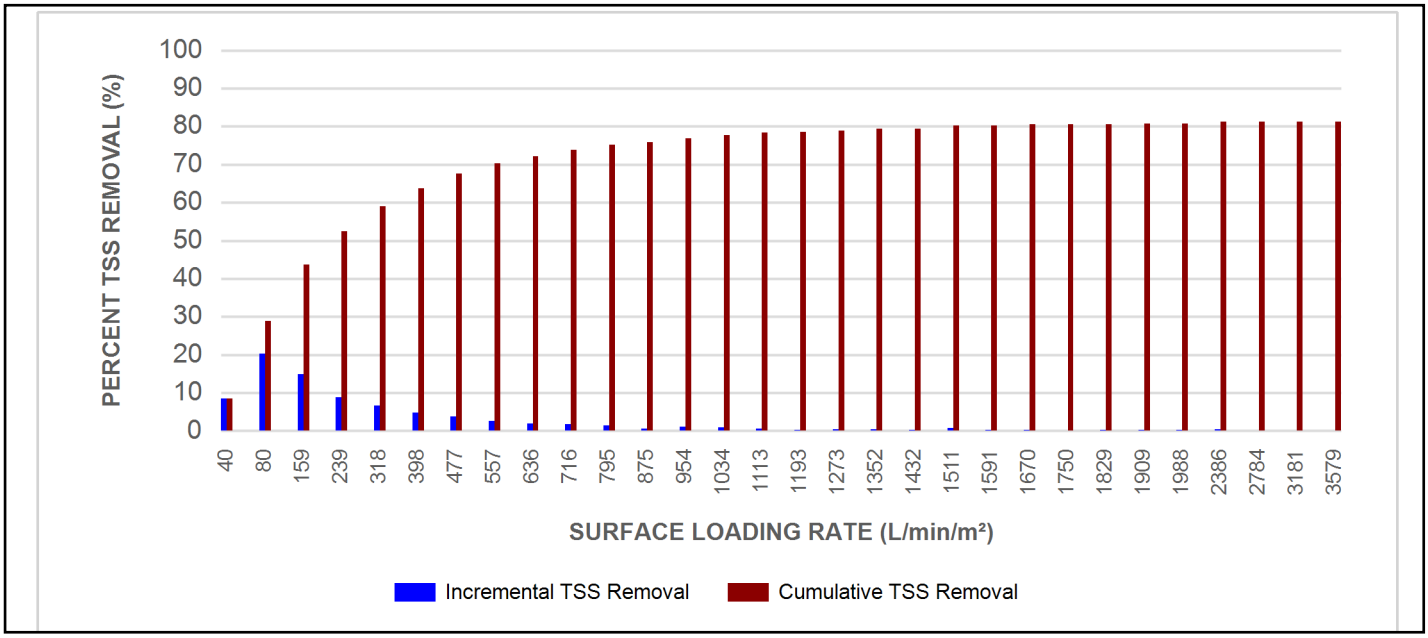
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.11	187.0	40.0	100	8.5	8.5
1.00	20.6	29.1	6.23	374.0	80.0	98	20.3	28.8
2.00	16.8	45.9	12.46	748.0	159.0	88	14.8	43.7
3.00	10.8	56.7	18.69	1121.0	239.0	82	8.8	52.4
4.00	8.5	65.2	24.92	1495.0	318.0	78	6.6	59.0
5.00	6.4	71.6	31.15	1869.0	398.0	74	4.8	63.8
6.00	5.5	77.0	37.38	2243.0	477.0	71	3.9	67.6
7.00	3.9	81.0	43.61	2617.0	557.0	67	2.6	70.3
8.00	2.9	83.9	49.84	2990.0	636.0	64	1.9	72.1
9.00	2.7	86.5	56.07	3364.0	716.0	64	1.7	73.9
10.00	2.2	88.7	62.30	3738.0	795.0	63	1.4	75.2
11.00	1.0	89.7	68.53	4112.0	875.0	63	0.6	75.8
12.00	1.7	91.3	74.76	4486.0	954.0	62	1.0	76.9
13.00	1.4	92.8	80.99	4859.0	1034.0	61	0.9	77.7
14.00	1.0	93.7	87.22	5233.0	1113.0	59	0.6	78.3
15.00	0.3	94.0	93.45	5607.0	1193.0	57	0.2	78.5
16.00	0.8	94.8	99.68	5981.0	1273.0	55	0.4	78.9
17.00	0.8	95.7	105.91	6355.0	1352.0	53	0.4	79.4
18.00	0.2	95.8	112.14	6728.0	1432.0	51	0.1	79.4
19.00	1.5	97.3	118.37	7102.0	1511.0	48	0.7	80.2
20.00	0.2	97.5	124.60	7476.0	1591.0	46	0.1	80.3
21.00	2.5	100.0	130.83	7850.0	1670.0	44	1.1	81.3
22.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
23.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
24.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
25.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
30.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
35.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
40.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
45.00	0.0	100.0	136.00	8160.0	1736.0	42	0.0	81.3
Estimated Net Annual Sediment (TSS) Load Reduction =								**81 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

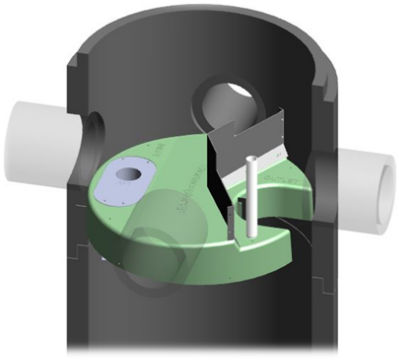
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

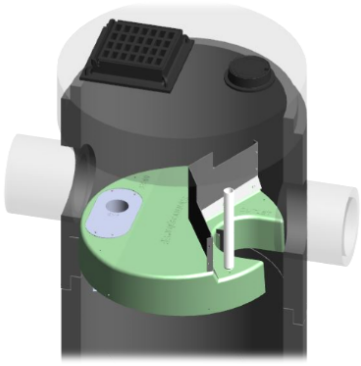
DESIGN FLEXIBILITY

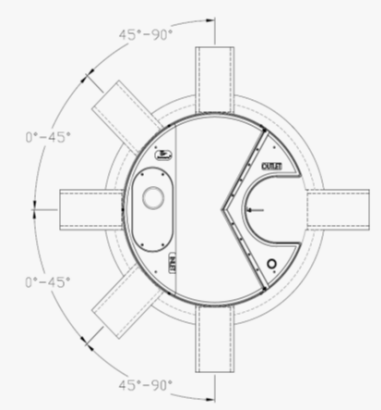
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

Stormceptor®

Rinker MATERIALS™

Stormceptor® EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

09/18/2024

Province:	Ontario
City:	Caledon
Nearest Rainfall Station:	TORONTO INTL AP
Climate Station Id:	6158731
Years of Rainfall Data:	20

Site Name:	

Drainage Area (ha):	2.78
Runoff Coefficient 'c':	0.90

Particle Size Distribution:	Fine
Target TSS Removal (%):	80.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	77.81
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	Yes
Upstream Orifice Control Flow Rate to Stormceptor (L/s):	139.80
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	
Estimated Average Annual Sediment Volume (L/yr):	2220

Project Name:	Fieldgate Caledon - C
Project Number:	24045
Designer Name:	Theodor Gheonea
Designer Company:	KWA Site Development Consulting Inc.
Designer Email:	theo.gheonea@kwasitedev.com
Designer Phone:	647-886-0146
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	54
EFO6	70
EFO8	80
EFO10	86
EFO12	91

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 80

Water Quality Runoff Volume Capture (%): > 90

imbrium

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

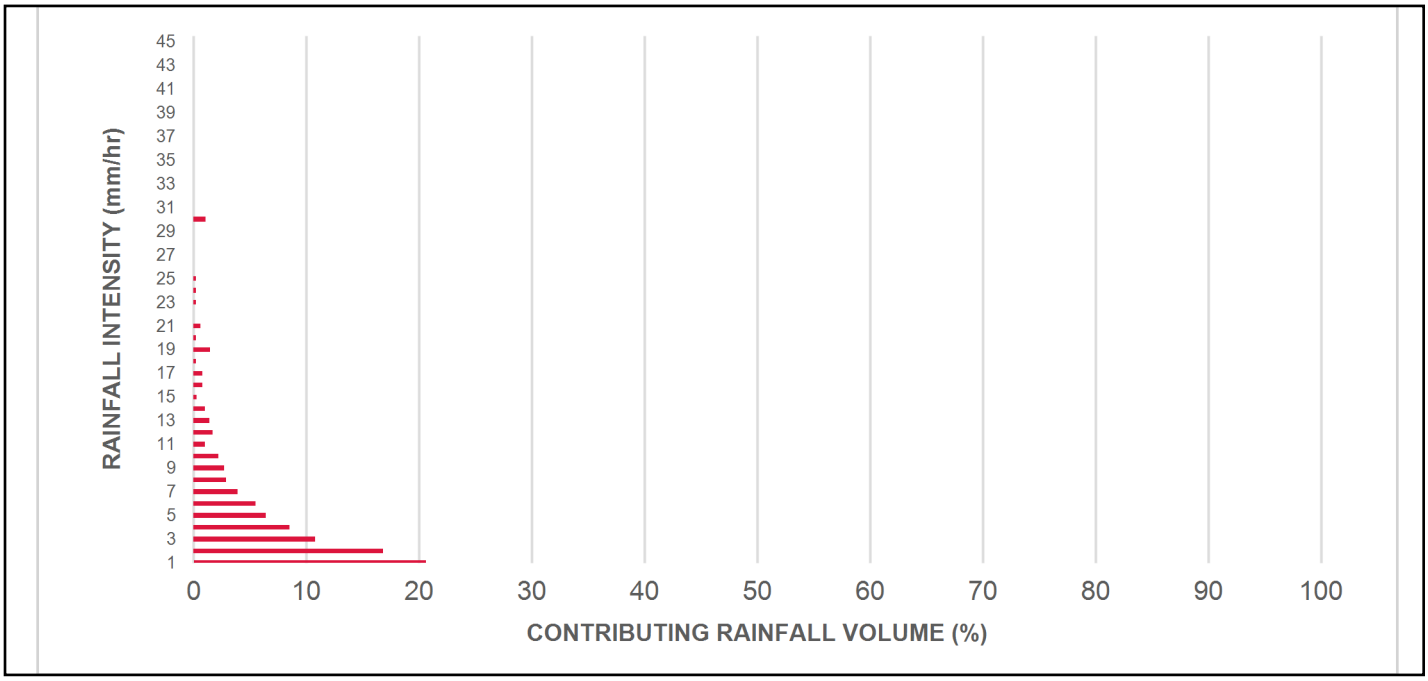
Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Upstream Flow Controlled Results

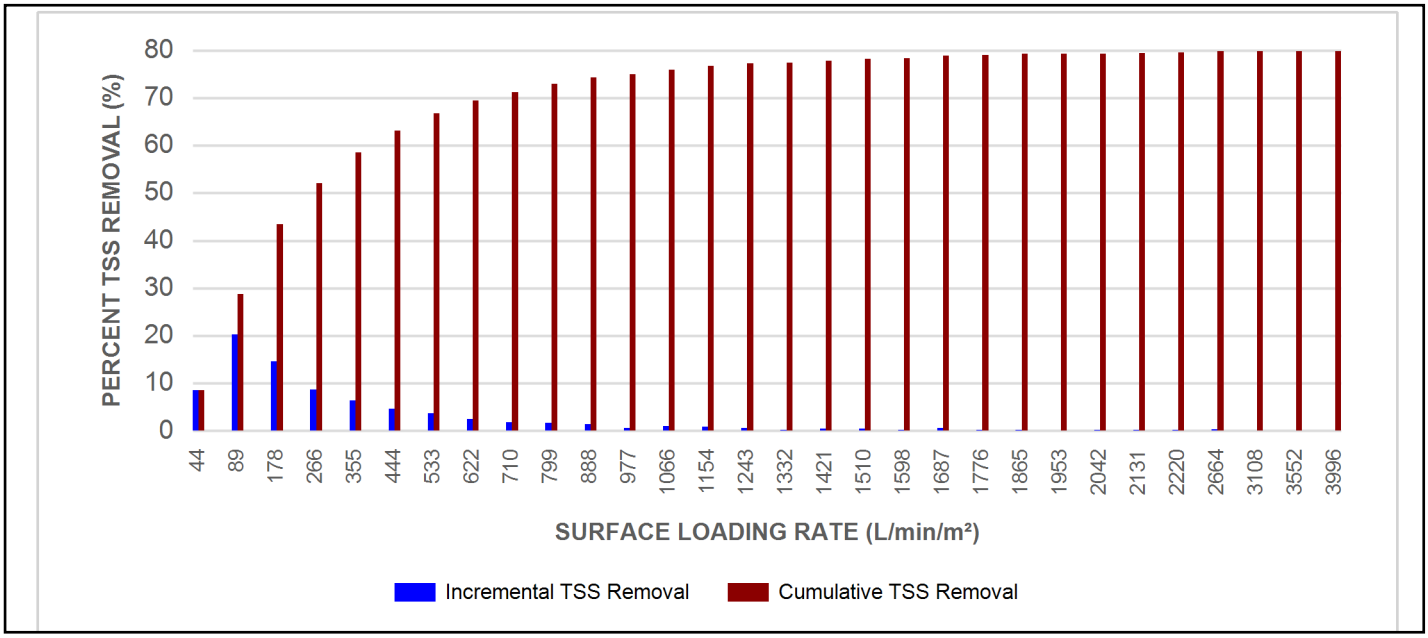
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.48	209.0	44.0	100	8.5	8.5
1.00	20.6	29.1	6.96	417.0	89.0	98	20.3	28.8
2.00	16.8	45.9	13.91	835.0	178.0	87	14.6	43.4
3.00	10.8	56.7	20.87	1252.0	266.0	80	8.6	52.1
4.00	8.5	65.2	27.82	1669.0	355.0	76	6.4	58.5
5.00	6.4	71.6	34.78	2087.0	444.0	72	4.6	63.1
6.00	5.5	77.0	41.73	2504.0	533.0	68	3.7	66.8
7.00	3.9	81.0	48.69	2921.0	622.0	64	2.5	69.4
8.00	2.9	83.9	55.64	3339.0	710.0	64	1.8	71.2
9.00	2.7	86.5	62.60	3756.0	799.0	63	1.7	72.9
10.00	2.2	88.7	69.56	4173.0	888.0	62	1.4	74.3
11.00	1.0	89.7	76.51	4591.0	977.0	62	0.6	74.9
12.00	1.7	91.3	83.47	5008.0	1066.0	60	1.0	75.9
13.00	1.4	92.8	90.42	5425.0	1154.0	58	0.8	76.7
14.00	1.0	93.7	97.38	5843.0	1243.0	56	0.5	77.2
15.00	0.3	94.0	104.33	6260.0	1332.0	54	0.2	77.4
16.00	0.8	94.8	111.29	6677.0	1421.0	52	0.4	77.8
17.00	0.8	95.7	118.24	7095.0	1510.0	48	0.4	78.2
18.00	0.2	95.8	125.20	7512.0	1598.0	46	0.1	78.3
19.00	1.5	97.3	132.16	7929.0	1687.0	44	0.7	78.9
20.00	2.7	100.0	139.11	8347.0	1776.0	41	1.1	80.0
21.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
22.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
23.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
24.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
25.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
30.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
35.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
40.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
45.00	0.0	100.0	140.00	8400.0	1787.0	41	0.0	80.0
Estimated Net Annual Sediment (TSS) Load Reduction =								**80 %**

Climate Station ID: 6158731 *Years of Rainfall Data*: 20

RAINFALL DATA FROM TORONTO INTL AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

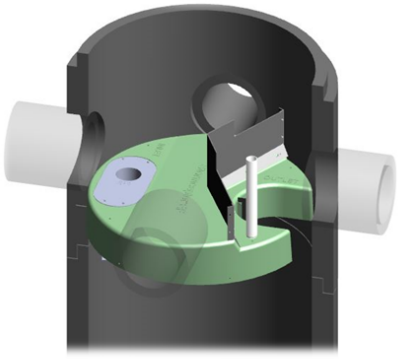
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

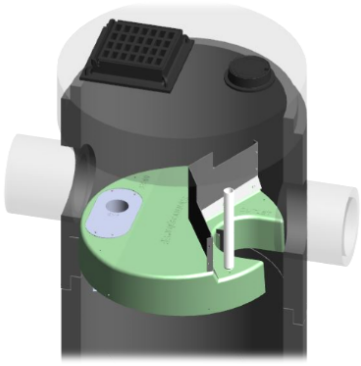
DESIGN FLEXIBILITY

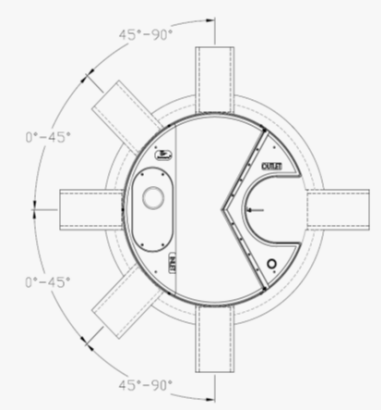
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.
0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.
45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity
** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall

remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to

assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

APPENDIX B

SANITARY CALCULATIONS

Sanitary Servicing Analysis - Site A + B

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/30/2024

Prepared By: LP
Checked By: TF

Standards Peel Region

Formulas

Peaking Factor (Harmon) $= 1+14/[4+(P/1000)^{1/2}]$

Peak Flow = p(q)M(unit conversion) + infiltration

Existing Sanitary Design Flow

Land Type	Area (m^2)	# of Units /Floor Area	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	97200				0.0002 m3/s/ha		1.94
Total	**97200**						**1.94**

Proposed Sanitary Design Flow

Land Type	Area (m^2)	# of Units / Floor Area	Density (ppha)	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	97200				0.0002 m3/s/ha		1.94
Retail A		15071 sq.m	50 ppha	76	302.8 L/cap/day	4.00	1.07
Retail B1		1283 sq.m	50 ppha	7	302.8 L/cap/day	4.00	0.10
Retail B2		1254 sq.m	50 ppha	7	302.8 L/cap/day	4.00	0.10
Retail B3		1142 sq.m	50 ppha	6	302.8 L/cap/day	4.00	0.08
Retail B4		1329 sq.m	50 ppha	7	302.8 L/cap/day	4.00	0.10
Retail B5		409 sq.m	50 ppha	3	302.8 L/cap/day	4.00	0.04
Total	**97200**	**20488**		**106**			**3.43**

Summary

Existing Sanitary Design Flow	1.94 L/s
Proposed Sanitary Design Flow	3.43 L/s
Increased Flow	1.49 L/s

Sanitary Servicing Analysis - Site C

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/30/2024

Prepared By: LP
Checked By: TF

Standards Peel Region

Formulas

Peaking Factor (Harmon) $= 1+14/[4+(P/1000)^{1/2}]$

Peak Flow = p(q)M(unit conversion) + infiltration

Existing Sanitary Design Flow

Land Type	Area (m^2)	# of Units /Floor Area	Density	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	27800				0.0002 m3/s/ha		0.56
Total	**27800**						**0.56**

Proposed Sanitary Design Flow

Land Type	Area (m^2)	# of Units / Floor Area	Density (ppha)	Population (p)	Average Flow (q)	Peaking Factor (M)	Peak Flow (Q) (L/s)
Infiltration Allowance	27800				0.0002 m3/s/ha		0.56
Retail C1		4366 sq.m	50 ppha	22	302.8 L/cap/day	4.00	0.31
Retail C2		1579 sq.m	50 ppha	8	302.8 L/cap/day	4.00	0.11
Retail C3		793 sq.m	50 ppha	4	302.8 L/cap/day	4.00	0.06
Retail C4		755 sq.m	50 ppha	4	302.8 L/cap/day	4.00	0.06
Total	**27800**	**7493**		**38**			**1.09**

Summary

Existing Sanitary Design Flow	0.56 L/s
Proposed Sanitary Design Flow	1.09 L/s
Increased Flow	0.53 L/s

Sanitary Servicing Analysis - Downstream

Project Name: 12100 Creditview
Project Numb 24045 — Prepared By: LP
Location: Caledon — Checked By: TF
Date: 9/30/2024

	Peak Flow	
Site A+B	3.43	L/s
Site C	1.09	L/s
Total	**4.52**	**L/s**

Pipe	Diameter (m)	Slope (%)	Velocity (m/s)	Full Flow Capacity (L/s)	Pre-Dev. Total Flow (L/s)	Pre-Dev. % Full	Post-Dev % Full
Street A (by TYLin)	200	0.5	0.74	23.19	n/a	n/a	19%
*MH52A	250	1.64	1.55	76.16	13.20	**17%**	**23%**
**MH59A	300	1.73	1.80	127.19	28.70	**23%**	**26%**

*upstream leg of Paradise Homes subdivision
**downstream leg of Paradise Homes subdivision

APPENDIX C

WATER CALCULATIONS

Required Fire Flow - Retail A (Site A+B)

Project Name:	12100 Creditview		
Project Number:	24045	Prepared By:	LP
Location:	Caledon	Checked By:	TF
Date:	9/30/2024		

as per Fire Underwriters Survey Water Supply for Public Fire Protection, 2020

1. Initial Required Fire Flow (Step A, B, C)

Construction Type =	Type II Noncombustible Construction	
Construction Coefficient, C =	0.8	
Total Effective Area, A =	15071	m^2
Required Fire Flow, RFF =	21606.46422	LPM
RFF, rounded =	**22000**	**LPM**

2. Occupancy and Contents Adjustment Factor (Step D)

Contents =	Noncombustible contents	
Adjustment Factor =	-25%	
RFF =	**16500**	**LPM**

3. Automatic Sprinkler Protection (Step E)

Sprinkler Design	Designed	Building Coverage	Credit
Automatic sprinkler protection designed and installed in accordance with NFPA 13	Yes	100%	30%
Water supply is standard for both the system and Fire Department hose lines	Yes	100%	10%
Fully supervised	No	100%	0%
		Total Sprinkler Credit =	40%

Reduction =	**6600**	**LPM**

4. Exposure Adjustment Charge (Step F)

Direction	Distance	Charge
North	Greater than 30m	0%
South	Greater than 30m	0%
East	Greater than 30m	0%
West	Greater than 30m	0%

Total Charge =	0%	
Charge =	**0**	**LPM**

5. Final Required Fire Flow (Step G)

RFF =	16500	LPM
Reduction =	6600	LPM
Charge =	0	LPM
RFF =	9900	LPM

Final RFF, rounded =	**10000**	**LPM**
	2642	**GPM**
	167	**L/s**

Domestic Demand (Site A+B)

Project Name:	12100 Creditview		
Project Number:	24045	Prepared By:	LP
Location:	Caledon	Checked By:	TF
Date:	9/30/2024		

as per Peel Region Standards

Population =	109	
Per Capita Demand =	300	L/cap/day
Average Daily Demand =	32700	L/day
	0.38	L/s

	Average Day	Minimum Hour	Peak Hour	Maximum Day	
Peaking Factor	n/a	n/a	3.00	1.40	
Demand	**0.38**	**n/a**	**1.14**	**0.53**	**L/s**
	6.00	n/a	18.00	8.40	GPM

Head Loss Calculations (Max Day + Fire) - Site A+B

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/30/2024

Prepared By: LP
Checked By: TF

Fire Flow = 167 L/s
Max Day Flow = 0.53 L/s
Total Flow = **167.2 L/s**

Major Losses (Hazen Williams Formula + Hardy Cross Methodology)

Pipe ID	Parallel / Series	Diameter	Area (m^2)	Length (m)	Adjusted Length* (m)	Flow (L/s)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
1	Series	600	0.2827	115	126.5	167.2	0.6	0.15	0.00	0.07	0.10
2	Series	300	0.0707	220	242	167.2	2.4	0.08	0.02	4.03	5.74
3	Series	250	0.0491	128	140.8	167	3.4	0.06	0.04	5.67	8.07
4	Parallel	250	0.0491	115	126.5	101	2.0	0.06	0.02	2.00	2.84
5	Parallel	250	0.0491	250	275	66	1.3	0.06	0.01	2.00	2.84
									Total major loss (psi) =		**16.75**

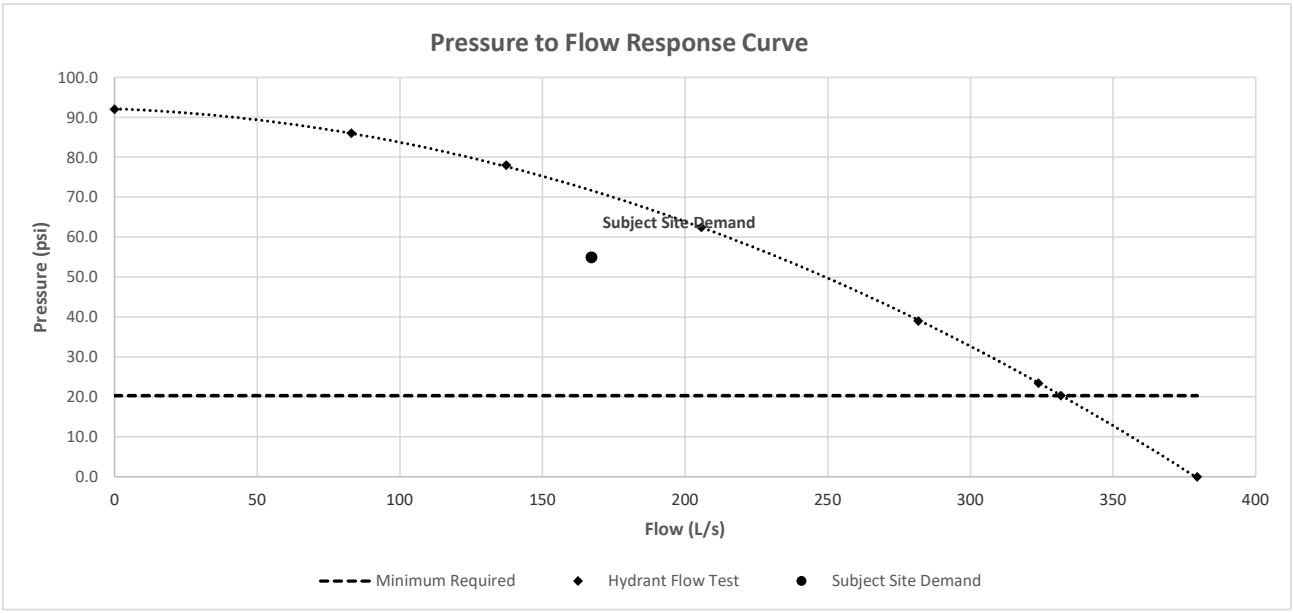
*adjusted length includes a 10% surcharge to account for minor losses

Total Headloss = 16.75 psi

Flow Test Results & Servicing Hydraulic Analysis

Pressure (psi)	*Flow (L/s)*	
92	0	*Static Pressure*
86	83.0	
78	137.3	

Flow Requirement =	***167***	L/s
Theoretical Pressure =	***71.7***	psi
With Pressure Losses =	***54.9***	psi
Minimum Required =	***20.3***	psi



Head Loss Calculations (Peak Hour) - Site A+B

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/30/2024

Prepared By: LP
Checked By: TF

Max Day Flow = 1.14 L/s

Major Losses (Hazen Williams Formula + Hardy Cross Methodology)

Pipe ID	Parallel / Series	Diameter	Area (m^2)	Length (m)	Adjusted Length* (m)	Flow (L/s)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
1	Series	600	0.2827	115	126.5	1.1	0.0	0.15	0.00	0.00	0.00001
2	Series	300	0.0707	220	242	1.14	0.0	0.08	0.00	0.00	0.00055
3	Series	250	0.0491	128	140.8	1.14	0.0	0.06	0.00	0.00	0.00078
4	Parallel	250	0.0491	115	126.5	0.69	0.0	0.06	0.00	0.00	0.00028
5	Parallel	250	0.0491	250	275	0.45	0.0	0.06	0.00	0.00	0.00028

Total major loss (psi) = 0.00

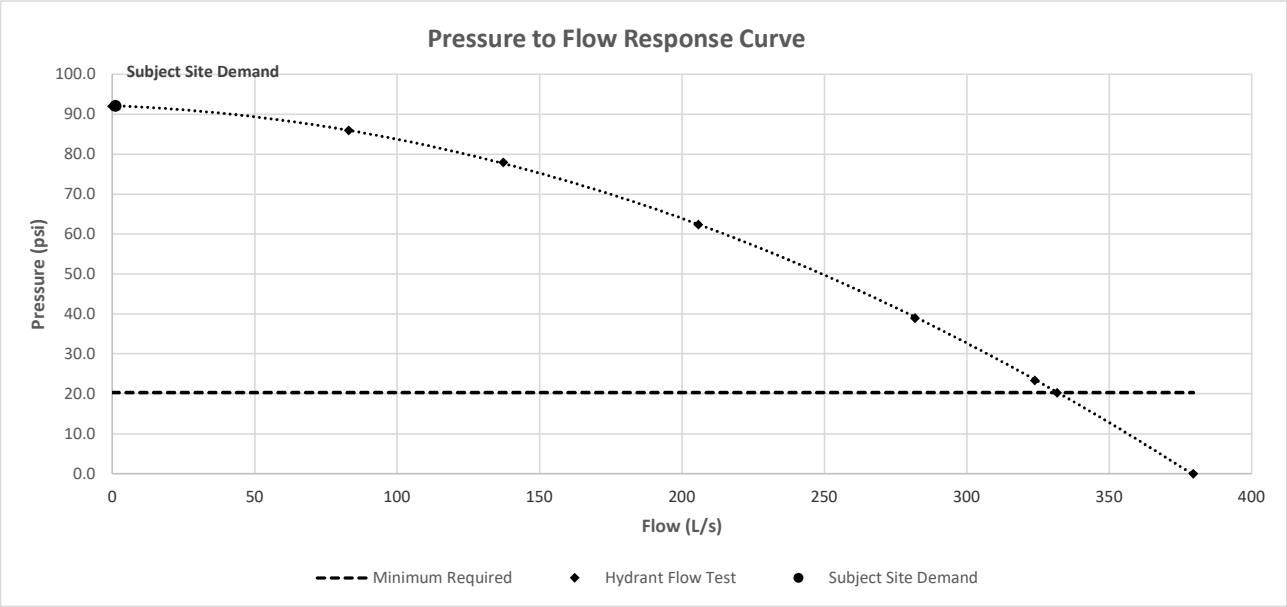
*adjusted length includes a 10% surcharge to account for minor losses

Total Headloss = 0.00 psi

Flow Test Results & Servicing Hydraulic Analysis

Pressure (psi)	*Flow (L/s)*	
92	0	*Static Pressure*
86	83.0	
78	137.3	

Flow Requirement =	***1***	L/s
Theoretical Pressure =	***92.1***	psi
With Pressure Losses =	***92.1***	psi
Minimum Required =	***20.3***	psi



Required Fire Flow - Retail C1/C2 (Site C)

Project Name:	12100 Creditview		
Project Number:	24045	Prepared By:	LP
Location:	Caledon	Checked By:	TF
Date:	9/24/2024		

as per Fire Underwriters Survey Water Supply for Public Fire Protection, 2020

1. Initial Required Fire Flow (Step A, B, C)

Construction Type =	Type II Noncombustible Construction	
Construction Coefficient, C =	0.8	
Total Effective Area, A =	5945	m^2
Required Fire Flow, RFF =	13570.27339	LPM
RFF, rounded =	**14000**	**LPM**

2. Occupancy and Contents Adjustment Factor (Step D)

Contents =	Noncombustible contents	
Adjustment Factor =	-25%	
RFF =	**10500**	**LPM**

3. Automatic Sprinkler Protection (Step E)

Sprinkler Design	Designed	Building Coverage	Credit
Automatic sprinkler protection designed and installed in accordance with NFPA 13	Yes	100%	30%
Water supply is standard for both the system and Fire Department hose lines	Yes	100%	10%
Fully supervised	No	100%	0%
		Total Sprinkler Credit =	40%

Reduction =	**4200**	**LPM**

4. Exposure Adjustment Charge (Step F)

Direction	Distance	Charge
North	Greater than 30m	0%
South	Greater than 30m	0%
East	Greater than 30m	0%
West	Greater than 30m	0%

Total Charge =	0%	
Charge =	**0**	**LPM**

5. Final Required Fire Flow (Step G)

RFF =	10500	LPM
Reduction =	4200	LPM
Charge =	0	LPM
RFF =	6300	LPM

Final RFF, rounded =	**6000**	**LPM**
	1585	**GPM**
	100	**L/s**

Domestic Demand (Site C)

Project Name:	12100 Creditview		
Project Number:	24045	Prepared By:	LP
Location:	Caledon	Checked By:	TF
Date:	9/24/2024		

as per Peel Region Standards

Population =	38	
Per Capita Demand =	300	L/cap/day
Average Daily Demand =	11400	L/day
	0.13	L/s

	Average Day	Minimum Hour	Peak Hour	Maximum Day	
Peaking Factor	n/a	n/a	3.00	1.40	
Demand	**0.13**	**n/a**	**0.40**	**0.18**	**L/s**
	2.09	n/a	6.27	2.93	GPM

Head Loss Calculations (Max Day + Fire) - Site C

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/24/2024

Prepared By: LP
Checked By: TF

Fire Flow = 100 L/s
Max Day Flow = 0.18 L/s
Total Flow = **100.2 L/s**

Major Losses (Hazen Williams Formula + Hardy Cross Methodology)

Pipe ID	Parallel / Series	Diameter	Area (m^2)	Length (m)	Adjusted Length* (m)	Flow (L/s)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
1	Series	600	0.2827	115	126.5	100.2	0.4	0.15	0.00	0.03	0.04
2	Series	300	0.0707	108	118.8	100.2	1.4	0.08	0.01	0.77	1.09
3	Series	250	0.0491	29	31.9	100	2.0	0.06	0.02	0.50	0.71
4	Parallel	250	0.0491	45	49.5	66	1.3	0.06	0.01	0.35	0.50
5	Parallel	250	0.0491	148	162.8	34	0.7	0.06	0.00	0.35	0.50
									Total major loss (psi) =		**2.34**

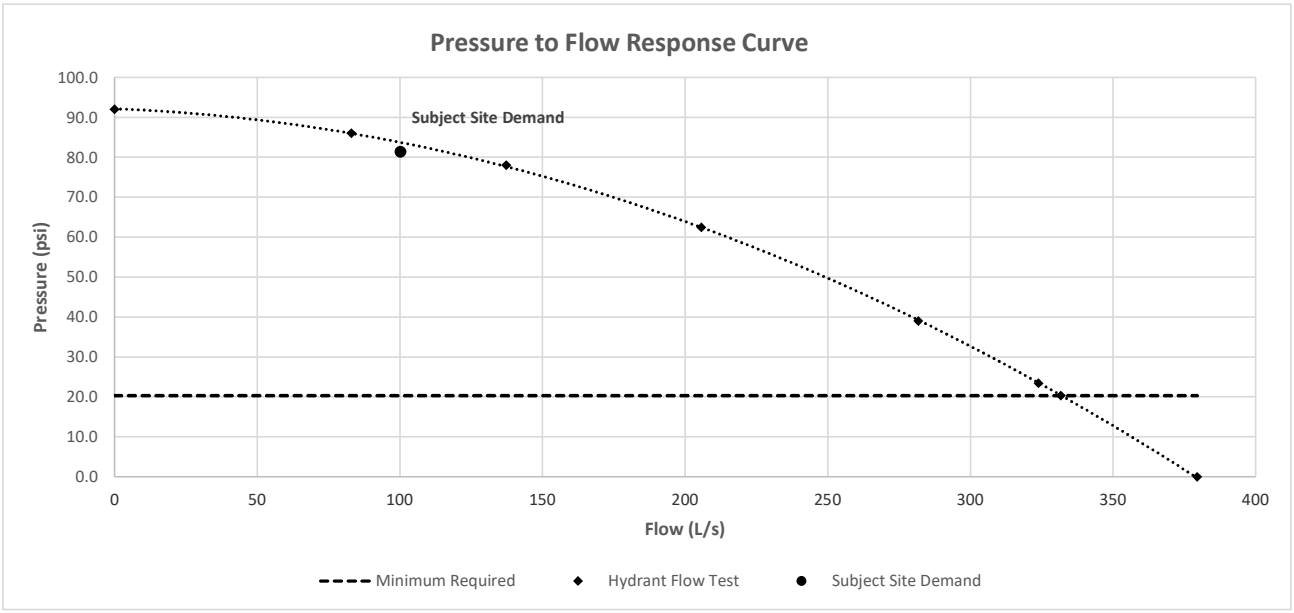
*adjusted length includes a 10% surcharge to account for minor losses

Total Headloss = 2.34 psi

Flow Test Results & Servicing Hydraulic Analysis

Pressure (psi)	*Flow (L/s)*	
92	0	*Static Pressure*
86	83.0	
78	137.3	

Flow Requirement =	***100***	L/s
Theoretical Pressure =	***83.7***	psi
With Pressure Losses =	***81.4***	psi
Minimum Required =	***20.3***	psi



Head Loss Calculations (Peak Hour) - Site C

Project Name: 12100 Creditview
Project Number: 24045
Location: Caledon
Date: 9/24/2024

Prepared By: LP
Checked By: TF

Max Day Flow = 0.40 L/s

Major Losses (Hazen Williams Formula + Hardy Cross Methodology)

Pipe ID	Parallel / Series	Diameter	Area (m^2)	Length (m)	Adjusted Length* (m)	Flow (L/s)	Velocity (m/s)	Hydraulic Radius	S	Headloss (m)	Headloss (psi)
1	Series	600	0.2827	115	126.5	0.4	0.0	0.15	0.00	0.00	0.00000
2	Series	300	0.0707	220	242	0.40	0.0	0.08	0.00	0.00	0.00008
3	Series	250	0.0491	128	140.8	0.40	0.0	0.06	0.00	0.00	0.00011
4	Parallel	250	0.0491	115	126.5	0.24	0.0	0.06	0.00	0.00	0.00004
5	Parallel	250	0.0491	250	275	0.16	0.0	0.06	0.00	0.00	0.00004

Total major loss (psi) = 0.00

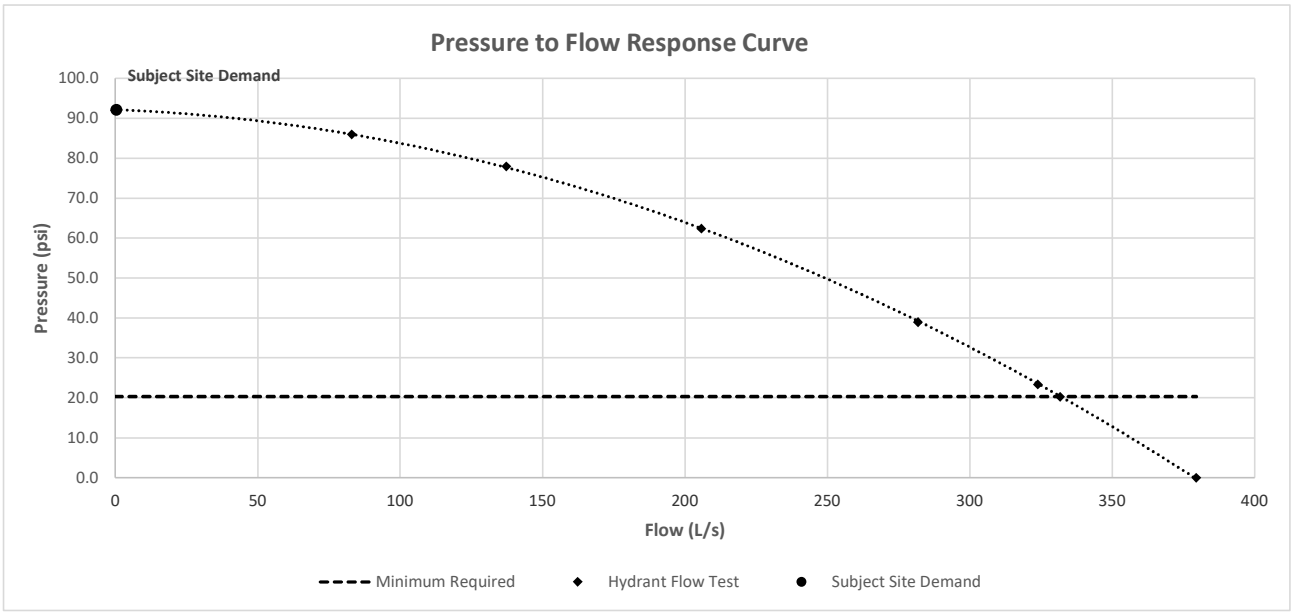
*adjusted length includes a 10% surcharge to account for minor losses

Total Headloss = 0.00 psi

Flow Test Results & Servicing Hydraulic Analysis

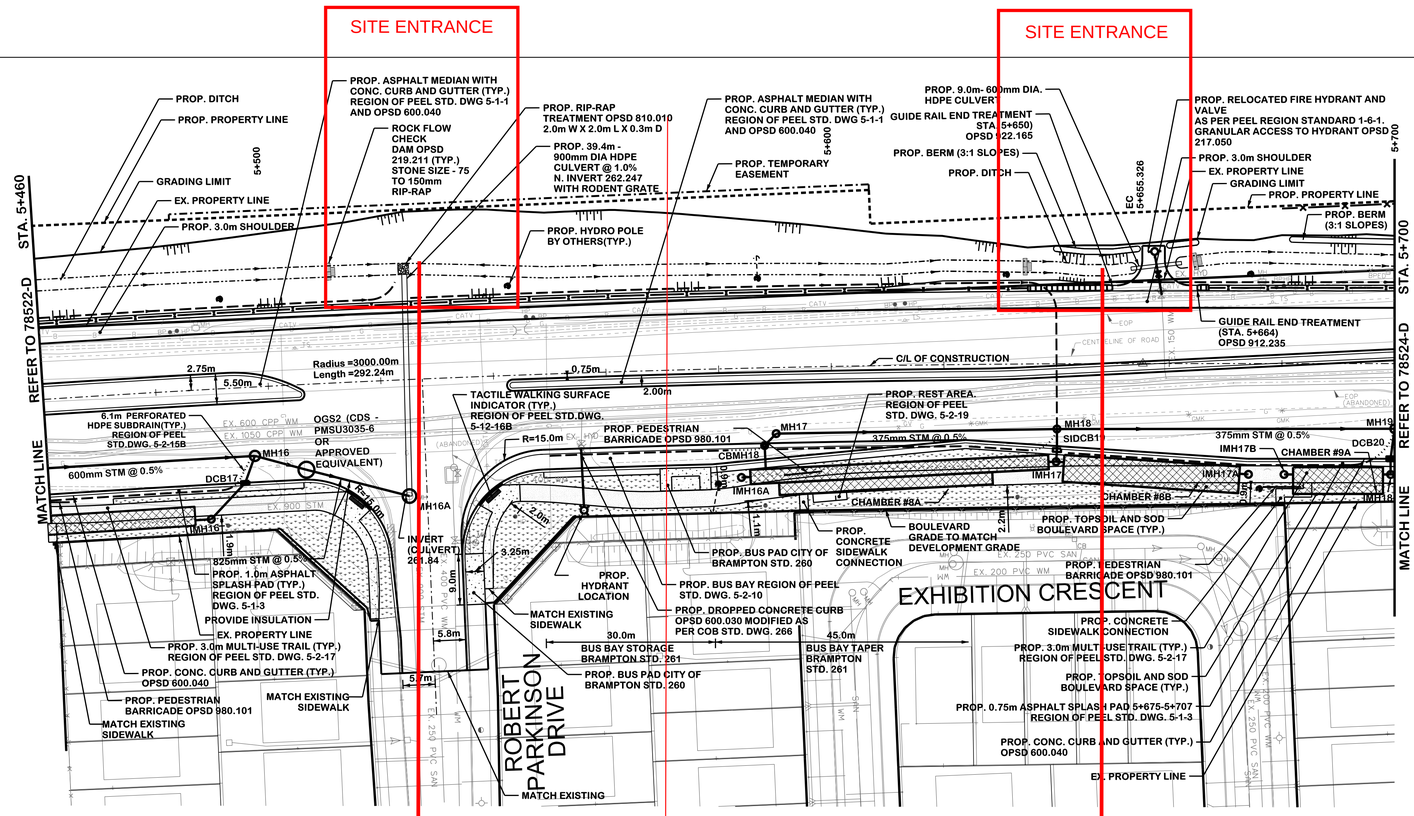
Pressure (psi)	*Flow (L/s)*	
92	0	*Static Pressure*
86	83.0	
78	137.3	

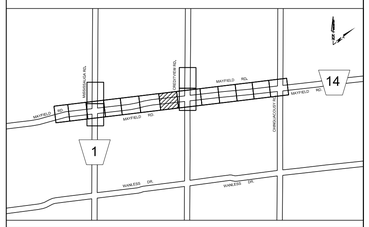
Flow Requirement =	***0***	L/s
Theoretical Pressure =	***92.1***	psi
With Pressure Losses =	***92.1***	psi
Minimum Required =	***20.3***	psi



APPENDIX D

SUPPORTING DOCUMENTS





SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
HYDRO ONE	SEP 28, 2017	S.S.	ALECTRA UTILITIES	JAN 18, 2019	S.S.
WATERMAINS	NOV 15, 2017	S.S.	PSN	MAY 18, 2018	S.S.
GAS MAINS	SEP 28, 2017	S.S.	SAN SEWERS	MAY 24, 2018	S.S.
BELL U/G CABLE	OCT 20, 2017	S.S.			
HYDRO ONE U/G	NOV 11, 2017	S.S.			
ROGERS	OCT 4, 2017	S.S.			

REVISIONS

DATE	DETAILS	INIT.
MARCH 21, 2023	ISSUED FOR TENDER	J.P.D.
APRIL 26, 2021	100% DESIGN SUBMISSION	J.P.D.
NOV 16, 2020	MECP SUBMISSION	J.P.D.
MAY 05, 2020	CVC PERMIT	J.P.D.
APRIL 18, 2019	ISSUED FOR 90% REVIEW	J.P.D.
JULY 13, 2018	ISSUED FOR 60% REVIEW	J.P.D.
JAN 19, 2018	ISSUED FOR 30% REVIEW	J.P.D.

LEGEND:

- PROPOSED FRENCH DRAIN
- PROPOSED IMPRESSED COLORED CONCRETE
- PROPOSED CONCRETE SIDEWALK / CONCRETE BUS PAD
- PROP. STEEL BEAM GUIDE RAIL OPSD 912.186
- PROPOSED HIGHWAY FENCE -OPSD 971,101
- PROPOSED MULTI USE PATH
- 150mm TOPSOIL AND SOD
- EXISTING BELL PLANTS
- EXISTING GAS LINE
- EXISTING WATERMAIN
- PROPOSED INFILTRATION TRENCH
- ROCK FLOW CHECK DAM OPSD 219.210 OR OPSD 219.211 STONE SIZE - 75 TO 150mm RIP-RAP

R.V. Anderson Associates Limited
engineering • environment • infrastructure

173653

General Notes

All Driveways Are ASPHALT Unless Otherwise Noted
All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
All Horizontal And Vertical Bends Are In Degrees
All Pipes Size In mm
2.0C Existing Water Service, Size In mm
WS25 Proposed Water Service, Size In mm
B.M. No, PEEL 61 Elev. 259.162 m
Description
Location On The East Face At The North Of Yellow Brick Bungalow Located On The South Of Mayfield Road
The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

NOTE:
1. Through Lane Before Merging Taper

Designed by ____ Chkd. ____ Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

10m 0 10 20 30m — HORIZONTAL SCALE
1m 0 1 2 3m — VERTICAL SCALE

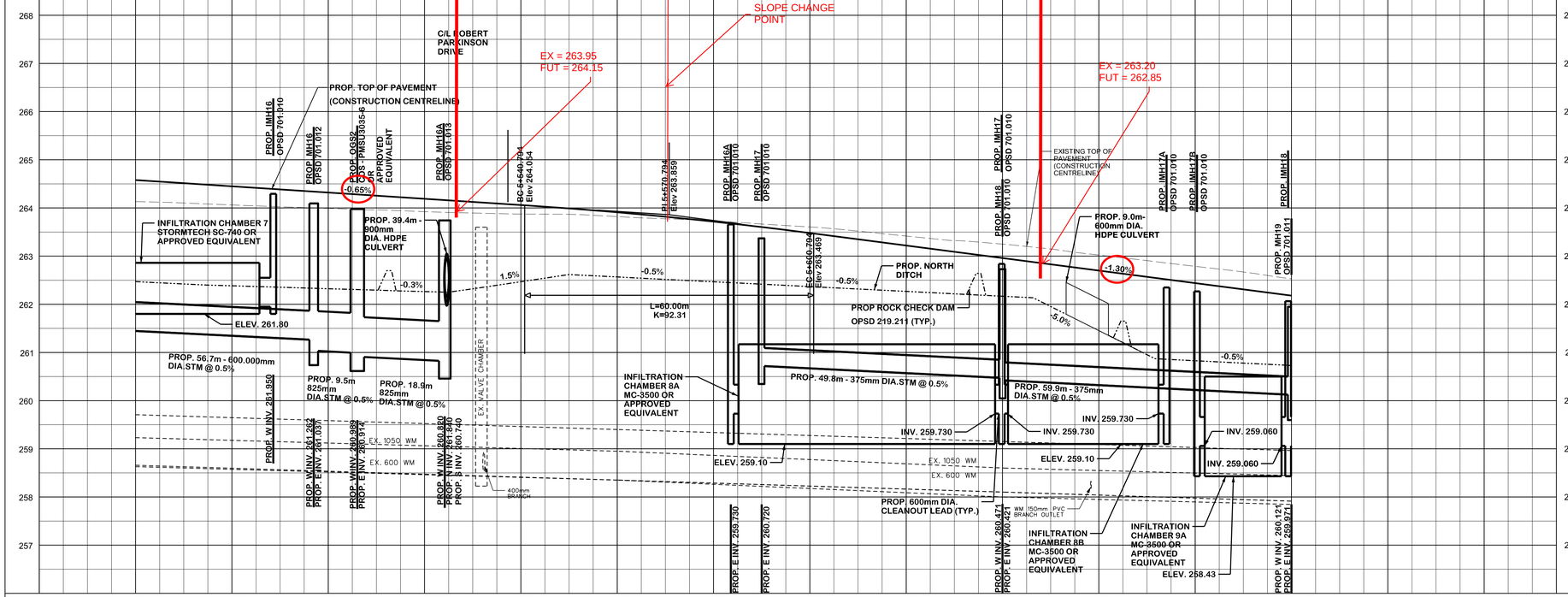
Region of Peel
working with you

MAYFIELD ROAD

(FROM MISSISSAUGA RD. TO CHINGUACOUSY RD.)

PROPOSED RECONSTRUCTION

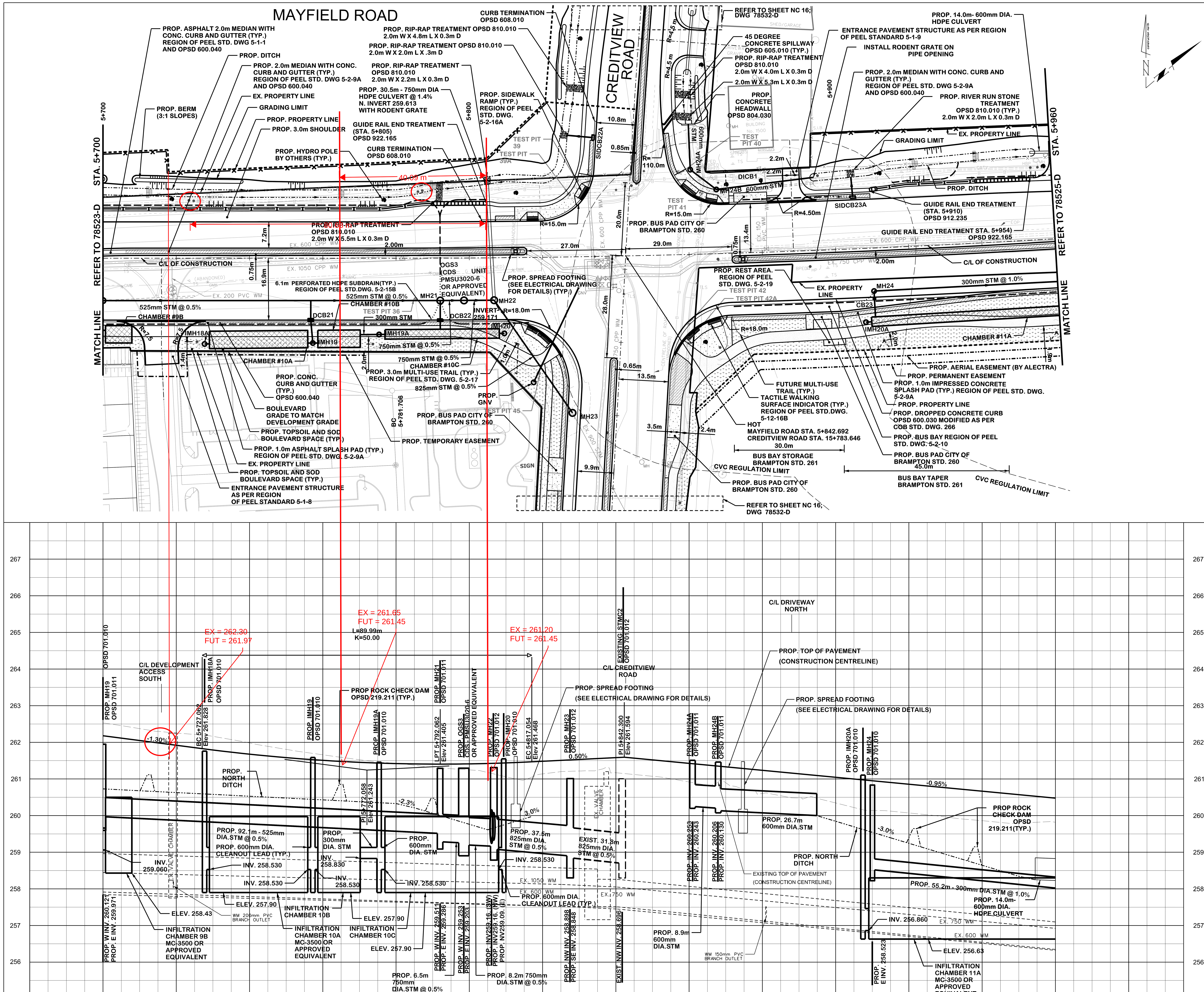
STA. 5+460 TO STA. 5+700



	N_262.47	N_262.38	N_262.32	N_262.26	N_262.47	N_262.57	N_262.47	N_262.37	N_262.27	N_262.17	N_261.45	N_260.83	N_260.73		PROP. SWALE ELEV
264.71	264.58	264.45	264.32	264.19	264.06	263.91	263.72	263.48	263.22	262.96	262.70	262.44	262.18	261.92	PROP. FINISHED GRADE
264.19	264.13	264.06	263.99	263.92	263.87	263.82	263.73	263.61	263.42	263.25	263.02	262.79	262.53	262.25	EX. ROAD ELEV.
5+440	5+460	5+480	5+500	5+520	5+540	5+560	5+580	5+600	5+620	5+640	5+660	5+680	5+700	5+720	ROAD CHAINAGE

CAD Area	Area B-33, C-09	Project No.	15-4070
Checked by K.A.C.	Drawn by S.S.		
Date: MAY 2020	Sheet: NC7 of NC20	Plan No.	**78523-D**

R:\2017\173653 - Mayfield\Rd\Project\Cad\Dwgs\Trans\DGN\Sheets\Plan and Profile\173653 - Plan and Profile 7.dgn
5:40:43 PM
2024-07-03
RVANTTrandanam



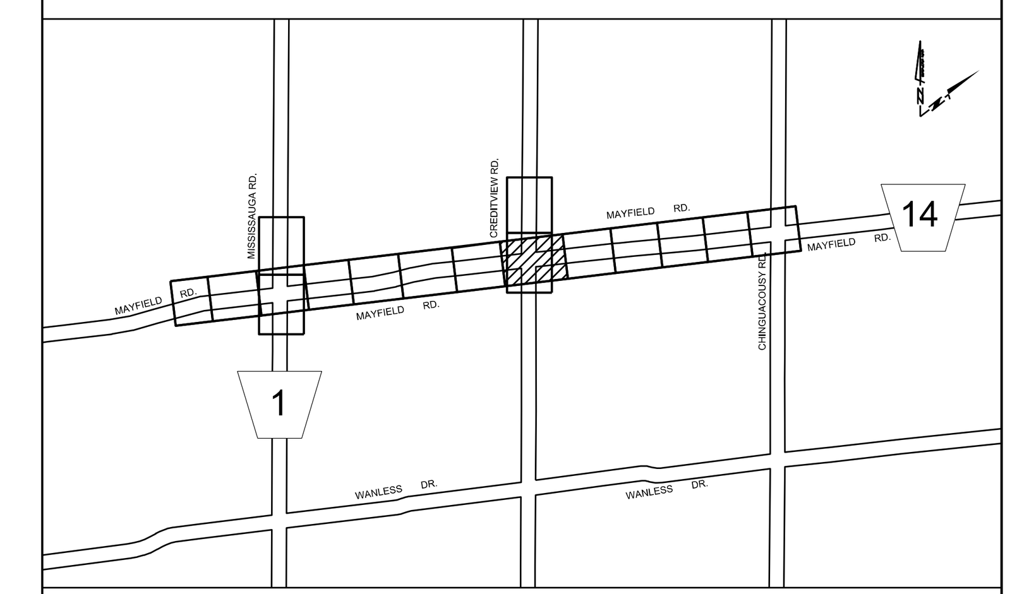
ROAD CHAINAGE	5+680	5+700	5+720	5+740	5+760	5+780	5+800	5+820	5+840	5+860	5+880	5+900	5+920	5+940	5+960
PROP. SWALE ELEV		N_260.73	N_260.63	N_260.53	N_260.43	N_260.33	N_259.76					N_259.84	N_259.24	N_258.64	N_258.22
PROP. FINISHED GRADE	262.44	262.18	261.92	261.68	261.51	261.42	261.41	261.48	261.58	261.43	261.24	261.05	260.86	260.67	260.48
EX. ROAD ELEV.	262.79	262.53	262.25	261.98	261.66	261.43	261.25	261.14	261.17	260.92	260.60	260.35	260.07	259.86	259.82

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
HYDRO ONE	SEP 28, 2017	S.S.	ALECTRA UTILITIES	JAN 18, 2019	S.S.
WATERMAINS	NOV 15, 2017	S.S.	PSN	MAY 18, 2018	S.S.
GAS MAINS	SEP 28, 2017	S.S.	SAN SEWERS	MAY 24, 2018	S.S.
BELL U/G CABLE	OCT 20, 2017	S.S.			
HYDRO ONE U/G	NOV 11, 2017	S.S.			
ROGERS	OCT 4, 2017	S.S.			

REVISIONS

DATE	DETAILS	INIT.
MARCH 21, 2023	ISSUED FOR TENDER	J.P.D.
APRIL 26, 2021	100% DESIGN SUBMISSION	J.P.D.
NOV 16, 2020	MECP SUBMISSION	J.P.D.
MAY 05, 2020	CVC PERMIT	J.P.D.
APRIL 18, 2019	ISSUED FOR 90% REVIEW	J.P.D.
JULY 13, 2018	ISSUED FOR 60% REVIEW	J.P.D.
JAN 19, 2018	ISSUED FOR 30% REVIEW	J.P.D.



LEGEND:

- PROPOSED FRENCH DRAIN
- PROPOSED IMPRESSED COLORED CONCRETE
- PROPOSED CONCRETE SIDEWALK / CONCRETE BUS PAD
- PROP. STEEL BEAM GUIDE RAIL OPSD 912.186
- PROPOSED HIGHWAY FENCE -OPSD 971.101
- PROPOSED MULTI USE PATH
- 150mm TOPSOIL AND SOD
- EXISTING BELL PLANTS
- EXISTING GAS LINE
- EXISTING WATERMAIN
- PROPOSED INFILTRATION TRENCH
- ROCK FLOW CHECK DAM OPSD 219.210 OR OPSD 219.211 STONE SIZE - 75 TO 150mm RIP-RAP

R.V. Anderson Associates Limited
engineering • environment • infrastructure

173653

General Notes

All Driveways Are ASPHALT Unless Otherwise Noted
All Water And Sanitary Service Locations Are Approximate And Must Be Located Accurately In The Field
All Horizontal And Vertical Bends Are In Degrees
All Pipes Size In mm
20C Existing Water Service, Size In mm
WS25 Proposed Water Service, Size In mm
B.M. No. PEEL 61 Elev. 259.162 m
Description
Location On The East Face At The North Of Yellow Brick Bungalow Located On The South Of Mayfield Road
The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction. Location Of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

NOTE:
1. Through Lane Before Merging Taper

Designed by ______ Chkd. ______
Approved by ______

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL
CITY OF MISSISSAUGA WORKS DEPT.
CITY OF BRAMPTON WORKS DEPT.
TOWN OF CALEDON WORKS DEPT.
BELL CANADA
ENBRIDGE INCORPORATED-GAS DISTRIBUTION
ONTARIO MINISTRY OF TRANSPORTATION
ONTARIO CLEAN WATER AGENCY
HYDRO ONE NETWORKS
ENERSOURCE, HYDRO MISSISSAUGA
HYDRO ONE BRAMPTON

CABLE TELEVISION/FIBREOPTIC PROVIDERS:
BELL CANADA
ENERSOURCE TELECOM
HYDRO ONE TELECOM
ROGERS CABLE
ALLSTREAM
PSN (PUBLIC SECTOR NETWORK)
FUTUREWAY (FCI BROADBAND)

HORIZONTAL SCALE: 10m 0 10 20 30m (30.00 m)
VERTICAL SCALE: 1m 0 1 2 3m

Region of Peel
working with you

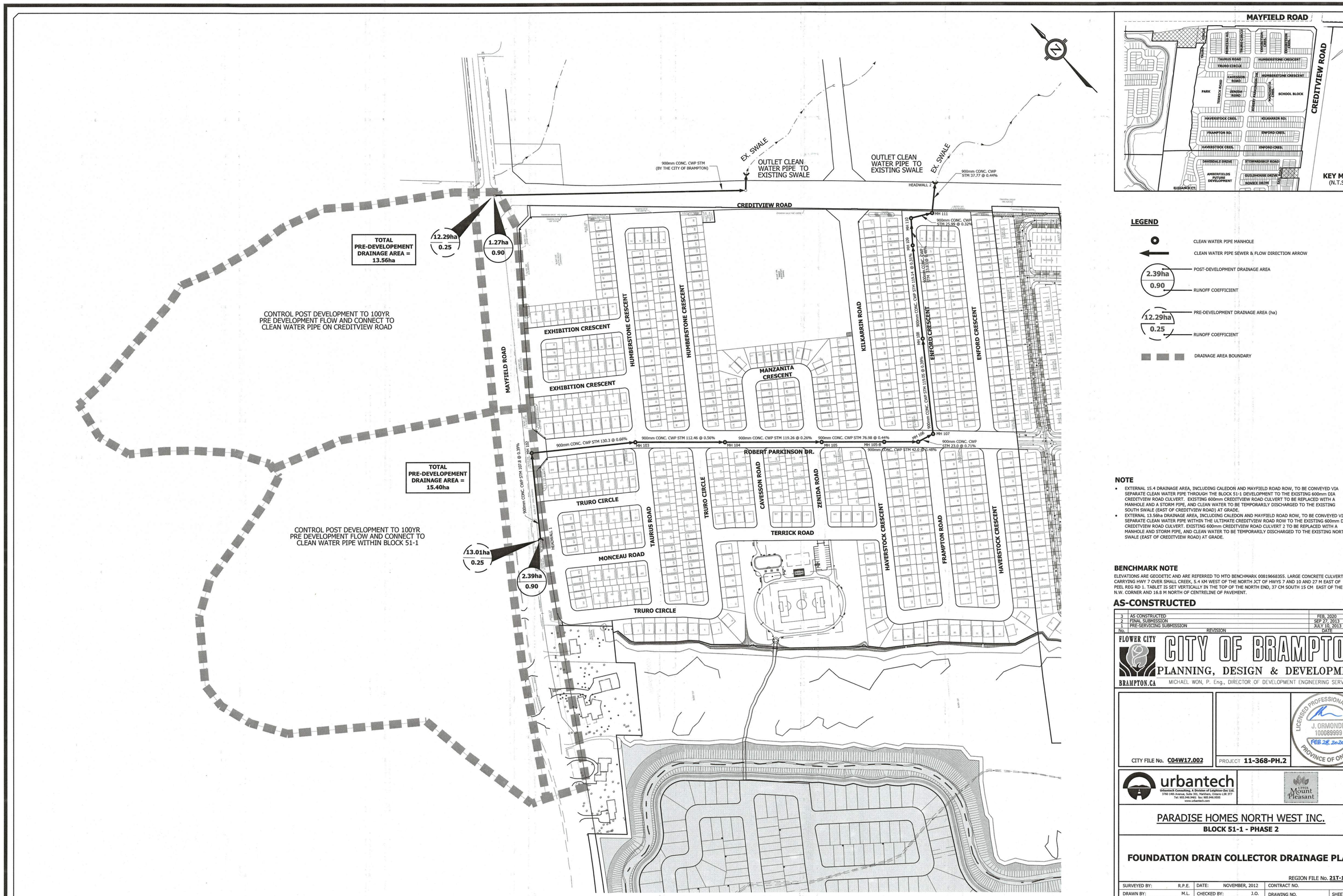
MAYFIELD ROAD

(FROM MISSISSAUGA RD. TO CHINGUACOUSY RD.)

PROPOSED RECONSTRUCTION

STA. 5+700 TO STA. 5+960

CAD Area	Area B-33. C-09	Project No. 15-4070
Checked by K.A.C.	Drawn by S.S.	
Date: MAY 2020	Sheet: NC8 of NC20	Plan No. 78524-D



LEGEND

- CLEAN WATER PIPE MANHOLE
- CLEAN WATER PIPE SEWER & FLOW DIRECTION ARROW
- 2.39ha / 0.90 — POST-DEVELOPMENT DRAINAGE AREA & RUNOFF COEFFICIENT
- 12.29ha / 0.25 — PRE-DEVELOPMENT DRAINAGE AREA (ha) & RUNOFF COEFFICIENT
- DRAINAGE AREA BOUNDARY

NOTE

- EXTERNAL 15.4 DRAINAGE AREA, INCLUDING CALEDON AND MAYFIELD ROAD ROW, TO BE CONVEYED VIA SEPARATE CLEAN WATER PIPE THROUGH THE BLOCK 51-1 DEVELOPMENT TO THE EXISTING 600mm DIA CREDITVIEW ROAD CULVERT. EXISTING 600mm CREDITVIEW ROAD CULVERT TO BE REPLACED WITH A MANHOLE AND A STORM PIPE, AND CLEAN WATER TO BE TEMPORARILY DISCHARGED TO THE EXISTING SOUTH SWALE (EAST OF CREDITVIEW ROAD) AT GRADE.
- EXTERNAL 13.56ha DRAINAGE AREA, INCLUDING CALEDON AND MAYFIELD ROAD ROW, TO BE CONVEYED VIA SEPARATE CLEAN WATER PIPE WITHIN THE ULTIMATE CREDITVIEW ROAD ROW TO THE EXISTING 600mm DIA CREDITVIEW ROAD CULVERT. EXISTING 600mm CREDITVIEW ROAD CULVERT 2 TO BE REPLACED WITH A MANHOLE AND STORM PIPE, AND CLEAN WATER TO BE TEMPORARILY DISCHARGED TO THE EXISTING NORTH SWALE (EAST OF CREDITVIEW ROAD) AT GRADE.

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO BENCHMARK 00819668355. LARGE CONCRETE CULVERT CARRYING HWY 7 OVER SMALL CREEK, 5.4 KM WEST OF THE NORTH JCT OF HWYS 7 AND 10 AND 27 M EAST OF PEEL REG RD 1. TABLET IS SET VERTICALLY IN THE TOP OF THE NORTH END, 37 CM SOUTH 15 CM EAST OF THE N.W. CORNER AND 16.8 M NORTH OF CENTRELINE OF PAVEMENT.

AS-CONSTRUCTED

No.	REVISION	DATE	BY
3	AS CONSTRUCTED	FEB, 2020	J.G.
2	FINAL SUBMISSION	SEP 27, 2013	J.O.
1	PRE-SERVICING SUBMISSION	JULY 10, 2013	J.O.

FLOWER CITY
CITY OF BRAMPTON
PLANNING, DESIGN & DEVELOPMENT
BRAMPTON.CA
MICHAEL WON, P. Eng., DIRECTOR OF DEVELOPMENT ENGINEERING SERVICES

LICENSED PROFESSIONAL ENGINEER — J. ORMONDE — 100089999 — FEB 28 2020 — PROVINCE OF ONTARIO

CITY FILE No. **C04W17.002**

PROJECT **11-368-PH.2**

urbantech
Urbantech Consulting, A Division of Leighton-Zec Ltd.
3760 14th Avenue, Suite 301, Markham, Ontario L3R 3T7
Tel: 905.946.9461 fax: 905.946.9595
www.urbantech.com

Little Mount Pleasant

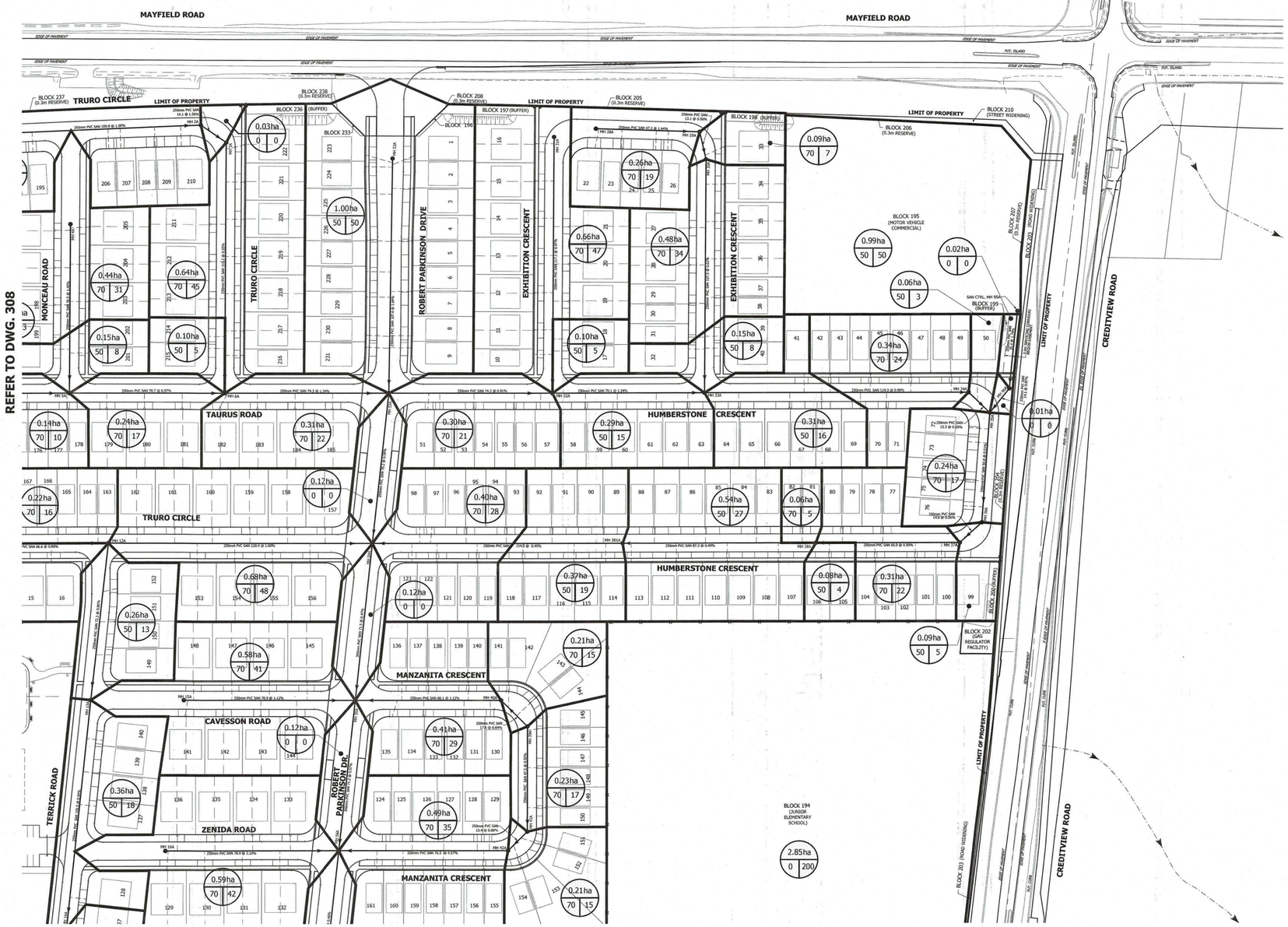
PARADISE HOMES NORTH WEST INC.
BLOCK 51-1 - PHASE 2

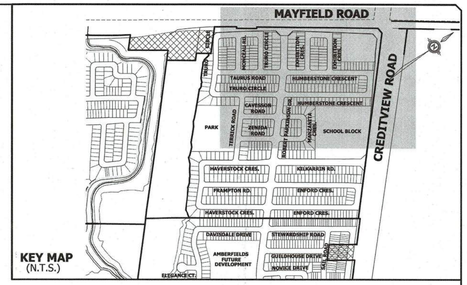
FOUNDATION DRAIN COLLECTOR DRAINAGE PLAN

REGION FILE No. **21T-10011Ba**

SURVEYED BY:	R.P.E.	DATE:	NOVEMBER, 2012	CONTRACT NO.	
DRAWN BY:	M.L.	CHECKED BY:	J.O.	DRAWING NO.	SHEET NO.
DESIGNED BY:	M.Z.	CHECKED BY:	J.O.	C1-9-1	306
SCALE:	1:2000	DATE:	JAN 20, 2014		

File: P:\Projects\11-368-Phase 2\Drawings\As-Constructed\Drawings\300 - Drainage - Revised by <JGILLINGHAM> - Fri, Feb 28 2020 - 4:45pm





LEGEND

- SANITARY MANHOLE AND FLOW DIRECTION ARROW
- 0.10ha / 70 | 7 — DRAINAGE AREA (ha) / POPULATION / POPULATION PER Ha (P/Ha)
- DRAINAGE AREA BOUNDARY
- EXTERNAL DRAINAGE AREA BOUNDARY
- DOUBLE HOUSE CONNECTION
- SINGLE HOUSE CONNECTION

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO BENCHMARK 00819668355, LARGE CONCRETE CULVERT CARRYING HWY 7 OVER SMALL CREEK, 5.4 KM WEST OF THE NORTH JCT OF HWYS 7 AND 10 AND 27 M EAST OF PEEL REG RD 1. TABLET IS SET VERTICALLY IN THE TOP OF THE NORTH END, 37 CM SOUTH 15 CM EAST OF THE N.W. CORNER AND 16.8 M NORTH OF CENTRELINE OF PAVEMENT.

AS-CONSTRUCTED

No.	REVISION	DATE	BY
4	AS CONSTRUCTED	FEB. 2020	J.O.
3	ADDITIONAL MAYFIELD ROAD WIDENING BLOCK 210	DEC 12, 2013	J.O.
2	FINAL SUBMISSION	SEP 27, 2013	J.O.
1	PRE-SERVICING SUBMISSION	JULY 10, 2013	J.O.

FLOWER CITY **CITY OF BRAMPTON**
PLANNING, DESIGN & DEVELOPMENT
BRAMPTON.CA
MICHAEL WON, P. Eng., DIRECTOR OF DEVELOPMENT ENGINEERING SERVICES

LICENSED PROFESSIONAL ENGINEER — J. ORMONDE — 100089999 — FEB.28.2020 — PROVINCE OF ONTARIO

CITY FILE No. **C04W17.002**
PROJECT **11-368-PH.2**

urbantech
Urbantech Consulting, A Division of Leighton-Zoc Ltd.
3760 14th Avenue, Suite 201, Markham, Ontario L3R 3T7
Tel: 905.946.9461 fax: 905.946.9595
www.urbantech.com

PARADISE HOMES NORTH WEST INC.

BLOCK 51-1 - PHASE 2

SANITARY DRAINAGE PLAN (PART 1)

REGION FILE No. **21T-10011Ba**

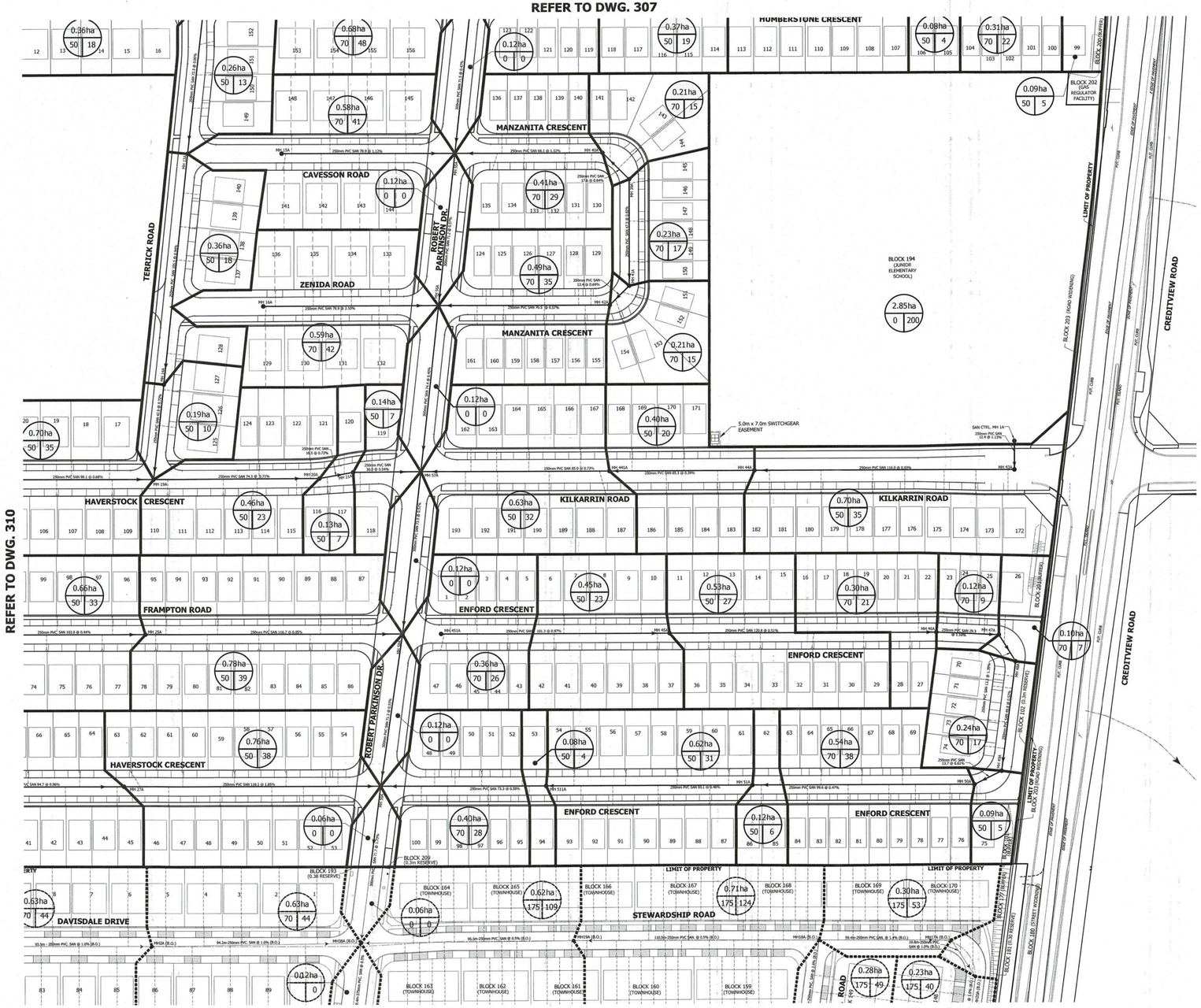
SURVEYED BY:	R.P.E.	DATE: NOVEMBER, 2012		CONTRACT NO.	
DRAWN BY:	J.S.	CHECKED BY:	J.O.	DRAWING NO.	SHEET NO.
DESIGNED BY:	J.O.	CHECKED BY:	J.O.	C1-4-5	307
SCALE:	1:1000	DATE:	JAN 20, 2014		

File: P:\Projects\11-368-Phase 2\Drawings\As-Constructed\Drawings\300 - Drainage - Revised by: <XEILLINGHAM> - Fri, Feb 28 2020 - 4:47pm

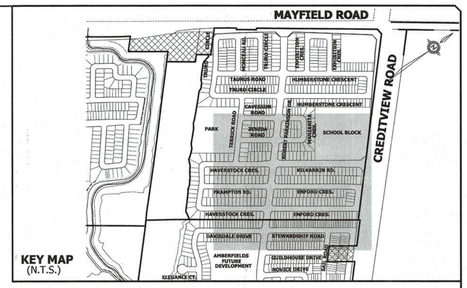
AS-CONSTRUCTED C1-4-5

REFER TO DWG. 307

REFER TO DWG. 310



REFER TO AMBER FIELDS LIMITED,
PROJECT No.: 11916
BY COUNTERPOINT ENGINEERING INC.



KEY MAP
(N.T.S.)

LEGEND

- SANITARY MANHOLE AND FLOW DIRECTION ARROW
- 0.10ha / 70 / 7 — DRAINAGE AREA (ha); POPULATION; POPULATION PER Ha (P/Ha)
- DRAINAGE AREA BOUNDARY
- EXTERNAL DRAINAGE AREA BOUNDARY
- DOUBLE HOUSE CONNECTION
- SINGLE HOUSE CONNECTION

BENCHMARK NOTE

ELEVATIONS ARE GEODETIC AND ARE REFERRED TO MTO BENCHMARK 00819668355. LARGE CONCRETE CULVERT CARRYING HWY 7 OVER SMALL CREEK, 5.4 KM WEST OF THE NORTH JCT OF HWYS 7 AND 10 AND 27 M EAST OF PEEL REG RD 1. TABLET IS SET VERTICALLY IN THE TOP OF THE NORTH END, 37 CM SOUTH 15 CM EAST OF THE N.W. CORNER AND 16.8 M NORTH OF CENTRELINE OF PAVEMENT.

AS-CONSTRUCTED

No.	REVISION	DATE	BY
4	AS CONSTRUCTED	FEB. 2020	J.O.
3	ADDITIONAL MAYFIELD ROAD WIDENING BLOCK 210	DEC 12, 2013	J.O.
2	FINAL SUBMISSION	SEP 27, 2013	J.O.
1	PRE-SERVICING SUBMISSION	JULY 10, 2013	J.O.

FLOWER CITY
CITY OF BRAMPTON
PLANNING, DESIGN & DEVELOPMENT
BRAMPTON.CA
MICHAEL WON, P. Eng., DIRECTOR OF DEVELOPMENT ENGINEERING SERVICES

LICENSED PROFESSIONAL ENGINEER
J. ORMONDE
100089999
FEB 28, 2020
PROVINCE OF ONTARIO

CITY FILE No. **C04W17.002**

PROJECT **11-368-PH.2**

urbantech
Urbantech Consulting, A Division of Leighton-Zec Ltd.
3760 14th Avenue, Suite 201, Markham, Ontario L3R 3T7
Tel: 905.946.9461 fax: 905.946.9595
www.urbantech.com

Mount Pleasant

PARADISE HOMES NORTH WEST INC.

BLOCK 51-1 - PHASE 2

SANITARY DRAINAGE PLAN (PART 3)

REGION FILE No. **21T-10011Ba**

SURVEYED BY:	R.P.E.	DATE:	NOVEMBER, 2012	CONTRACT NO.	
DRAWN BY:	J.S.	CHECKED BY:	J.O.	DRAWING NO.	SHEET NO.
DESIGNED BY:	J.O.	CHECKED BY:	J.O.	C1-4-7	309
SCALE:	1:1000	DATE:	JAN 20, 2014		

File: P:\Projects\11-368-Phase 2\Drawings\As-Constructed\Drawings\300 - Drainage - Revised by <JGILLINGHAM> - Fri, Feb 28 2020 - 4:50pm

AS-CONSTRUCTED C1-4-7

urbantech

AS CONSTRUCTED - SANITARY SEWER DESIGN SHEET

Paradise Homes North West Inc. - Phase 2

Region of Peel

PROJECT DETAILS

Registered Plan No: 43M-1947/43M-1948/43M-1949
City File No: C04W17.002B
Region File No: 21T-10011Ba
Project No: 11-368-PH2
Date: 28-Feb-20
Designed by: M.L.
Checked by: J.O.

DESIGN CRITERIA

Min. Flow =	13	l/s	Avg. Domestic Flow =	302.8	l/c/d
Min Diameter =	250	mm	Infiltration =	0.200	l/s/ha
Mannings 'n'=	0.013				
Min. Velocity =	0.75	m/s	Max. Peaking Factor =	4.00	
Max. Velocity =	3.50	m/s	Min. Peaking Factor=	1.50	
			Domestic Sewage flow for < 1000 ppl = 0.013m³/s		
Factor of Safety =	0	%	(Region of Peel Std. 2-5-2)		

NOMINAL PIPE SIZE USED

LICENSED PROFESSIONAL ENGINEER
J. ORMONDE
100089995
FEB 28, 2020
PROVINCE OF ONTARIO

STREET	FROM MH	TO MH	RESIDENTIAL AREA (ha)	ACC. AREA (ha)	UNITS (#)	DENSITY (P/ha)	DENSITY (P/unit)	POP	ACCUM. RES. POP.	COMMERCIAL/INDUSTRIAL/INSTITUTIONAL AREA (ha)	ACC. AREA (ha)	EQUIV. POP. (p/ha)	FLOW RATE (l/s/ha)	EQUIV. POP.	ACCUM. EQUIV. POP.	FLOW CALCULATIONS INFILTRATION (l/s)	TOTAL ACCUM. POP.	PEAKING FACTOR	RES. FLOW (l/s)	MIN. RES. FLOW (l/s)	COMM. FLOW (l/s)	ACCUM. COMM. FLOW (l/s)	TOTAL FLOW (l/s)	PIPE DATA SLOPE (%)	PIPE DIAMETER (mm)	PIPE LENGTH (m)	FULL FLOW CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)	PERCENT FULL (%)
FUTURE ALLOA PUMP STATION	100A	1A																						0.66	250	10.7	48.3	0.98	0.26	
TRURO CIRCLE	1A	2A	0.56	0.56		70		40	40							0.1	40	4.00	0.6	13.0			13.1	1.00	250	109.8	59.5	1.21	0.96	22%
TRURO CIRCLE	2A	3A	0.03	0.59					40							0.1	40	4.00	0.6	13.0			13.1	1.56	250	14.1	74.3	1.51	1.13	18%
TRURO CIRCLE	3A	6A	0.64	1.23		70		45	85							0.2	85	4.00	1.2	13.0			13.2	0.55	250	115.2	44.1	0.90	0.78	30%
		6A	0.10	0.10		50		5	5							0.0	5	4.00	0.1	13.0			13.0							
TAURUS ROAD	9A-E	5A	0.14	0.14		70		10	10							0.0	10	4.00	0.1	13.0			13.0	2.19	250	70.4	88.0	1.79	1.29	15%
TAURUS ROAD		5A	0.17	0.17		50		9	9							0.0	9	4.00	0.1	13.0			13.0							
MONCEAU ROAD	4A	5A	0.44	0.44		70		31	31							0.1	31	4.00	0.4	13.0			13.1	1.45	250	76.5	71.6	1.46	1.09	18%
		5A	0.15	0.15		50		8	8							0.0	8	4.00	0.1	13.0			13.0							
TAURUS ROAD	5A	6A	0.24	1.14		70		17	75							0.2	75	4.00	1.1	13.0			13.2	0.57	250	70.7	44.9	0.91	0.78	29%
TAURUS ROAD	6A	53A-S	0.31	2.78		70		22	187							0.6	187	4.00	2.6	13.0			13.6	1.24	250	74.2	66.2	1.35	1.04	20%
ROBERT PARKINSON DRIVE	52A	53A-S	1.00	1.00		50		50	50							0.2	50	4.00	0.7	13.0			13.2	1.64	250	107.6	76.2	1.55	1.15	17%
ROBERT PARKINSON DRIVE	53A-S	54A	0.12	3.90					237							0.8	237	4.00	3.3	13.0			13.8	0.58	250	70.2	45.3	0.92	0.80	30%
TRURO CIRCLE	7A	8A	0.34	0.34		70		24	24							0.1	24	4.00	0.3	13.0			13.1	0.99	250	49.1	59.2	1.21	0.95	22%
TRURO CIRCLE	8A	9A-S	0.16	0.50		50		8	32							0.1	32	4.00	0.4	13.0			13.1	0.72	250	22.7	50.5	1.03	0.85	26%
		9A-S	0.03	0.03		70		3	3							0.0	3	4.00	0.0	13.0			13.0							
TRURO CIRCLE	9A-S	10A	0.40	0.93		50		20	55							0.2	55	4.00	0.8	13.0			13.2	0.43	250	60.1	39.0	0.79	0.69	34%
TRURO CIRCLE	10A	11A	0.17	1.10		50		9	64							0.2	64	4.00	0.9	13.0			13.2	0.96	250	15.5	58.3	1.19	0.94	23%
TRURO CIRCLE	11A	12A-E	0.36	1.46		50		18	82							0.3	82	4.00	1.1	13.0			13.3	0.49	250	86.6	41.6	0.85	0.74	32%
		12A-E	0.22	0.22		70		16	16							0.0	16	4.00	0.2	13.0			13.0							
TRURO CIRCLE	12A-E	54A	0.68	2.36		70		48	146							0.5	146	4.00	2.0	13.0			13.5	1.60	250	120.4	75.2	1.53	1.15	18%
HUMBERSTONE CRESCENT	53A-E	32A	0.30	0.30		70		21	21							0.1	21	4.00	0.3	13.0			13.1	0.91	250	74.2	56.7	1.16	0.91	23%
EXHIBITION CRESCENT	31A	32A	0.66	0.66		70		47	47							0.1	47	4.00	0.7	13.0			13.1	0.97	250	117.1	58.6	1.19	0.94	22%
		32A	0.10	0.10		50		5	5							0.0	5	4.00	0.1	13.0			13.0							
HUMBERSTONE CRESCENT	32A	33A	0.29	1.35		50		15	88							0.3	88	4.00	1.2	13.0			13.3	1.34	250	70.1	68.8	1.40	1.07	19%
EXHIBITION CRESCENT	28A	29A	0.26	0.26		70		19	19							0.1	19	4.00	0.3	13.0			13.1	1.44	250	47.3	71.4	1.45	1.09	18%
EXHIBITION CRESCENT	29A	30A	0.09	0.35		70		7	26							0.1	26	4.00	0.4	13.0			13.1	0.50	250	13.1	42.0	0.86	0.75	31%
EXHIBITION CRESCENT	30A	33A	0.48	0.83		70		34	60							0.2	60	4.00	0.8	13.0			13.2	0.62	250	1047.5	46.8	0.95	0.81	28%
		33A	0.15	0.15		50		8	8							0.0	8	4.00	0.1	13.0			13.0							
HUMBERSTONE CRESCENT	33A	34A	0.31	2.64		50		16	172							0.5	172	4.00	2.4	13.0			13.5	0.49	250	119.3	41.6	0.85	0.74	32%
		34A	0.34	0.34		70		24	24							0.1	24	4.00	0.3	13.0			13.1							
HUMBERSTONE CRESCENT	34A	35A	0.06	3.04		50		3	199							0.6	199	4.00	2.8	13.0			13.6	0.50	250	13.3	42.0	0.86	0.75	32%
BLOCK 195 (COMMERCIAL)	DEALERSHIP	CTRL 95A	0.99	0.99		50		50	50							0.2	50	4.00	0.7	13.0			13.2		250					
HUMBERSTONE CRESCENT	CTRL 95A	96A	0.02	1.01					50							0.2	50	4.00	0.7	13.0			13.2	1.79	250	35.4	79.6	1.62	1.20	17%
HUMBERSTONE CRESCENT	96A	35A	0.01	1.02					50							0.2	50	4.00	0.7	13.0			13.2	0.87	250	14.1	55.5	1.13	0.92	24%
HUMBERSTONE CRESCENT	35A	36A	0.24	4.30		70		17	266							0.9	266	4.00	3.7	13.0			13.9	0.51	250	50.8	42.5	0.87	0.75	33%
HUMBERSTONE CRESCENT	36A	37A	0.09	4.39		50		5	271							0.9	271	4.00	3.8	13.0			13.9	0.26	250	14.0	30.3	0.62	0.59	46%
HUMBERSTONE CRESCENT	37A	38A	0.31	4.70		70		22	293							0.9	293	4.00	4.1	13.0			13.9	0.50	250	65.0	42.0	0.86	0.75	33%
		38A	0.08	0.08		50		4	4							0.0	4	4.00	0.1	13.0			13.0							
HUMBERSTONE CRESCENT	38A	381A	0.54	5.32		50		27	324							1.1	324	4.00	4.5	13.0			14.1	0.49	250	87.3	41.6	0.85	0.74	34%
		381A	0.06	0.06		70		5	5							0.0	5	4.00	0.1	13.0			13.0							
HUMBERSTONE CRESCENT	381A	54A	0.37	5.75		50		19	348							1.2	348	4.00	4.9	13.0			14.2	0.45	250	114.3	39.9	0.81	0.73	35%
		54A	0.40	0.40		70		28	28							0.1	28	4.00	0.4	13.0			13.1							
ROBERT PARKINSON DRIVE	54A	55A	0.12	12.53					759							2.5	759	3.87	10.3	13.0			15.5	0.47	300	71.5	66.3	0.94	0.74	23%
CAVESSON ROAD	15A	55A	0.58	0.58		70		41	41							0.1	41	4.00	0.6	13.0			13.1	1.12	250	78.9	62.9	1.28	0.99	21%

Urbantech Consulting, A Division of Leighton-Zec Ltd.
3760 14th Avenue, Suite 301 Markham, Ontario L3R 3T7
TEL: 905.946.9461 FAX: 905.946.9595
www.urbantech.com

urbantech

AS CONSTRUCTED - SANITARY SEWER DESIGN SHEET

Paradise Homes North West Inc. - Phase 2

Region of Peel

PROJECT DETAILS

Registered Plan No: 43M-1947/43M-1948/43M-1949
City File No: C04W17.002B
Region File No: 21T-10011Ba
Project No: 11-368-PH2
Date: 28-Feb-20
Designed by: M.L.
Checked by: J.O.

DESIGN CRITERIA

Min. Flow =	13	l/s	Avg. Domestic Flow =	302.8	l/c/d
Min Diameter =	250	mm	Infiltration =	0.200	l/s/ha
Mannings 'n'=	0.013		Max. Peaking Factor =	4.00	
Min. Velocity =	0.75	m/s	Min. Peaking Factor=	1.50	
Max. Velocity =	3.50	m/s	Domestic Sewage flow for < 1000 ppl = 0.013m³/s		
Factor of Safety =	0	%	(Region of Peel Std. 2-5-2)		

NOMINAL PIPE SIZE USED

LICENSED PROFESSIONAL ENGINEER
J. ORMONDE
100089993
FEB 28, 2020
PROVINCE OF ONTARIO

STREET	FROM MH	TO MH	RESIDENTIAL AREA (ha)	RESIDENTIAL ACC. AREA (ha)	RESIDENTIAL UNITS (#)	RESIDENTIAL DENSITY (P/ha)	RESIDENTIAL DENSITY (P/unit)	RESIDENTIAL POP	RESIDENTIAL ACCUM. RES. POP.	COMMERCIAL/INDUSTRIAL/INSTITUTIONAL AREA (ha)	COMM/IND/INST ACC. AREA (ha)	COMM/IND/INST EQUIV. POP. (p/ha)	COMM/IND/INST FLOW RATE (l/s/ha)	COMM/IND/INST EQUIV. POP.	COMM/IND/INST ACCUM. EQUIV. POP.	FLOW CALCULATIONS INFILTRATION (l/s)	TOTAL ACCUM. POP.	PEAKING FACTOR	RES. FLOW (l/s)	MIN. RES. FLOW (l/s)	COMM. FLOW (l/s)	ACCUM. COMM. FLOW (l/s)	TOTAL FLOW (l/s)	PIPE DATA SLOPE (%)	PIPE DIAMETER (mm)	PIPE LENGTH (m)	FULL FLOW CAPACITY (l/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)	PERCENT FULL (%)
MANZANITA CRESCENT	39A-N	40A	0.21	0.21		70		15	15							0.0	15	4.00	0.2	13.0			13.0	0.64	250	17.6	47.6	0.97	0.80	27%
MANZANITA CRESCENT	40A	55A	0.41	0.62		70		29	44							0.1	44	4.00	0.6	13.0			13.1	1.12	250	66.1	62.9	1.28	0.99	21%
ROBERT PARKINSON DRIVE	55A	56A	0.12	13.85					844							2.8	844	3.85	11.4	13.0			15.8	0.57	300	71.2	73.0	1.03	0.82	22%
ZENIDA ROAD	16A	56A	0.59	0.59		70		42	42							0.1	42	4.00	0.6	13.0			13.1	2.10	250	78.9	86.2	1.76	1.26	15%
MANZANITA CRESCENT	39A-S	41A	0.23	0.23		70		17	17							0.0	17	4.00	0.2	13.0			13.0	0.92	250	47.5	57.0	1.16	0.92	23%
MANZANITA CRESCENT	41A	42A	0.21	0.44		70		15	32							0.1	32	4.00	0.4	13.0			13.1	0.69	250	13.4	49.4	1.01	0.84	26%
MANZANITA CRESCENT	42A	56A	0.49	0.93		70		35	67							0.2	67	4.00	0.9	13.0			13.2	0.57	250	76.5	44.9	0.91	0.78	29%
ROBERT PARKINSON DRIVE	56A	57A	0.12	15.49					953							3.1	953	3.81	12.7	13.0			16.1	0.40	300	74.4	61.2	0.87	0.72	26%
TERRICK ROAD	12A-S	13A	0.26	0.26		50		13	13							0.1	13	4.00	0.2	13.0			13.1	0.90	250	72.3	56.4	1.15	0.91	23%
TERRICK ROAD	13A	14A	0.36	0.62		50		18	31							0.1	31	4.00	0.4	13.0			13.1	0.94	250	105.5	57.7	1.17	0.93	23%
TERRICK ROAD	14A	19A	0.19	0.81		50		10	41							0.2	41	4.00	0.6	13.0			13.2	0.72	250	42.9	50.5	1.03	0.85	26%
HAVERSTOCK CRESCENT	17A-N	18A	0.16	0.16		50		8	8							0.0	8	4.00	0.1	13.0			13.0	0.73	250	14.2	50.8	1.04	0.86	26%
HAVERSTOCK CRESCENT	18A	19A	0.70	0.86		50		35	43							0.2	43	4.00	0.6	13.0			13.2	0.68	250	99.1	49.0	1.00	0.83	27%
HAVERSTOCK CRESCENT	19A	20A	0.46	2.13		50		23	107							0.4	107	4.00	1.5	13.0			13.4	0.71	250	74.5	50.1	1.02	0.85	27%
HAVERSTOCK CRESCENT	20A	21A	0.13	2.26		50		7	114							0.5	114	4.00	1.6	13.0			13.5	0.72	250	16.5	50.5	1.03	0.85	27%
HAVERSTOCK CRESCENT	21A	57A	0.14	2.40		50		7	121							0.5	121	4.00	1.7	13.0			13.5	0.54	250	30.0	43.7	0.89	0.77	31%
BLOCK 194 (JUNIOR SCHOOL)	SCHOOL	CTRL 1A	2.85	2.85				200	200							0.6	200	4.00	2.8	13.0			13.6		250					
KILKARRIN ROAD	CTRL 1A	43A		2.85					200							0.6	200	4.00	2.8	13.0			13.6	1.13	250	12.4	63.2	1.29	0.99	21%
KILKARRIN ROAD	43A	44A	0.70	3.55		50		35	235							0.7	235	4.00	3.3	13.0			13.7	0.93	250	116.0	57.3	1.17	0.95	24%
KILKARRIN ROAD	44A	441A	0.40	3.95		50		20	255							0.8	255	4.00	3.6	13.0			13.8	0.39	250	65.3	37.1	0.76	0.68	37%
KILKARRIN ROAD	441A	57A	0.63	4.58		50		32	287							0.9	287	4.00	4.0	13.0			13.9	0.73	250	85.0	50.8	1.04	0.86	27%
ROBERT PARKINSON DRIVE	57A	58A	0.12	22.59					1361							4.5	1361	3.71	17.7	17.7			22.2	0.51	300	73.9	69.1	0.98	0.85	32%
HAVERSTOCK CRESCENT	17A-S	24A	0.25	0.25		50		13	13							0.1	13	4.00	0.2	13.0			13.1	1.04	250	60.3	60.6	1.24	0.98	22%
FRAMPTON ROAD	24A	25A	0.66	0.91		50		33	46							0.2	46	4.00	0.6	13.0			13.2	0.44	250	102.0	39.4	0.80	0.70	33%
FRAMPTON ROAD	25A	58A	0.78	1.69		50		39	85							0.3	85	4.00	1.2	13.0			13.3	0.85	250	116.7	54.8	1.12	0.90	24%
ROBERT PARKINSON DRIVE	58A	59A	0.12	24.40					1446							4.9	1446	3.69	18.7	18.7			23.6	0.53	300	71.3	70.4	1.00	0.87	34%
ENFORD CRESCENT	451A	45A	0.36	0.36		70		26	26							0.1	26	4.00	0.4	13.0			13.1	0.97	250	101.3	58.6	1.19	0.94	22%
		45A	0.45	0.45		50		23	23							0.1	23	4.00	0.3	13.0			13.1							
ENFORD CRESCENT	45A	46A	0.53	1.34		50		27	76							0.3	76	4.00	1.1	13.0			13.3	0.51	250	120.8	42.5	0.87	0.75	31%
		46A	0.30	0.30		70		21	21							0.1	21	4.00	0.3	13.0			13.1							
ENFORD CRESCENT	46A	47A	0.12	1.76		70		9	106							0.4	106	4.00	1.5	13.0			13.4	1.10	250	29.3	62.4	1.27	0.98	21%
ENFORD CRESCENT	47A	48A	0.10	1.86		70		7	113							0.4	113	4.00	1.6	13.0			13.4	1.39	250	13.3	70.1	1.43	1.09	19%
ENFORD CRESCENT	48A	49A	0.24	2.10		70		17	130							0.4	130	4.00	1.8	13.0			13.4	0.52	250	49.8	42.9	0.87	0.76	31%
ENFORD CRESCENT	49A	50A	0.09	2.19		50		5	135							0.4	135	4.00	1.9	13.0			13.4	0.61	250	13.7	46.4	0.95	0.80	29%
ENFORD CRESCENT	50A	51A	0.54	2.73		70		38	173							0.5	173	4.00	2.4	13.0			13.5	0.47	250	99.6	40.8	0.83	0.72	33%
		51A	0.12	0.12		50		6	6							0.0	6	4.00	0.1	13.0			13.0							
ENFORD CRESCENT	51A	511A	0.62	3.47		50		31	210							0.7	210	4.00	2.9	13.0			13.7	0.48	250	93.1	41.2	0.84	0.73	33%
ENFORD CRESCENT	511A	59A	0.08	3.55		50		4	214							0.7	214	4.00	3.0	13.0			13.7	0.58	250	73.3	45.3	0.92	0.80	30%
		59A	0.40	0.40		70		28	28							0.1	28	4.00	0.4	13.0			13.1							
HAVERSTOCK CRESCENT	23A	22A	0.25	0.25		50		13	13							0.1	13	4.00	0.2	13.0			13.1	1.44	250	50.4	71.4	1.45	1.09	18%
HAVERSTOCK CRESCENT	22A	26A	0.26	0.51		50		13	26							0.1	26	4.00	0.4	13.0			13.1	0.99	250	13.3	59.2	1.21	0.95	22%
HAVERSTOCK CRESCENT	26A	27A	0.63	1.14		50		32	58							0.2	58	4.00	0.8	13.0			13.2	0.96	250	94.7	58.3	1.19	0.94	23%
HAVERSTOCK CRESCENT	27A	59A	0.76	1.90		50		38	96							0.4	96	4.00	1.3	13.0			13.4	1.85	250	116.1	80.9	1.65	1.22	17%
ROBERT PARKINSON DRIVE	59A	38A (B.O.)	0.12	30.37					1784							6.1	1784	3.62	22.7	22.7			28.7	1.73	300	71.7	127.2	1.80	1.42	23%

***NOTE: For Sanitary Design Sheet downstream of 38A (B.O.), Please refer to Amber Fields Limited, Project No.: 11916, By Counterpoint Engineering.**

****NOTE: Alloa Pump Station will be constructed at a future date.**

Urbantech Consulting, A Division of Leighton-Zec Ltd.
3760 14th Avenue, Suite 301 Markham, Ontario L3R 3T7
TEL: 905.946.9461 FAX: 905.946.9595
www.urbantech.com

TYLIN CANADA
3381 Steeles Avenue East
Toronto, Ontario M2H 3S8
www.tylin.com

August 29, 2024

PROJECT NUMBER 10376

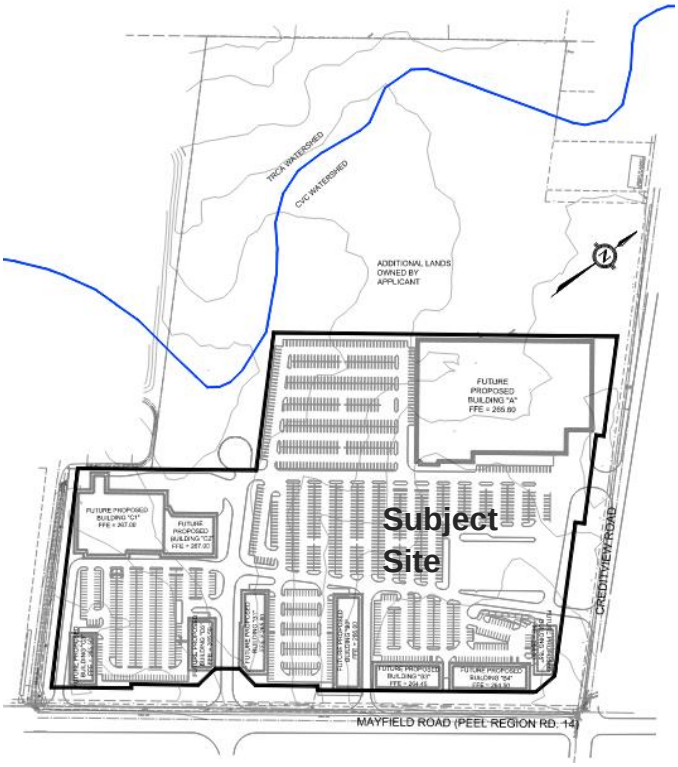
Town of Caledon
6311 Old Church Road
Caledon, Ontario
L7C 1J6

Re: Erosion and Sediment Control Report in Support of Site Alteration Permit Application – 12100 Creditview Road
Town of Caledon

1 Introduction and Project Description

This letter report has been prepared in support of a Site Alteration Permit application for approximately 12.9 ha of a proposed industrial development associated with 12100 Creditview Road in the Town of Caledon. The property is bound by Creditview Road to the northeast, Mayfield Road to the southeast, and existing vacant and agricultural land to the northwest and southwest as shown on **Figure 1-1.** This application is only for the southeastern portion of the property and the remaining lands are not proposed for development at this time.

Figure 1-1 Site Location



The Toronto and Region Conservation Authority (TRCA) Erosion and Sediment Control Guidelines for Urban Construction (2019) were used in the design of the erosion and sediment control plans. This letter outlines the criteria used in the design and the resulting technical characteristics of the temporary sediment control measures.

This letter report should be read in conjunction with the Site Alteration Control Plan (Drawings ESC-01 to ESC-03) prepared by TYLin (August 2024).

2 Existing Site Conditions

The subject site is currently agricultural land with an existing dwelling. The existing topography of the site has a gentle slope from west to east, towards the ditch located at Creditview and Mayfield Road with elevation differences of approximately 5.0-6.0m across the length of the site.

The TRCA and CVC watershed divide is located within the 12100 Creditview Road property. However, the subject area proposed to be developed and for the purpose of this application is located within the CVC watershed.

3 Existing Watercourse Conditions

There is no existing watercourse through the subject property.

4 Adjacent Areas and Features

The subject site is bound by Creditview Road to the northeast, Mayfield Road to the southeast, and existing vacant and agricultural land to the northwest and southwest. Adjacent lands to the east and west are being developed for commercial and residential uses. South of Mayfield Road, in the City of Brampton, there is an existing residential subdivision, developed as part of Block 51-1, Phase 2.

5 Receiving Water System

The erosion control pond will discharge to the existing 500mm diameter culvert along the Mayfield Road ditch just west of Creditview Road. The flows from the culvert will continue southerly through the clean water pipe to a realigned channel east of Thornbush Boulevard and eventually to Fletcher's Creek. The realigned channel is classified as warmwater community.

6 Soils

Soils in the area are Chinguacousy clay loam, which is characterized as a heavy textured till.

7 Critical Areas

No critical areas are located on the site.

8 Permanent Stabilization

The detailed erosion and sediment control plans (Drawings ESC-01 to ESC-03) provide the details regarding the site stabilization including the proposed seed mix to be used for stabilization.

9 Design Details of ESC Measures

9.1 Site Preparation

Prior to commencing the site alteration works, the subject site will be enclosed using silt fencing, as shown on the Site Alteration Control Plan (Drawings ESC-01 to ESC-03). Access to the subject site will be from Creditview Road and mud mats will be constructed and maintained during the duration of the construction.

Conveyance swales around the perimeter of the site will be extended to convey flows from the north and west portion of the site to the temporary SWM pond. The perimeter cut-off swales were graded to convey runoff based on existing grades. As the site is striped and filled, conveyance swales will be implemented according to Drawings ESC-01 to ESC-03. Overland swales have a trapezoidal cross section with 2:1 side slope, 0.60m bottom widths and a minimum depth of 0.5m to convey flows up to the 5-year flow. Refer to the attachments for calculations.

9.2 Temporary Sediment Control Pond

A Temporary sediment control pond shown on Drawing ESC-01 is proposed. The temporary sediment control pond is required to detain runoff long enough to allow soil particles to settle out of suspension. The temporary sediment control pond is located at the end of the drainage path. Flows will enter the temporary sediment control pond via overland swales, which have been sized to adequately convey the existing 5-year flows, as described in above sections.

9.2.1 Permanent Pool

The permanent pool has been designed with a minimum storage volume of 125 m^3/hectare of contributing drainage area. With a total tributary area of 12.9 ha, the temporary sediment control pond requires a permanent pool volume of 1,613 m^3.

The temporary sediment control pond design provides a total permanent pool volume of 2,240 m^3 at an elevation of 260.50 m with a maximum depth of 1.0 m. The sediment forebay is proposed to pre-treat incoming flows. The designed forebay length is 49.4m, which exceeds the required settling length of 12 m and the required dispersion length of 5 m. Please refer to the attachments for detailed calculations.

9.2.2 Active Storage

As per the Erosion and Sediment Control Guidelines (2019) the active storage component of the temporary sediment control pond should have a minimum 48-hour drawdown time; and should be designed with a minimum storage volume of 125 m^3/hectare of contributing drainage area. With a total tributary area of 12.9 ha, the temporary sediment control pond requires 1,613m^3 of active storage. An active storage volume of 2,310m^3 has been provided within the temporary sediment control pond between the elevations of 260.50m (permanent pool level) and 261.20m (maximum high water level).

The required outflow of 14L/s is calculated by dividing the required active storage volume for 12.9 ha at 125 m^3/ha (1,613 m^3) by the minimum drawdown time of 48 hours ([Volume / drawdown time] x 1.5).

The required outflow rate will be achieved through the implementation of a vertical riser pipe, discharging through a 200 mm diameter PVC pipe fitted with a 90 mm diameter orifice plate set at an invert elevation of 260.50 m, which is equal to the permanent pool water level. The outlet details are shown on Drawing ESC-01-03**.**

Table 9-1 Summary of Temporary Sediment Control Pond Specifications

Pond Component	Stage (m)	Depth (m)	Required / Provided Storage Volume (m^3)	Design Release Rate (L/s)	Outlet Description
Permanent Pool	260.50	1.0	1,613/2,240	---	---
Required Active Storage	261.00	0.50	1,613/1,650	12	Control provided by a 90 mm diameter orifice set at 260.50 m
Provided Active Storage	261.20	0.70	1,613/2,310	14	

10 Record Keeping Procedures and Maintenance

During construction the designated site inspector shall inspect the site as per the notes on Drawing ESC-01 and ensure that all required maintenance is completed. A sample Inspection Report template is attached to this letter.

The following are the maintenance and inspection activities outlined on Drawing ESC-01.

Inspections

- Weekly inspection of all sediment control measures and after each rain event, any failure must be repaired immediately.

Sediment Trap

- The sediment trap will require cleaning when sediment accumulation reaches 50% of the height of the sediment trap.
- Sediment trap inlet, outlet, and side slopes should be inspected weekly and after each rainfall and significant snowmelt events.

Temporary Sediment Pond

- Sediment accumulation in the pond must be measured a minimum of once every six (6) months. The pond will require cleaning when sediment accumulation reaches 50% of the forebay design capacity (or 0.6m depth).
- Sediment pond embankments, outlet, and spillway should be inspected weekly and after each rainfall and significant snowmelt events.

Sediment Fences

- Sediment control fences must be inspected regularly, and after every rainfall, to identify failed sections. Any repairs must be undertaken immediately to restore the fencing.
- When sediment accumulates to the half the height of the geotextile it should be removed and disposed of in a controlled area.
- A supply of sediment control fence should be kept on site to provide for quick repairs, or the installation of additional fence as required.

Mud Mat

- The granular material will require periodic replacement as it becomes contaminated by vehicle traffic.
- Sediment shall be removed from public roads by shovelling or sweeping and disposed of properly in a controlled sediment disposal area.

Conveyance Swales

- Conveyance swales should be inspected periodically, and cleaning will be required when the measured depth of the sediments accumulated reaches 30% of depth behind flow interruption devices.

11 Emergency Contact

A list of emergency and non-emergency contacts will be kept on construction site all the time.

12 Closing

We trust that this Erosion and Sediment Control Plan satisfies your requirements. Should you have any questions or comments please contact the undersigned.

Sincerely,

T.Y. LIN INTERNATIONAL CANADA INC.

Rosalie Chung, P.Eng.
Water Resources Engineer
rosalie.chung@tylin.com

Encl: Temporary Sediment Pond Calculations
Cut of Swales Calculations
Inspection Report Template

ATTACHMENTS

Temporary Sediment Ponds Calculations

Temporary Sediment Control Pond **Project#:** **10376**

Storage Requirements **Date:** **August 2024**

Erosion & Sediment Control Guideline for Urban Construction
Sediment Pond

Drainage Area:	12.9	ha
Permanent Pool Volume:	125	m^3/hectare drainage area
Active Storage Volume:	125	m^3/hectare drainage area
Required Permanent Pool Volume:	**1,613**	**m^3**
Required Active Storage Volume:	**1,613**	**m^3**
Total	**3225**	**m^3**

Drawdown Time
(Minimum 48 hr Drawdown Time)

Active Storage Volume:	**1,613**	**m^3**
Estimated Peak Release Rate	**14.0**	**L/s**

(1.5 times of average flow)

Temporary Sediment Control Pond
Provided Storage Calculations

Project#: 10376
Date: August 2024

POND CHARACTERISTICS

Base of Pond:	259.50	
N.W.L.:	260.50	masl
Increment for Volume:	0.1	m
Required Permanent Pool Volume:	**1,613**	m^3
Required Active Pool Volume:	**1,613**	m^3
Permanent Pool Volume Provided:	**2,240**	m^3

VOLUME

Known Water Level:	261.00	
	INCL. P.P.	ACTIVE ONLY
Lower Known Elevation:	260.5	
Lower Known Volume:	2,240.25	
Upper Known Elevation:	261.2	
Upper Known Volume:	4,550.74	
Volume of Known W.L. Elevation:	**3,891**	**1,650**
Active Storage Required:		**1,613**

Water Level of Known Volume

Known Volume:	565	1613
	INCL. P.P.	ACTIVE ONLY
Lower Known Elevation:	259.5	260.50
Lower Known Volume:	0	0.00
Upper Known Elevation:	260.5	261.20
Upper Known Volume:	2240.246	2310.50
W.L. Elevation of Known Volume:	**259.75**	**260.99**

Permanent Pool Volume Provided:	**2,240**	m^3
Active Pool Volume Provided:	**2,310**	m^3

STAGE / STORAGE INFORMATION

	Elevation (m)	Stage (m)	Area 1 (m^2)	Area 2 (m^2)	Total Area (m^2)	Avg. Area (m^2)	Incremental Storage (m^3)	Cumulative Storage (m^3)	Cumulative Storage above Permanent Pool (m^3)
Pond Base:	259.50	0.00	445.2	1,181.5	1,626.7		0.0		
NWL	260.50	1.00	935.7	1,918.1	2,853.8	2,240.2	2,240.2	**2,240**	**0**
HWL/Regional	261.20	1.70	3,747.6		3,747.6	3,300.7	2,310.5	**4,551**	**2,310**
Freeboard	261.50	2.00	4,094.0		4,094.0	3,920.8	1,176.2	**5,727**	**3,487**

Temporary Sediment Control Pond **Project#: 10376**

Release Rate and Orifice Sizing August 2024

Allowable Release Rate = 0.014 m^3/s (Estimated Release Rate)

CALCULATE DIAMETER KNOWING Q & H	
$Q(m^3/s)$ =	0.014
Td (m) =	0.70
Approx A =	0.0061
Approx D =	88
$A(m^2)$ =	0.006
D(mm) =	**90**

Orifice Plate	
DIA (mm) =	**90**
AREA (m^2) =	0.006
COEFF =	**0.62**
GRAVITY =	9.81
K =	1.0

TOTAL DEPTH m	Invert= 260.50 m Head m	Qp m^3/s	TOTAL FLOW Qp m^3/s	ELEVATION m	
0.00	**0.000**	**0.000**	**0.000**	**260.50**	NWL
0.100	0.055	0.004	0.004	260.60	
0.200	0.155	0.007	0.007	260.70	
0.300	0.255	0.009	0.009	260.80	
0.400	0.355	0.010	0.010	260.90	
0.500	0.455	0.012	0.012	261.00	
0.600	0.555	0.013	0.013	261.10	
0.700	**0.655**	**0.014**	**0.014**	**261.20**	hwl
0.800	0.755	0.015	0.015	261.30	
0.900	0.855	0.016	0.016	261.40	
1.000	**0.955**	**0.017**	**0.017**	**261.50**	Free board

ORIFICE FLOW

$Qp(m^3/s) = COEF \times AREA \times (2 \times GRAVITY \times HEAD / K)^{0.5}$

$Approx\ A = Q / (COEF \times (2 \times GRAVITY \times Td / K)^{0.5})$

$Approx\ D = ((Approx\ A / PI)^{0.5}) \times 2 \times 1000$

$A\ (m^2) = Q / (COEF \times (2 \times GRAVITY \times (Td - (0.5 \times Approx\ D / 1000)) / K)^{0.5})$

$D(mm) = ((A / PI)^{0.5}) \times 2 \times 1000$

WEIR FLOW $Q(m^3/s) = C \times L \times H^{1.5}$ C=1.5

Temporary Sediment Control Pond **Project#: 10376**

Drawdown Time

Stage-Storage-Discharge:

	Stage		Storage	Total Flow	Drain Time at Each Interval	Total Drain Time
	Water Elevation (m)	Water Elevation Above Orifice Inv. (m)	(m^3)	(m^3/s)	(hrs)	(hrs)
Orifice Invert	260.50	0.00	0	0.000	na	0.00
	260.60	0.10	275	0.004	18.62	18.62
	260.70	0.20	660	0.007	15.57	34.19
	260.80	0.30	990	0.009	10.39	44.58
	260.90	0.40	1,320	0.010	8.81	53.39
	261.00	0.50	1,650	0.012	7.78	61.17
	261.10	0.60	1,980	0.013	7.04	68.21
HWL	261.20	0.70	2,310	0.014	6.48	**74.70**

FOREBAY CALCULATIONS

PROJECT #: 10376

Temporary Sediment Control Pond

August 2024

PERMANENT POOL REQUIREMENTS

INPUT AREA

LENGTH TO WIDTH RATIO (r):	4.2		
PEAK QUALITY STORM RELEASE RATE:	0.0140	m^3/s	
2 YEAR PEAK STORM FLOW INTO POND:	0.37	m^3/s	
PARTICLE SETTLING VELOCITY (v_s):	3.00E-04	m/s	3.00E-4 FOR 150um PARTICLES
PROVIDED PERMANENT POOL DEPTH:	1.00	m	
PERMANENT POOL BERM TARGET VELOCITY:	0.5	m/s	0.5 STANDARD

SETTLING LENGTH CALCULATION

PERMANENT POOL LENGTH:	**14**	

DISPERSION LENGTH CALCULATION

PERMANENT POOL LENGTH:	**6**	

PERMANENT POOL DIMENSIONS (REQUIRED)

PERMANENT POOL LENGTH:	**14**	
PERMANENT POOL WIDTH:	**3**	

Provided Forebay dimensions:

PERMANENT POOL LENGTH:	49.4	m
PERMANENT POOL WIDTH:	11.9	m
PERMANENT POOL DEPTH:	**1.00**	m

Temporary Sediment Control Pond **Project#: 10376**

Emergency Spillway

Date: August 2024

SWM Pond Emergency Spillway

Weir Parameters

Weir Length (L)	4	m	
Weir Top Width (Bt)	8	m	
Weir Bottom Width (Bb)	5	m	
Median Width (B)	6.5	m	
MAX Qinlet (100 year peak flow)	0.813	m^3/s	(rational method)
Crest Elevation	261.20	m	
Top of Weir Elevation	261.50	m	
Depth of Weir	0.30	m	

Weir Calculations ($Q = Cd * b * H^{3/2}$)

Water Level (H)	H/L	Cd	Q
0.05	0.013	1.40	0.10
0.10	0.025	1.40	0.29
0.15	0.038	1.48	0.56
0.20	0.050	1.52	0.88
0.25	0.063	1.53	1.24
0.30	0.075	1.55	1.66

Therefore, maximum capacity of spillway is

1.66 m^3/s

Note: The minimum weir bottom width shall be 8.0m long as per the Erosion & Sediment Control Guideline for Urban Construction

Cut-Off Swales

12100 Creditview Road
Town of Caledon

Project # : 10376

Date: August 2024

Preconstruction Conditions

Runoff coefficient calculation

Feature	*Area (ha)*	*Runoff Coefficient*	*Imperviousness*
Site	*12.90*	*0.25*	*0.07*
Overall Total	***12.90***	***0.25***	***0.07***

Time of Concentration

Upland Method

Area (ha)	12.90	
Length (m)	390	
Slope (%)	1.03	
Velocity (m/s)	0.21	pasture lands
N	3	
Tc (hr)	0.51	

Note:
-Velocity is obtained from Figure A.5.2
-Tc = L / V
-Tp = (N-1)/N*Tc

Tc = 30.40 min

Rainfall Intensity (Town of Milton)

Return Period	*A*	*B*	*C*	*Rainfall Intensity, i*	
2 year	*779.0*	*6.0*	*0.821*	*40.783*	*mm/hr*
5 year	*959.0*	*5.7*	*0.802*	*53.958*	*mm/hr*
10 year	*1089.0*	*5.7*	*0.796*	*62.807*	*mm/hr*
25 year	*1234.0*	*5.5*	*0.786*	*73.879*	*mm/hr*
50 year	*1323.0*	*5.3*	*0.779*	*81.777*	*mm/hr*
100 year	*1435.0*	*5.2*	*0.775*	*90.012*	*mm/hr*

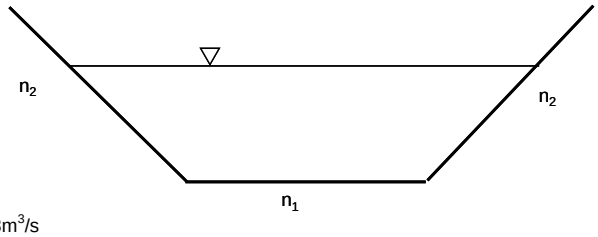
Existing Peak Discharge

Rational Runoff Coefficient, c	*0.25*	
Drainage Area, A	*12.90*	*ha*
2 Year Peak Discharge, Q_2	*0.368*	*m^3/s*
5 Year Peak Discharge, Q_5	*0.487*	*m^3/s*
10 Year Peak Discharge, Q_{10}	*0.567*	*m^3/s*
25 Year Peak Discharge, Q_{25}	*0.667*	*m^3/s*
50 Year Peak Discharge, Q_{50}	*0.738*	*m^3/s*
100 Year Peak Discharge, Q_{100}	*0.813*	*m^3/s*

Manning's Equation Calculator
for Trapezoidal Channels

Input:

Bottom Width =	**0.60**	m
Bottom 'n_1' =	0.025	
Side Slope =	2	:1
Side 'n_2' =	0.025	
Long. Slope =	0.0076	m/m
Depth =	0.50	m



Output:

Flow =	1.301	m^3/s	> 5 year flow of 0.38m^3/s
Velocity =	1.627	m/s	

Top Width of water = 2.60 m

Freeboard **0.22**

Summary of Channel Dimenstions and Check for high velocities:

2 :1

Slope	Flow depth		Ditch Width	Flow (m3/s)	Velocity (m/s)	Note
0.005	0.31		1.83	0.380	1.018	
0.006	0.29		1.78	0.380	1.089	
0.007	0.28		1.73	0.380	1.152	
0.008	0.27		1.70	0.380	1.210	Use Rip-Rap Class I
0.009	0.27		1.66	0.380	1.263	Use Rip-Rap Class I
0.010	0.26		1.64	0.380	1.313	Use Rip-Rap Class I
0.011	0.25		1.61	0.380	1.359	Use Rip-Rap Class I
0.012	0.25		1.59	0.380	1.403	Use Rip-Rap Class I

Note:
As per TRCA Erosion and Control Guideline "The typical threshold velocity before a well-grassed channel begins to erode is 1.2 m/s"

Inspection Report Template

Erosion and Sediment Control Guide
For Urban Construction

Prepared by:
Toronto and Region Conservation Authority

2019

APPENDIX F: ESC INSPECTION REPORT TEMPLATE

ESC INSPECTION REPORT TEMPLATE

Date:_____ Weather/Time:_____

Project Site:_____ Reason for Visit:_____

Inspector Name:_____

Recipients:

List of report recipients and e-mail

ACTION ITEMS:

Item Number	Location	Description	Date	Completion Date	Weeks Recurring

a table listing active/ongoing maintenance, repair and replacement requirements can be used to summarize a detailed report. This can provide quick reference "Checklist/To Do" for the contractor.

Detailed ESC Report to Follow:

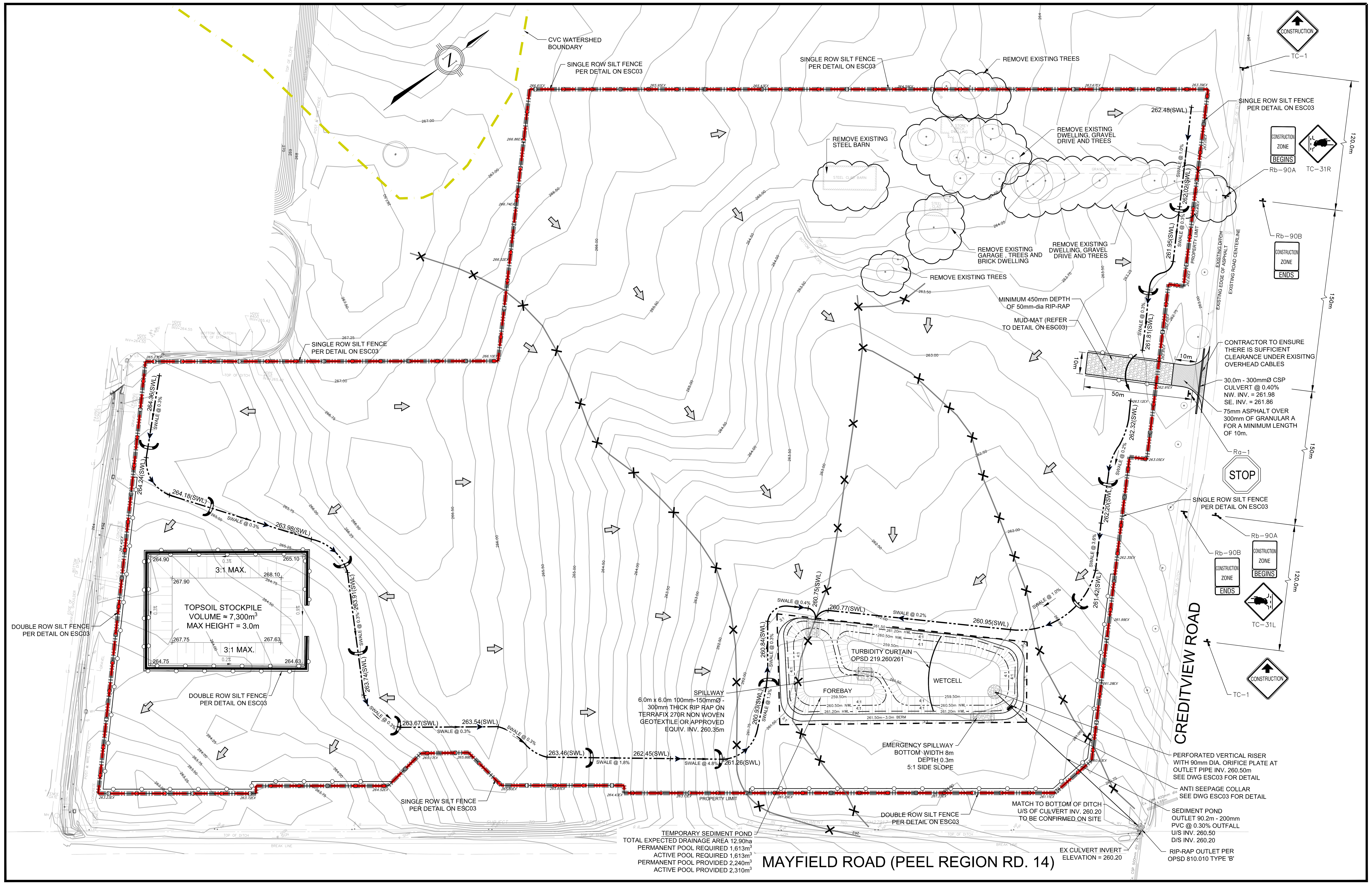
Item #:

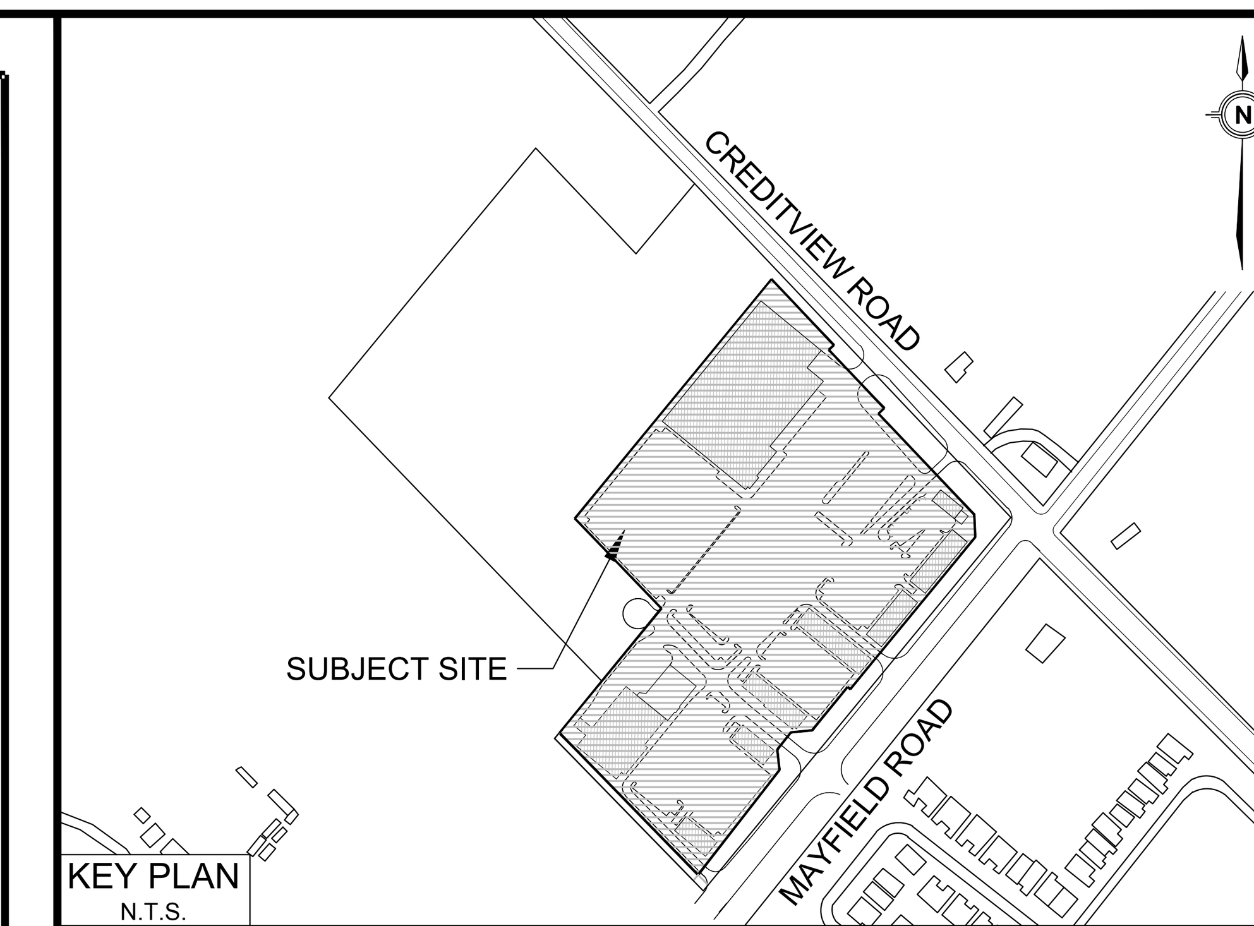
Clear and concise description of what should be done…action item including a representative date stamped photo of the concern.

This should be done for each item every inspection.

MAP – *attach a site plan/drawing and note the action items (new and recurring) that appear on the corresponding inspection report to ensure locations of corrective/actions items are clear. This is particularly useful for large projects.*

Signature_____ Date_____





KEY PLAN
N.T.S.

LEGEND

- FILTREXX CHECK DAM AS PER DETAIL (ESC03)
- × 265.36 (SWL) PROPOSED SWALE ELEVATION
- × 265.65 EX EXISTING ELEVATION
- 265 EXISTING CONTOUR
- STRAW BALES — DOUBLE ROW SILT FENCE (AS PER DETAIL ON ES03)
- SILT CONTROL FENCE (AS PER DETAIL ON ES03)
- SWALE @ 1.63% — CUT-OFF SWALE AS PER DETAIL ON ESC03
- OVERLAND FLOW DIRECTION
- PROPERTY LIMIT
- CONSTRUCTION LIMIT – STAGE 1
- CVC/TRCA REGULATION LIMITS
- EXISTING DWELLING, GRAVEL DRIVE, TREES, ETC. TO BE REMOVED
- MUD-MAT (AS PER DETAIL ON ES03)
- EXISTING HEADWATER DRAINAGE/ SWALE TO BE FILLED
- PUMP STORMWATER RUN-OFF (AS-NEEDED)

CVC STANDARD NOTES

1. "EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION."
2. "DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES."
3. "ALL IN-WATER AND NEAR WATER WORKS WILL BE CONDUCTED IN THE DRY WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS."
4. "THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. CVC ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY."
5. "AN ENVIRONMENTAL MONITOR WILL ATTEND THE SITE TO INSPECT ALL NEW CONTROLS, AS WELL AS ON A WEEKLY BASIS, OR FOLLOWING RAIN/SNOWMELT EVENT, TO MONITOR ALL WORKS, AND IN PARTICULAR WORKS RELATED TO EROSION AND SEDIMENT CONTROLS, DEWATERING OR UNWATERING, RESTORATION AND IN- OR NEAR- WATER WORKS. SHOULD CONCERNS ARISE ON SITE THE ENVIRONMENTAL MONITOR WILL CONTACT THE CVC ENFORCEMENT OFFICER AS WELL AS THE PROPONENT.
6. "ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATER."
7. "ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED."
8. "THE PROPONENT/CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE OF THE ONSET OF THE PROJECT TO ENSURE THAT THE WORKS WILL BE CONDUCTED DURING FAVOURABLE WEATHER CONDITIONS. SHOULD AN UNEXPECTED STORM ARISE, THE CONTRACTOR WILL REMOVE ALL UNFIXED ITEMS FROM THE REGIONAL STORM FLOOD PLAIN THAT WOULD HAVE THE POTENTIAL TO CAUSE A SPILL OR AN OBSTRUCTION TO FLOW, E.G., FUEL TANKS, PORTA-POTTIES, MACHINERY, EQUIPMENT, CONSTRUCTION MATERIALS, ETC."
9. "ALL DEWATERING/UNWATERING SHALL BE TREATED AND RELEASED TO THE ENVIRONMENT AT LEAST 30 METRES FROM A WATERCOURSE OR WETLAND AND ALLOWED TO DRAIN THROUGH A ELL-VEGETATED AREA. NO DEWATERING EFFLUENT SHALL BE SENT DIRECTLY TO ANY WATERCOURSE, WETLAND OR FOREST, OR ALLOWED TO DRAIN ONTO DISTURBED SOILS WITHIN THE WORK AREA. THESE CONTROL MEASURES SHALL BE MONITORED FOR EFFECTIVENESS AND MAINTAINED OR REVISED TO MEET THE OBJECTIVE OF PREVENTING THE RELEASE OF SEDIMENT LADEN WATER."
10. "ALL ACCESS TO THE WORK SITE SHALL BE FROM EITHER SIDE OF THE WATERCOURSE. NO EQUIPMENT OR VEHICLES ARE PERMITTED TO CROSS THROUGH THE WATERCOURSE UNLESS APPROVED BY CVC."
11. "IN ORDER TO COMPLY WITH THE MIGRATORY BIRDS CONVECTION ACT, CVC RECOMMENDS THAT TREE REMOVALS BE COMPLETED BETWEEN AUGUST 1 AND APRIL 1."
12. "TO PROTECT LOCAL FISH POPULATIONS DURING THEIR SPAWNING, NURSERY AND MIGRATORY PERIODS, IN-WATER/NEAR-WATER ACTIVITIES, MAY ONLY OCCUR DURING THE FOLLOWING TIME PERIOD. JULY 1 TO SEPT 15.
13. "FISH AND WILDLIFE STRANDED WITHIN THE WORK AREA SHALL BE CAPTURED AND RELEASED LIVE IN SUITABLE HABITAT UPSTREAM OF THE WORK AREA UNDER THE SUPERVISION OF A QUALIFIED AQUATIC BIOLOGIST. A PERMIT FROM THE MINISTRY OF NATURAL RESOURCES IS REQUIRED."
14. "PLEASE NOTIFY CVC ENFORCEMENT OFFICER AND CVC PROJECT MANAGER 48 HOURS PRIOR TO COMMENCING CONSTRUCTION."
15. "AN ENVIRONMENTAL MONITOR WILL BE ON SITE, AND PROVIDE ADVICE, TO ENSURE THAT ACTIVITIES THAT COULD HAVE A NEGATIVE IMPACT TO THE NATURAL ENVIRONMENT ARE EFFECTIVELY MITIGATED AS CONSTRUCTION PROCEEDS. THE ENVIRONMENTAL MONITOR SHALL NOTIFY THE CVC ENFORCEMENT OFFICER AND PROJECT MANAGER IF AN ISSUE ARISES."

EROSION AND SEDIMENT CONTROL GENERAL NOTES (TOWN OF CALEDON)

1. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTE(S) AS SHOWN ON THE PLANS. CONSTRUCTION ACCESS WILL BE MAINTAINED TO THE SATISFACTION OF THE TOWN/REGION. STREET SWEEPING IS REQUIRED AS NEEDED.
2. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SILT FENCE OR LIMITS OF THE SITE WORKS.
3. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION BEST PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND/OR CONSERVATION AUTHORITY
4. ALL DISTURBED GROUND LEFT INACTIVE FOR 30 DAYS SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS. DISTURBED AREAS ARE TO BE HYDROSEEDED (OR APPROVED EQUIVALENT) TO THE SATISFACTION OF THE TOWN.
5. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPE SHALL BE 2:1 (H:V). ONCE TOPSOIL STRIPPING IS COMPLETED THE STOCKPILE SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS, BY HYDROSEEDED, OR AN APPROVED EQUIVALENT, TO THE SATISFACTION OF THE TOWN

SEED MIXTURE

NATIVE PRAIRIE LOW GROW GRASS MIXTURE	
% OF MIXTURE	COMPOSITION TYPE
25%	FOWL BLUEGRASS (POA PALUSTRIS)
30%	CANADA WILD RYE (ELYMUS CANADENSIS)
15%	LITTLE BLUESTEM (SCHIZACHYRIUM SCORPARIUM)
30%	SAND DROPSEED (SPOROBOLUS CRYPTANDRUS)

SUMMARY CHART FOR ESC STAGING

ESC MEASURE	TIMING FOR INSTALLATION	INSPECTION MAINTENANCE REQUIREMENTS	TIMING FOR REMOVAL
STAGE 1 – AREA GRADING			
1. Install traffic control signs and construction access to the site. 2. Install silt fences in the areas shown. 3. Clear site of trees and vegetation as required. Clear and grub the area. 4. Construct the temporary sediment pond. 5. Construct the cut-off swales. 6. Strip the topsoil from the site, and stockpile in area shown. Stockpile area to be pre-graded before stockpiling. 7. Install double row silt fence around stockpile area.	Prior to stage 1 works.	- Consultant to arrange inspection with Town staff once installation is complete. - Consultant to undertake weekly inspections and after each rainfall event, including weekly reporting. - Regular maintenance to remove accumulated sediment and repair ESC measures.	Just prior to final grading, replacement with Stage 2 measures.

REGION NOTES:

1. THE APPLICANT, APPLICANT'S REPRESENTATIVE CONSULTANT, CONTRACTOR AND SUB CONTRACTOR ARE RESPONSIBLE TO ENSURE THAT THEIR DESIGN AND CONSTRUCTION PRACTICES CONFORM TO THE LATEST REGION OF PEEL STANDARDS, SPECIFICATIONS AND DESIGN CRITERIA, POSTED ON THE REGION OF PEEL'S WEBSITE (www.peelregion.ca/pw/standards).

No.	REVISIONS	Date	By	Approved
1	FIRST SUBMISSION	AUGUST 2024	U.A.	A.A.

BENCHMARK: SET CUT CROSS 0.35m FROM SOUTH FACE OF CONCRETE HEAD WALL ALONG EAST SIDE OF ENTRANCE ROAD. 200m NORTH OF MAYFIELD ROAD. ELEVATION 265.29m

ELEVATION: ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM THE CITY OF BRAMPTON HORIZONTAL CONTROL MONUMENT: No. 042200357 AT ELEVATION=260.691m

LICENSED PROFESSIONAL ENGINEER
A.A.AHMADZAI
100161453
PROVINCE OF ONTARIO

REGION FILE No: XX

Designed By:

TOWN FILE No: XX

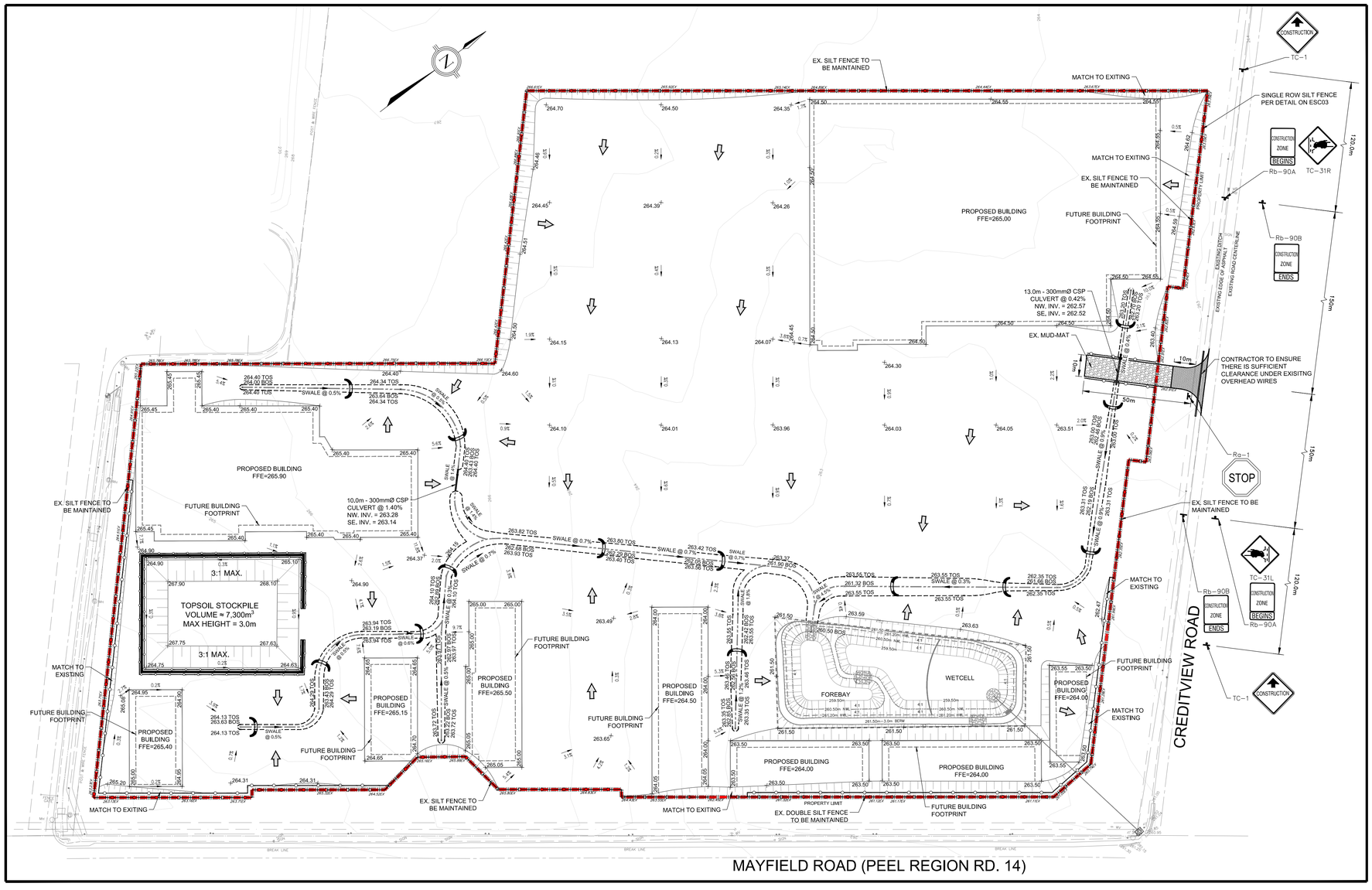
TOWN OF CALEDON

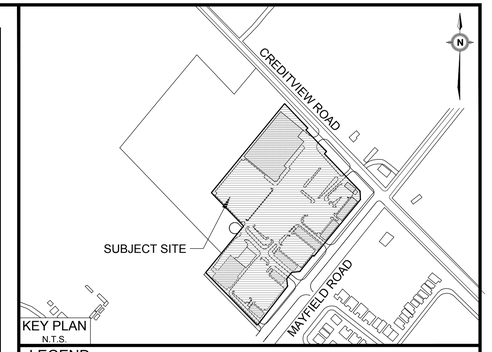
TYLin
3381 Steeles Avenue East,
Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700
f: 905.738.0065

12100 CREDITVIEW DEVELOPMENTS LTD.

EROSION & SEDIMENTATION PLAN STAGE 1 (TOPSOIL STRIPPING)

SCALE: 1:1000	CHECKED BY: A.A.	PROJECT NO. 10376
DESIGNED BY: U.A.	DRAWN BY: U.A./R.P.	DRAWING NO. ESC01
CHECKED BY: D.M.	DATE: AUGUST 2024	SHEET NO. 01





LEGEND

- FILTREXX CHECK DAM AS PER DETAIL (ESC03)
- 265.11 — PRE-GRADE ELEVATIONS
- 265.36 TOS — PROPOSED TOP OF SWALE
- 265.36 BOS — PROPOSED BOTTOM OF SWALE
- 265.65 EX — EXISTING ELEVATION
- 265 — EXISTING CONTOUR
- STRAW BALES — DOUBLE ROW SILT FENCE (AS PER DETAIL ON ESC03)
- SILT CONTROL FENCE (AS PER DETAIL ON ESC03)
- SWALE @ 1.60% — CUT OFF SWALES AS PER DETAIL ON ESC03
- SWALE @ 2.00% — EXISTING STAGE 1 SWALE
- OVERLAND FLOW DIRECTION
- PROPERTY LIMIT
- CONSTRUCTION LIMIT – STAGE 2
- MUD-MAT (AS PER DETAIL ON ES03)

REGION NOTES:

1. THE APPLICANT, APPLICANT'S REPRESENTATIVE CONSULTANT, CONTRACTOR AND SUB CONTRACTOR ARE RESPONSIBLE TO ENSURE THAT THEIR DESIGN AND CONSTRUCTION PRACTICES CONFORM TO THE LATEST REGION OF PEEL STANDARDS, SPECIFICATIONS AND DESIGN CRITERIA, POSTED ON THE REGION OF PEEL'S WEBSITE (www.peelregion.ca/pw/standards).

No.	REVISIONS	Date	By	Approved
1	FIRST SUBMISSION	AUGUST 2024	U.A.	A.A.

BENCHMARK: SET CUT CROSS 0.35m FROM SOUTH FACE OF CONCRETE HEAD WALL ALONG EAST SIDE OF ENTRANCE ROAD. 200m NORTH OF MAYFIELD ROAD. ELEVATION 265.29m

ELEVATION: ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM THE CITY OF BRAMPTON HORIZONTAL CONTROL MONUMENT: No. 042200357 AT ELEVATION=260.691m

LICENSED PROFESSIONAL ENGINEER — A.A. AHMADZAI — 100161453 — PROVINCE OF ONTARIO

REGION FILE No: XX | Designed By: | TOWN FILE No: XX

TOWN OF CALEDON

TYLin
3381 Steeles Avenue East, Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700
f: 905.738.0065

12100 CREDITVIEW DEVELOPMENTS LTD.

EROSION & SEDIMENTATION PLAN STAGE 2 (PRE-GRADE)

SCALE: 1:1000	CHECKED BY: A.A.	PROJECT NO.	10376
DESIGNED BY: U.A.	DRAWN BY: U.A./R.P.	DRAWING NO.	ESC02
CHECKED BY: D.M.	DATE: AUGUST 2024	SHEET NO.	02

CVC STANDARD NOTES

1. "EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION."
2. "DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES."
3. "ALL IN-WATER AND NEAR WATER WORKS WILL BE CONDUCTED IN THE DRY WITH APPROPRIATE EROSION AND SEDIMENT CONTROLS."
4. "THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. CVC ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY."
5. "AN ENVIRONMENTAL MONITOR WILL ATTEND THE SITE TO INSPECT ALL NEW CONTROLS, AS WELL AS ON A WEEKLY BASIS, OR FOLLOWING RAIN/SNOWMELT EVENT, TO MONITOR ALL WORKS, AND IN PARTICULAR WORKS RELATED TO EROSION AND SEDIMENT CONTROLS, DEWATERING OR UNWATERING, RESTORATION AND IN- OR NEAR-WATER WORKS. SHOULD CONCERNS ARISE ON SITE THE ENVIRONMENTAL MONITOR WILL CONTACT THE CVC ENFORCEMENT OFFICER AS WELL AS THE PROPONENT."
6. "ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE WILL BE CONDUCTED A MINIMUM OF 30 METRES FROM THE WATER."
7. "ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED."
8. "THE PROPONENT/CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE OF THE ONSET OF THE PROJECT TO ENSURE THAT THE WORKS WILL BE CONDUCTED DURING FAVOURABLE WEATHER CONDITIONS. SHOULD AN UNEXPECTED STORM ARISE, THE CONTRACTOR WILL REMOVE ALL UNFIXED ITEMS FROM THE REGIONAL STORM FLOOD PLAIN THAT WOULD HAVE THE POTENTIAL TO CAUSE A SPILL OR AN OBSTRUCTION TO FLOW, E.G., FUEL TANKS, PORTA-POTTIES, MACHINERY, EQUIPMENT, CONSTRUCTION MATERIALS, ETC."
9. "ALL DEWATERING/UNWATERING SHALL BE TREATED AND RELEASED TO THE ENVIRONMENT AT LEAST 30 METRES FROM A WATERCOURSE OR WETLAND AND ALLOWED TO DRAIN THROUGH A ELL-VEGETATED AREA. NO DEWATERING EFFLUENT SHALL BE SENT DIRECTLY TO ANY WATERCOURSE, WETLAND OR FOREST, OR ALLOWED TO DRAIN ONTO DISTURBED SOILS WITHIN THE WORK AREA. THESE CONTROL MEASURES SHALL BE MONITORED FOR EFFECTIVENESS AND MAINTAINED OR REVISED TO MEET THE OBJECTIVE OF PREVENTING THE RELEASE OF SEDIMENT LADEN WATER."
10. "ALL ACCESS TO THE WORK SITE SHALL BE FROM EITHER SIDE OF THE WATERCOURSE. NO EQUIPMENT OR VEHICLES ARE PERMITTED TO CROSS THROUGH THE WATERCOURSE UNLESS APPROVED BY CVC."
11. "IN ORDER TO COMPLY WITH THE MIGRATORY BIRDS CONVECTION ACT, CVC RECOMMENDS THAT TREE REMOVALS BE COMPLETED BETWEEN AUGUST 1 AND APRIL 1."
12. "TO PROTECT LOCAL FISH POPULATIONS DURING THEIR SPAWNING, NURSERY AND MIGRATORY PERIODS, IN-WATER/NEAR-WATER ACTIVITIES, MAY ONLY OCCUR DURING THE FOLLOWING TIME PERIOD. JULY 1 TO SEPT 15.
13. "FISH AND WILDLIFE STRANDED WITHIN THE WORK AREA SHALL BE CAPTURED AND RELEASED LIVE IN SUITABLE HABITAT UPSTREAM OF THE WORK AREA UNDER THE SUPERVISION OF A QUALIFIED AQUATIC BIOLOGIST. A PERMIT FROM THE MINISTRY OF NATURAL RESOURCES IS REQUIRED."
14. "PLEASE NOTIFY CVC ENFORCEMENT OFFICER AND CVC PROJECT MANAGER 48 HOURS PRIOR TO COMMENCING CONSTRUCTION."
15. "AN ENVIRONMENTAL MONITOR WILL BE ON SITE, AND PROVIDE ADVICE, TO ENSURE THAT ACTIVITIES THAT COULD HAVE A NEGATIVE IMPACT TO THE NATURAL ENVIRONMENT ARE EFFECTIVELY MITIGATED AS CONSTRUCTION PROCEEDS. THE ENVIRONMENTAL MONITOR SHALL NOTIFY THE CVC ENFORCEMENT OFFICER AND PROJECT MANAGER IF AN ISSUE ARISES."

EROSION AND SEDIMENT CONTROL GENERAL NOTES (TOWN OF CALEDON)

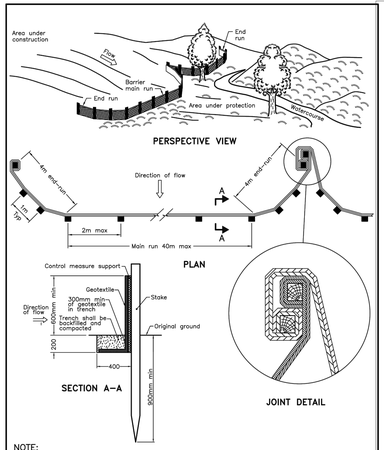
1. ALL CONSTRUCTION VEHICLES MUST ENTER AND EXIT THE SITE ONLY FROM THE APPROVED ACCESS ROUTE(S) AS SHOWN ON THE PLANS. CONSTRUCTION ACCESS WILL BE MAINTAINED TO THE SATISFACTION OF THE TOWN/REGION. STREET SWEEPING IS REQUIRED AS NEEDED.
2. NO CONSTRUCTION ACTIVITY OR MACHINERY SHALL BE ALLOWED BEYOND THE SILT FENCE OR LIMITS OF THE SITE WORKS.
3. THE CONTRACTOR IS RESPONSIBLE TO IMPLEMENT DUST CONTROL MEASURES AND CONSTRUCTION BEST PRACTICE GUIDELINES AS APPROVED BY THE TOWN AND/OR CONSERVATION AUTHORITY
4. ALL DISTURBED GROUND LEFT INACTIVE FOR 30 DAYS SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS. DISTURBED AREAS ARE TO BE HYDROSEEDED (OR APPROVED EQUIVALENT) TO THE SATISFACTION OF THE TOWN.
5. ALL TOPSOIL STOCKPILES SHALL BE SURROUNDED WITH SEDIMENT CONTROL FENCE. THE MAXIMUM SIDE SLOPE SHALL BE 2:1 (H:V). ONCE TOPSOIL STRIPPING IS COMPLETED THE STOCKPILE SHALL BE VEGETATED, SUBJECT TO WEATHER CONDITIONS, BY HYDROSEEDED, OR AN APPROVED EQUIVALENT, TO THE SATISFACTION OF THE TOWN

SUMMARY CHART FOR ESC STAGING

ESC MEASURE	TIMING FOR INSTALLATION	INSPECTION MAINTENANCE REQUIREMENTS	TIMING FOR REMOVAL
STAGE 2 – PRE-GRADING			
1. Install cut-off swales where shown. 2. Fill existing stage 1 swales. 3. Pre-grade site to elevations shown. 4. Maintain ESC measures as required.	Prior to site servicing.	- Consultant to arrange inspection with Town staff once installation is complete. - Consultant to undertake weekly inspections and after each rainfall event, including weekly reporting. - Regular maintenance to remove accumulated sediment and repair esc measures.	Prior to final topsoil and sodding of lot/block areas.

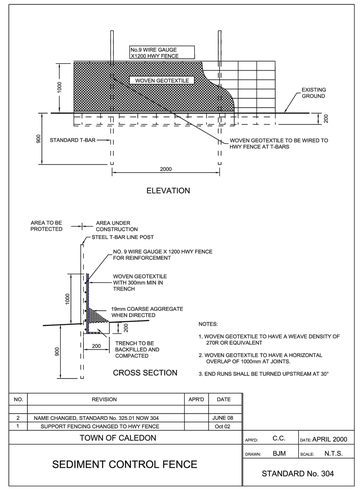
SEED MIXTURE

NATIVE PRAIRIE LOW GROW GRASS MIXTURE	
% OF MIXTURE	COMPOSITION TYPE
25%	FOWL BLUEGRASS (POA PALUSTRIS)
30%	CANADA WILD RYE (ELYMUS CANADENSIS)
15%	LITTLE BLUESTEM (SCHIZACHYRIUM SCORPARIUM)
30%	SAND DROPSEED (SPOROBOLUS CRYPTANDRUS)



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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev	3
HEAVY–DUTY SILT FENCE BARRIER			
OPSD 219.130			



NOTES:
1. WOVEN GEOTEXTILE TO HAVE A WEAVE DENSITY OF 270R OR EQUIVALENT
2. WOVEN GEOTEXTILE TO HAVE A HORIZONTAL OVERLAP OF 1000mm AT JOINTS.
3. END RUNS SHALL BE TURNED UPSTREAM AT 30°

NO.	REVISION	APR'D	DATE
2	NAME CHANGED, STANDARD No. 325.01 NOW 304		JUNE 08
1	SUPPORT FENCING CHANGED TO HWY FENCE		Oct 02

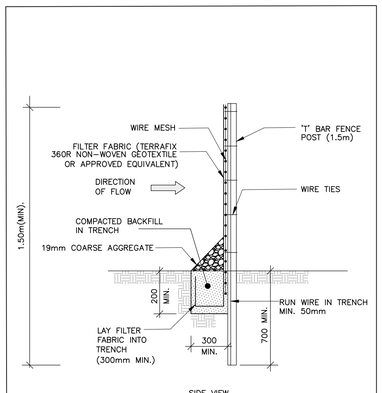
TOWN OF CALEDON

SEDIMENT CONTROL FENCE

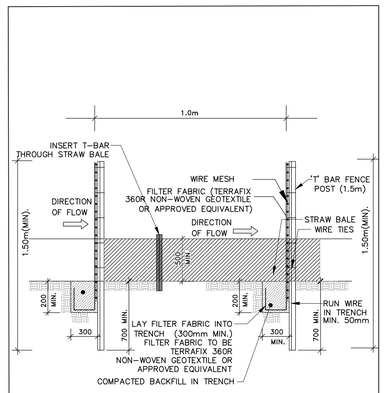
APR'D: C.C. DATE: APRIL 2000
DRAWN: BJM SCALE: N.T.S.

STANDARD No. 304

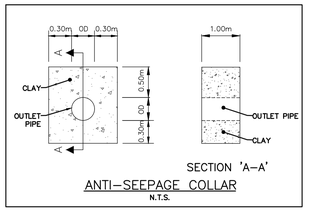
✳ GEOTEXTILE TO BE 270R TERRAFIX OR APPROVED EQUIVALENT. GEOTEXTILE USED SHOULD NOT HAVE A PLASTIC MESH LAYER.



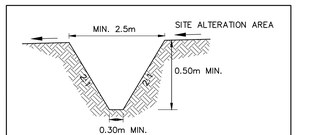
SIDE VIEWSEDIMENT CONTROL FENCE
AS PER TOWN OF CALEDON STD. 304 (MODIFIED)
N.T.S.



SIDE VIEW DOUBLE SILT FENCE
AS PER OPSD 219.130
N.T.S.

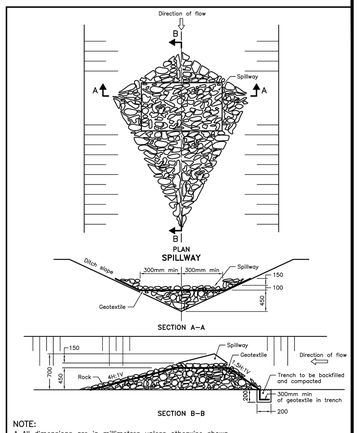


ANTI–SEEPAGE COLLAR
N.T.S.



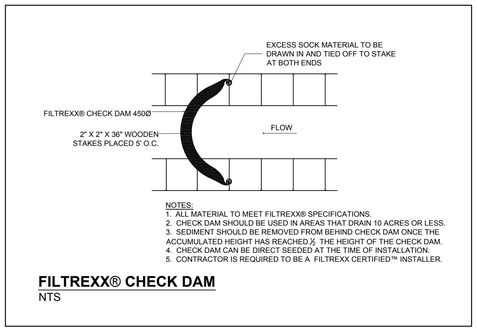
CUT–OFF SWALE TYPICAL SECTION
N.T.S.
SWALE TO BE SEEDED WITH THE SEED MIX FOR STABILIZATION OF DISTURBED AREAS PROVIDED ON DWG. ESC-01

SWALE SLOPE	FILTER SOCK CHECK DAM SPACING
0 - 1%	45m
1 - 2%	20m
2 - 3%	15m
3 - 4%	10m
4 - 5%	9m



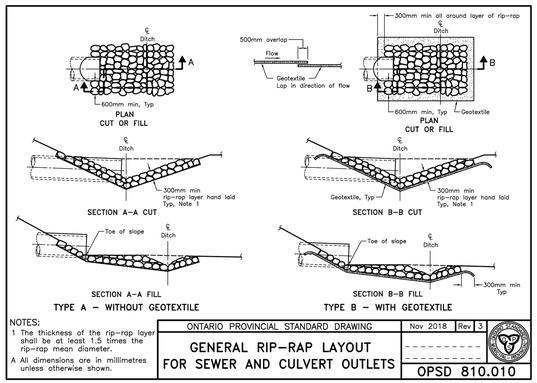
NOTE:
A All dimensions are in millimetres unless otherwise shown.

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



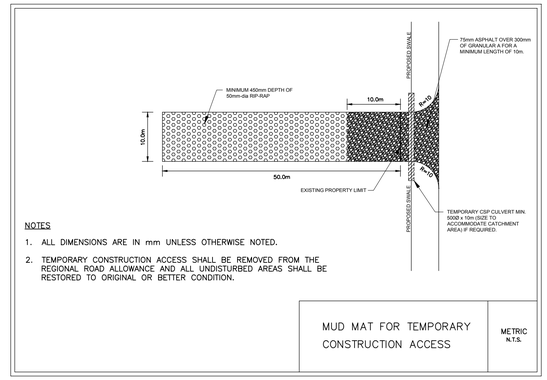
NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. CHECK DAM SHOULD BE USED IN AREAS THAT DRAIN 10 ACRES OR LESS.
3. SEDIMENT SHOULD BE REMOVED FROM BEHIND CHECK DAM ONCE THE ACCUMULATED HEIGHT HAS REACHED ½ THE HEIGHT OF THE CHECK DAM.
4. CHECK DAM CAN BE DIRECT SEEDED AT THE TIME OF INSTALLATION.
5. CONTRACTOR IS REQUIRED TO BE A FILTREXX CERTIFIED™ INSTALLER.

FILTREXX® CHECK DAM
NTS



NOTES:
1 The thickness of the rip–rap layer shall be at least 1.5 times the rip–rap mean diameter.
A All dimensions are in millimetres unless otherwise shown.

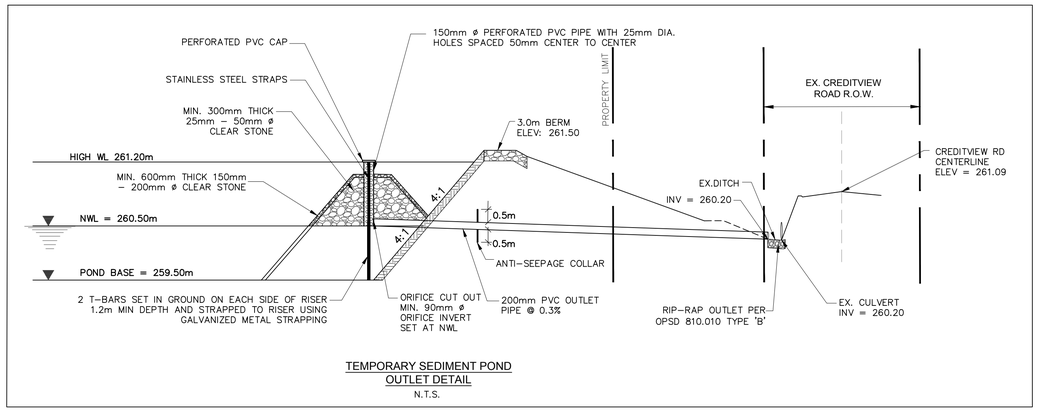
ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2018	Rev	3
GENERAL RIP–RAP LAYOUT FOR SEWER AND CULVERT OUTLETS			
OPSD 810.010			



NOTES
1. ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE NOTED.
2. TEMPORARY CONSTRUCTION ACCESS SHALL BE REMOVED FROM THE REGIONAL ROAD ALLOWANCE AND ALL UNDISTURBED AREAS SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION.

MUD MAT FOR TEMPORARY CONSTRUCTION ACCESS

METRIC N.T.S.



TEMPORARY SEDIMENT POND
OUTLET DETAIL
N.T.S.

THE SILTATION CONTROL PLAN IS INTENDED TO ASSIST THE CONTRACTOR IN THE LAYOUT AND CONSTURCTION OF THE SILTATION CONTROL FEATURES ONLY. THIS DRAWING SHALL NOT BE USED FOR CONSTRUCTION OF SITE SERVICES

ALL CONTROL WORKS SHALL BE IN PLACE PRIOR TO THE START OF STRIPPING OPERATIONS

NO IN-WATER WORKS ALLOWED BETWEEN APRIL 1ST TO JUNE 30TH, UNLESS AUTHORIZED BY DFO, MNR AND CH.

SILT / ENVIRONMENTAL CONTROL MEASURES TO BE INSPECTED AS REQUIRED, BY THE PROJECT ENVIRONMENTAL CONSULTANT DURING ALL PHASES OF CONSTRUCTION.

No.	REVISIONS	Date	By	Approved
1	FIRST SUBMISSION	AUGUST 2024	U.A.	A.A.

BENCHMARK: SET CUT CROSS 0.35m FROM SOUTH FACE OF CONCRETE HEAD WALL ALONG EAST SIDE OF ENTRANCE ROAD. 200m NORTH OF MAYFIELD ROAD. ELEVATION 265.29m

ELEVATION: ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM THE CITY OF BRAMPTON HORIZONTAL CONTROL MONUMENT: No. 042200357 AT ELEVATION=260.691m

LICENSED PROFESSIONAL ENGINEER
A.A.AHMADZAI
100161453
PROVINCE OF ONTARIO

REGION FILE No: XX
Designed By:
TOWN FILE No: XX

TOWN OF CALEDON

TYLin
3381 Steeles Avenue East,
Suite 315
Toronto, ON
M2H 3S8
p: 905.738.5700
f: 905.738.0065

12100 CREDITVIEW DEVELOPMENTS LTD.

EROSION & SEDIMENTATION PLAN DETAILS

SCALE: AS SHOWN	CHECKED BY: A.A.	PROJECT NO.	10376
DESIGNED BY: U.A.	DRAWN BY: U.A./R.P.	DRAWING NO.	ESC03
CHECKED BY: D.M.	DATE: AUGUST 2024	SHEET NO.	03