Stormwater Management Report

35 Industrial Drive

Township of Asphodel-Norwood, Ontario

Engage Project Number 22056

Engage Engineering Ltd.

Issued for Development Agreement

April 2023

Revision Summary

Revision No.	Revision Title	Date	Revision Summary
1	Issued for 1st Development Agreement	April 28th 2023	Final

Land Acknowledgement

Engage Engineering would like to acknowledge that our concern is in the traditional territory of the Michi Saagiig Anishinaabe and is part of the land and people encompassed within Treaty #20 and the Williams Treaty. We believe it is important to acknowledge these treaties, as our projects and designs often have a lasting impact on the lands, waters, wildlife, and people of this territory. We thank our local First Nations and communities for their ongoing stewardship of these lands and waters and strive to center their voices in our work and honor our treaty obligations. May we dedicate ourselves as treaty people to moving forward in the spirit of reconciliation and enduring collaboration.

Accessibility for Ontarians with Disabilities (AODA)

This report was prepared and formatted to comply with AODA guidelines. Engage is committed to taking all reasonable steps to ensure that anyone who accesses our services will be able to do so in a way that respects their needs. As such, if you require any assistance with the access or interpretation of this proposal, please do not hesitate to reach out and we will be pleased to accommodate you.

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1.0 Introduction

1.1 Purpose

Engage Engineering Limited (Engage) has been retained to prepare a Stormwater Management (SWM) Report in support of a Development Agreement for the proposed construction of a medical clinic at 35 Industrial Drive, Norwood. The development will include the construction of a one story medical building with three parking lots, landscaping a bioretention facility, and dry pond. To support the site development, Spruce Drive is proposed to be extended approximately 35m north into the existing right-of-way (ROW) with a temporary gravel turn around.

The purpose of this report is to support the development agreement by quantifying the impact the proposed development will have on the natural water cycle. This report proposes various stormwater management measures required to maintain post development flows to pre development levels, and achieve water quality objectives. This report will identify a strategy to reduce water quality impact on downstream receivers and provide on site water infiltration.

Recommendations made in this report will be in accordance with Otonabee Region Conservation Authority (ORCA) requirements, in addition to current stormwater management best practices and the Credit Valley Conservation Low Impact Development Stormwater Management Planning and Design Guide.

1.2 Site Description

The site is located in southern part the Town of Norwood, bordered by Industrial Drive to the north, residential houses to the south and east, and an industrial facility to the west. The industrial area contains two building used to assist in the operations of a trucking company. The undeveloped site is currently used as an agricultural field. A ROW spans the site between Maple Avenue and Industrial Drive. The subject site is approximately 6.58 ha of agricultural land. The proposed medical clinic will be contained to a portion of the site east of the ROW. The proposed medical clinic site area is approximately 0.83 ha. The remaining land is subject to future development. The location of the subject site is identified on the Location Plan included as **Figure 1**.

Figure 1: Location Plan

2.0 Hydrologic Analysis

2.1 Hydrologic Model

As part of this study, a hydrologic model for the site under both existing and proposed conditions was developed using Visual OTTHYMO (VO) software. The model was used to simulate peak flows from the site under both pre- and post-development conditions for 6 hour SCS storm distributions. The model was used to verify the stormwater management facilities storage requirements and performance. City of Peterborough rainfall data was utilized to develop the storm distributions in the model due to its proximity to the site.

A geotechnical investigation completed by Cambium Ltd. in March 2023 and aerial imagery was used to determine the landuse type and soil characteristics for the hydrologic model. According to the Geotechnical Investigation, the underlying soils are generally characterized as glacial till soil with some gravelly sandy silt and clayey silt. This type of soil is classified as Hydraulic Soils Group B for the purpose of this report.

A monitoring well was set up near the location of the proposed bioretention feature to determine the static groundwater level at the site. The monitoring well BH104-23 was dry upon drilling completion and again on April 12th, 2023, indicating the groundwater level is lower than 2.03mbgs.The geotechnical investigation included in **Appendix H**, states the groundwater table at the site appears to be at an elevation of 199.51 mASL. This elevation is mostly within the bedrock depths at the site. During the geotechnical investigation, presumed bedrock was encountered at depth ranging from 1.9 mbgs to 3.5 mbgs.

2.2 Existing Conditions

The existing site is an agricultural field 6.58 hectares in size located south of Industrial Drive, in the town of Norwood. The site is currently used for agricultural purposes. The topography contains some localized depressions and approximately 8m of fall between the high point in the southeast corner to the low point in the northwest corner.

JBF Surveyors was retained to preform a topographic survey of the site dated September 14th, 2022, and is included as **Figure 2**. The survey was used to determine the existing elevations, locations of features on the site, and to establish proposed grading for the development of the site. Additional elevation data for areas outside of the subject site was extracted from the South Central Ontario Orthophotography Project 2013 (SCOOP).

Based on a review of the topography and a site visit, the majority of excess runoff generated from site is directed into one of two existing culvert that crosses under Industrial Drive in the north end of the site. The existing culverts are not included on the survey although they were identified and measured during a subsequent site visit. The culverts direct stormwater north where it ultimately discharges into the Ouse River. The northeast culvert is a 400mm diameter CSP and the northwest culvert is a 450mm diameter CSP. Pictures of the existing culverts and a sketch showing the outlet locations is included in **Appendix A**.

The site has three existing drainage catchment areas and one external drainage area that are identified on the Pre-Development Catchment Area Plan, included as **Figure 4**. The catchment areas can be identified based on the following properties:

- **EX1**: Existing catchment area **EX1** is 2.273 ha and includes the eastern portion of the site. The area consists of agricultural land and is relatively flat with two localized depressions. Runoff from this area drains north into an existing 400mm corrugated steel pipe (CSP) culvert that runs under Industrial Drive. The existing northeast culvert directs stormwater through a forested area before ultimately reaching the Ouse River.

- **EX2**: Existing catchment area **EX2** is 3.961 ha and includes the western portion of the site. This area consists of agricultural land, gravel, and the Right-of-Way. Runoff from this area flows north towards the existing culvert under Industrial Drive. The existing northwest culvert directs stormwater through the empty lot before ultimately reaching the Ouse River.

- **EX3**: Existing catchment area **EX3** is 0.348 ha and includes the southeastern corner of the site. This area is currently used for agricultural purposes. Runoff from this area drains towards Maple Avenue East.

- **EXT4**: Existing external catchment area **EXT4** is 0.166 ha southwest of the subject site. This area consists of developed single residence units along Maple Avenue East. Runoff from this small external catchment area drains into the site through EX2. Runoff from this catchment will ultimately flow through the existing northwest culvert to the north and enter the Ouse River.

The area west of EX2 is an industrial area that is generally composed of gravel landuse. This area is outside of the topographic survey limits. The SCOOP elevation data from 2013 and a site visit was used to determine the general runoff characteristics from this area. This area is relatively flat with a slight slope towards the northwest. Runoff generated from this area generally flows towards the bend in Industrial Drive and eventually reaches the Ouse River.

The characteristics of the proposed catchment areas are summarized in **Table 1** below. The initial abstraction for EX1 has been set above the other catchments to simulate the

additional infiltration that occurs within the localized depressions. A complete list of the VO input data is included in **Appendix B**.

Table 1 - Existing Catchment Areas (ha)

Catchment	Area (ha)	TP	CN*	IA	VO Command
EX1	2.273	0.27	78	10	NASHYD
EX2	3.961	0.32	76	5	NASHYD
EX3	0.348	0.20	73	5	NASHYD
EXT4	0.166	0.11	67	5	NASHYD

2.3 Proposed Conditions

Under the proposed condition, the topography will change to accommodate the grading for the proposed development. There are seven proposed drainage areas and one external drainage areas identified on the **Post Development Catchment Area Plan** included as **Figure 5.** The respective catchment areas and their characteristics are summarized below.

- **PR1:** Proposed catchment area **PR1** is 2.213 ha and includes the eastern portion of the site. This area is slightly smaller than EX1 due to the development boundary and associated grading changes in the south end of the catchment. The area consists of agricultural land and is relatively flat with two localized depressions. Runoff from this area drains north into an existing northeast 400mm CSP culvert that runs under Industrial Drive. The existing northeast culvert directs stormwater through a forested area before ultimately reaching the Ouse River.

- **PR2:** Proposed catchment area **PR2** is 1.799 ha and includes the western portion of the site. This area consists of agricultural land, gravel, and the undeveloped portion of the Right-of-Way. Runoff from this area flows north towards an existing northwest culvert under Industrial Drive. The existing northwest culvert directs stormwater through the back portion of an empty lot before ultimately reaching the Ouse River.

- **PR3:** Proposed catchment area **PR3** is 0.326 ha and includes the southeastern corner of the site. This area is currently used for agricultural purposes. It is slightly smaller than EX3 due to the development boundary and associated grading changes. Runoff from this area drains towards Maple Avenue East through residential lots.

- **PR4**: Proposed catchment area **PR4** is 1.457 ha and includes the central portion of the site. This area includes the proposed Spruce Drive extension and a gravel turn-around. A proposed swale will be constructed along the western border of the catchment area along with a dry pond in the north end. The landuse within this catchment area is mostly agricultural with some impervious gravel and paved surfaces. Runoff from **PR4** will be conveyed and controlled prior to entering the existing culvert and ultimately reaching the Ouse River.

- **PR5**: Proposed catchment area **PR5** is 0.270 ha on the western portion of the development area. The catchment includes proposed parking spaces, walkways, landscaped areas, and a portion of the medical clinic. A part of the bioretention facility falls within this catchment area. Runoff from this catchment area will be treated within the bioretention facility, conveyed through the swale, and controlled within the dry pond prior to entering the existing culvert and ultimately reaching the Ouse River.

- **PR6**: Proposed catchment area **PR6** is 0.228 ha on the southern portion of the development area. The catchment includes proposed parking spaces, walkways, landscaped areas, and a portion of the medical clinic. Runoff from this catchment area will be collected and conveyed through an underground storm sewer to the bioretention facility. Excess runoff within the facility will be conveyed through the swale and controlled within the dry pond prior to entering the existing culvert and ultimately reaching the Ouse River.

- **PR7**: Proposed catchment area **PR7** is 0.309 ha on the northern portion of the development area. The catchment includes proposed parking spaces, walkways, landscaped areas, a portion of the medical clinic and a section of agricultural land. A part of the bioretention facility falls within this catchment area. Runoff from this catchment area will be treated within the bioretention facility, conveyed through the swale, and controlled within the dry pond prior to entering the existing culvert and ultimately reaching the Ouse River.

- **PXT1**: External catchment area **PXT1** is 0.166 ha, southwest of the subject site. This catchment area is the same as EXT4. This area consists of developed single residence units along Maple Avenue East. Runoff from this small external catchment area drains into the site through PR2. Runoff from this catchment will ultimately flow through the existing culvert to the north and enter the Ouse River.

The characteristics of the proposed catchment areas are summarized in **Table 2** below.

Table 2 - Proposed Catchment Area (ha)

Catchment	Area (ha)	TIMP	XIMP	CN*	IA	VO Command
PR1	2.213	-	-	78	10	NASHYD
PR2	1.799	-	-	77	5	NASHYD
PR3	0.326	-	-	73	5	NASHYD
PR4	1.437	-	-	76	5	NASHYD
PR5	0.270	0.652	0.652	56	1.5	STANDHYD
PR6	0.228	0.588	0.588	56	1.5	STANDHYD
PR7	0.309	0.550	0.550	61	1.5	STANDHYD
PXT1	0.166	-	-	78	5	NASHYD

2.4 Existing and Proposed Peak Flows

The SCS Type II storm distributions have been utilized to determine the peak flows for the existing and proposed conditions. The hydrologic model was used to simulate existing and proposed peak flows for the 2 through 100 year storm events. The results are summarized in **Table 3**and **Table 4** below. Spreadsheets with the VO model parameters are included in **Appendix B.**

Table 3 – Existing Peak Flows (m³/s)

Catchment	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
EX1	0.048	0.098	0.137	0.190	0.231	0.275
EX2	0.094	0.171	0.229	0.309	0.372	0.437
EX3	0.010	0.019	0.025	0.034	0.041	0.048
EXT4	0.005	0.009	0.013	0.017	0.021	0.025
Total to Northwestern Culvert*	**0.097**	**0.177**	**0.237**	**0.318**	**0.384**	**0.451**
Total Existing	**0.157**	**0.297**	**0.404**	**0.550**	**0.665**	**0.785**

*Note: Total area contributing to the northwestern culvert includes EX2 and EXT4

Table 4 – Proposed Peak Flows (m³/s)

Catchment	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
PR1	0.046	0.095	0.133	0.185	0.225	0.267
PR2	0.046	0.083	0.111	0.149	0.179	0.209
PR3	0.010	0.018	0.024	0.032	0.038	0.045
PR4	0.068	0.121	0.161	0.214	0.256	0.299
PR5	0.032	0.045	0.054	0.065	0.074	0.083
PR6	0.025	0.036	0.043	0.052	0.059	0.066
PR7	0.033	0.048	0.057	0.070	0.080	0.090
PXT1	0.005	0.009	0.013	0.017	0.021	0.025
Total to Northwestern Culvert*	**0.196**	**0.320**	**0.410**	**0.531**	**0.627**	**0.724**
Total Proposed	**0.265**	**0.455**	**0.596**	**0.784**	**0.932**	**1.084**

*Note: Total area contributing to the northwestern culvert includes PR2, PR4, PR5, PR6, PR7, and PXT1

The results indicate that in the absence of any quantity controls, the proposed peak flows are greater than the existing peak flows directed to the northwest existing culvert. Some form of quantity controls will be required to manage the peak runoff flows for this portion of the proposed site.

The proposed flows directed towards the south, PR3, are at or below the existing flows, EX3, therefore no quantity controls are required for this catchment area.

The proposed flows entering the northeast culvert, PR1, are below the existing flows, EX1, as the size of the catchment area has slightly decreased. No form of quantity controls will be required for this catchment area.

3.0 Stormwater Management

3.1 Quantity Control

Runoff from major and minor storm events from catchment areas PR1, PR2, PR3 and PXT1 will be released from the site uncontrolled. The proposed development is mainly outside of these catchment areas therefore the overall hydraulic conditions will not significantly change from existing conditions due to the development of the site.

As demonstrated in Table 3 and Table 4 above, the post development peak flow rate entering the existing culvert is higher than the allowable pre-development peak flow rate, therefore quantity control is required for runoff directed towards the northwest culvert. A dry pond is being proposed to provide the quantity control for the site. The dry pond has been designed to provide sufficient storage volume to reduce the peak flows from the contributing proposed drainage areas to rates below or at the existing conditions.

Runoff from major and minor storm events from catchment areas PR5, PR6 and PR7 will flow through the bioretention facility into the conveyance swale that is directed into the proposed dry pond. It is anticipated that the bioretention facility will assist in reducing the total runoff volume and peak flows during storm events. As bioretention LID facilities are typically not used for quantity control, it has conservatively not been included in the VO model. These types of LIDs have the potential to reduce annual runoff volumes by 90%.

Runoff from major and minor storm events from catchment area PR4 will be conveyed to the dry pond through the conveyance swale. The 2 to 100 year peak flows outletting from the dry pond will be controlled by the 450mm CSP culvert.

A 4.5m wide overflow weir has been designed within the dry pond to safely convey the uncontrolled 100 year peak flow in an emergency situation where the 450mm culvert

becomes blocked or clogged. Calculations demonstrating the sizing and capacity of the overflow weir is included in **Appendix G**.

The proposed dry pond was modeled to determine the functionality and confirm that is has the capacity to accommodate the flows from the site. A proposed dry pond surface was developed in Autodesk Civil 3D. This surface was analyzed, and it was determined the pond has a total volume 615m^3 below the overflow weir. Volume calculations are included in **Appendix D**.

VO model computations were completed for the site to determine the storage volumes required to limit post development flows to pre development levels. The dry pond was incorporated in the VO model as a route reservoir feature with a 450mm outletting culvert. The culvert is designed to control the 2 through 100 year design storms. A 0.05m difference between the bottom of the dry pond and the invert of the 450mm diameter culvert has been provided to ensure the required storage volume is provide and allow for infiltration and sedimentation. The Hydraflow Express extension for Autodesk Civil 3D was used to model the stage discharge rating curve because a culvert is a complex control structure with varying governing equations depending on the flow regime. The results of the model were used to determine the route reservoir rating curve in the VO model. The Hydraflow Express results are included in **Appendix D**. The VO model outputs are included in **Appendix C**. An abbreviated stage storage discharge (SSD) relationship for the dry pond is shown in **Table 5** below. The complete SSD table is included in **Appendix D**.

Table 5 - Stage Storage Discharge

Description	Stage (m)	Discharge (m^3/s)	Minimum Storage Required (from VO) (m^3)	Actual Storage Provided (m^3)
Bottom of Storage	199.00	0.000	-	0
2 - Year Ponding	199.25	0.045	150	168
5 - Year Ponding	199.35	0.085	226	241
10 - Year Ponding	199.42	0.115	280	295
25 - Year Ponding	199.50	0.155	349	358
50 - Year Ponding	199.57	0.185	402	415
100 - Year Ponding	199.65	0.215	457	465
Top of Storage	200.00	-	-	805

The provided SSD will limit the storm events to release rates below pre development conditions. **Table 6** below demonstrates the proposed discharge rates entering the existing northeast culvert are at or below pre development release rates. The proposed discharge rates includes uncontrolled flows from PR2 and PXT1 and controlled flows from PR4, PR5, PR6 and PR7. These results were extracted from the VO model results found in **Appendix D**.

Table 6 – Total Allowable vs. Proposed Release Rates

Design Storm (years)	Allowable Discharge Rate (m^3/sec)	Proposed Discharge Rate North (m^3/sec)
2	0.097	0.094
5	0.177	0.173
10	0.237	0.233
25	0.318	0.313
50	0.384	0.376
100	0.451	0.438

3.2 Quality Control

Quality control will be required for the site as runoff from the proposed impervious surfaces will contain suspended solids and other contaminates. Quality control to an enhanced level will be provided for the site through infiltration in within the bioretention facility.

Catchment areas PR1**,** PR2**,** and PR3 consist of agricultural landuse that produces essentially clean runoff water. Water quality controls are not required for these areas.

To provide quality control for the subject site, drainage from PR5, PR6 and PR7 will be directed to the bioretention facility for treatment prior to the conveyance swale and dry pond.

Catchment area PR4 consists mostly of agricultural landuse with a portion of the Spruce Drive road extension and turn around. Water quality controls have not been specifically designed for these disconnected impervious surfaces. It is expected that an enhanced level of quality control will be achieved through the grassed swale and dry pond prior to release for the site. The grassed swale has a shallow slope and will have a bottom width of 0.75m to provide additional opportunity for sedimentation and water quality

treatment. Runoff from PR4 is not expected to have a negative impact on downstream receivers.

Catchment areas PR5, PR6 and PR7 have a total area of 0.807ha and a percent imperviousness of 59.5%. Per table 3.2 of the MOE SWM Planning & Design Manual, the quality storage volume requirements for an infiltration facility with 59.5% imperviousness was determined to be approximately 32m^3/ha. Based on a contributing area of 0.807ha, the required infiltration volume for quality control is 25m^3. The available infiltration volume in the bioretention facility below the overflow catchbasin is 104.9m^3. This indicates there is sufficient water quality volume available within the bioretention facility to provide an enhanced level of water quality control. The water quality calculations are included in **Appendix E.**

Infiltration testing to support the proposed LID strategy was conducted by Cambium Inc. dated March 21st, 2023, included in **Appendix I**. During the investigation, Cambium completed in-situ permeameter testing in one location in the approximate location of the proposed bioretention facility. The testing confirms the expected infiltration rate 2.0m below the surface is 27mm/hr after applying a safety factor of 2.5. At the time of the investigation the soil was dry to moist.

3.3 Low Impact Development (LID) Controls

Stormwater low impact design (LID) features are critical components in managing the adverse environmental impacts of stormwater runoff caused by new developments. LID features attempt to mimic the natural hydrological cycle and reduce the amount of runoff that reaches streams and rivers. The bioretention facility has been designed to temporarily store, treat, and infiltrate the first 15mm of a storm event from the new proposed impervious surfaces. The total area of impervious surfaces proposed from catchment areas PR4, PR5, PR6 and PR7 is 6200m^2. Multiplying the impervious area by the target 15mm infiltration, results in a volume of 93m^3 infiltration volume target.

The bioretention facility was designed to provide the required water quality volume to allow infiltration of the first 15mm of a rain event. Due to bedrock and grading constraints the facility is divided into an east and west cell. Excess runoff from the east cell is directed into the west cell through an overflow weir. A thermoplastic liner within the connecting spillway prevent water from interflowing between the cells, allowing them to act independently. The separation allows the bottom of the cells to be at different elevations and ensures sufficient separation from the bedrock.

The total infiltration volume provided by the bioretention facility is 104.9m^3, greater than the targeted 93.0m^3. Drawing cross sections of each of the bioretention cells is provided within the detailed drawings included in **Appendix J** Further details on the induvial bioretention cells are provided below:

East Bioretention Cell

The eastern bioretention cell will treat excess runoff from catchment area PR7. The cell has a total volume of 38.3m^3 below the overflow into the western bioretention cell. The total volume includes subsurface void space and surface ponding. 14.3m^3 of storage is provided by the voids within the 0.55m deep filtration media plus the 0.15m of gravel. A void ratio of 0.40 was used in the calculation as per the Bioretention: Filter media LID SWM Planning and Design Guide. The remaining 24.0m^3 is provided by 0.35m of surface ponding up to the overflow. Details on the volume calculation are included within **Appendix E**.

The geotechnical investigation identified bedrock at the borehole closest to the east bioretention cell, BH105-23. The depth to bedrock at this borehole is 1.88m below ground surface. The existing ground surface elevation at the location of the east bioretention cell is approximately 203.75m. Assuming the depth to bedrock follows the existing contours, the expected bedrock elevation is at 201.87m. The stone at the bottom of the bioretention cell is at an elevation of 203.35m. Therefore, there will be 1.48m between the bottom of the stone and the bedrock.

West Bioretention Cell

The western bioretention cell will treat excess runoff from catchment areas PR5 and PR6. The cell has a total volume of 66.6m^3 below the overflow catchbasin. The total volume includes subsurface void space and surface ponding. 23.9m^3 of storage is provided by the voids within the 0.55m deep filtration media plus the 0.15m of gravel. A void ratio of 0.40 was used in the calculation as per the Bioretention: Filter media LID SWM Planning and Design Guide. The remaining 42.7m^3 is provided by 0.35m of surface ponding up to the overflow. The overflow catchbasin will direct water into the conveyance swale adjacent to the ROW. The west bioretention cell has an overflow weir that can convey the uncontrolled 100 year peak flows in an emergency situation. Details on the volume calculation are included within **Appendix E**.

The geotechnical investigation identified bedrock at borehole BH103-23. The depth to bedrock at this borehole is 2.29m below ground surface. The existing ground surface elevation at the location of the west bioretention cell is approximately 203.10m. Assuming the depth to bedrock follows the existing contours, the expected bedrock elevation is at 200.81m. The stone at the bottom of the bioretention cell is at an elevation of 202.30m. Therefore, there will be 1.49m between the bottom of the stone and the bedrock.

3.4 Stormwater Conveyance

Runoff from catchment area **PR6** will be conveyed via storm sewers to the west biorientation cell. The storm sewers have been designed in accordance with best

practices with all sections of pipe operating below 80% capacity. All storm sewers have been designed to convey the 10 year storm event. A storm sewer design sheet demonstrating the sizing and capacity of the storm sewers has been provided in **Appendix G**.

A conveyance swale on the east of the ROW conveys flows for minor and major storm events from drainage area PR4, PR5, PR6 and PR7 to the dry pond. A swale along the east side of the parking lot within PR5 accepts runoff from minor and major storm events from the contributing drainage area and directs water into the west bioretention cell. Calculations demonstrating the sizing and capacity of the swales are included in **Appendix G** and summarized in **Table 7** below.

Table 7 – Swale Capacity

Swale	Contributing Catchment Areas	Characteristics	Cross Sectional Area (m^2)	Maximum Flow Rate (m^3/s)	Capacity at 100 Year Flow Rate
Conveyance Swale to Dry Pond	PR4, PR5, PR6, PR7	Trapezoidal; 3:1 side slope, 0.5% minimal slope, bottom width 0.75m, depth 0.5m	1.125	0.538	47%
Conveyance Swale to Bioretention	PR5	Triangular; 3:1 side slope, 0.5% minimal slope, depth 0.3m	0.270	0.083	48%

Weir sizing calculations have been provided in **Appendix G** to demonstrate the ability of the overflow weirs from the dry pond and bioretention facility to convey the 100 year uncontrolled runoff in the event that the outlets are blocked.

3.5 Existing Culvert Capacities

To ensure the existing culverts in the north end of the site have sufficient capacity to be considered a suitable outlet location, a capacity analysis was conducted using the Hydraflow Express extension for Autodesk Civil 3D. Both of the culverts were modeled

to determine the peak flow they can convey prior to overtopping. The culverts were identified and measured during a site visit. The culverts are located outside of the survey boundaries therefore the length and slopes of the culverts were calculated based on the topological data from SCOOP. A sketch showing the approximate location of the two culverts is included in **Appendix A.**

Table 8 below summarizes the culvert characteristics and the results of the Hydraflow Express modeling. The model output results are provided in **Appendix G**.

Table 8 – Existing Culvert Calculations

Structure	Contributing Catchment Areas	Culvert Properties	Existing 100 Year Peak Flow (m^3/s)	High Water Elevation (m)	Outlet Velocity (m/s)
Eastern Culvert	EX1	400 mm diameter, 3.0% slope, length 20m	0.275	201.55	2.26
Western Culvert	EX2 + EXT4	450mm diameter, 2.5% slope, length 55m	0.451	200.08	2.77

The results of the existing culvert analysis indicate both culverts have the capacity to safely convey minor storms and are at their capacity for major storms under the existing conditions. Under existing and proposed conditions, some overtopping of the road may occur during a 100 year storm event. The depth of water overtopping the road would be minimal and will not adversely impact road conditions. Under proposed conditions the 100 year peak flow rates will decrease, further reducing the risk to downstream receivers. The existing culverts are a suitable outlet for the proposed catchment areas.

3.6 Inlet Capacity Calculations

Inlet capture capacities for the catchbasin in **PR6** and the bioretention facility have been analyzed. The catchbasins have been designed to safely capture and convey flows up to and including the 10 year storm. Inlet capacities have been interpolated from MTO Design Chart 4.19 and supporting calculations are included in **Appendix H**. Capture calculations have been provided in **Table 9** below. The 10 year flows were derived from the VO model for the contributing areas derived from the Post-Development Catchment Area Plan included as **Figure 5**. The VO model results are included in **Appendix C**.

Table 9 - Inlet Capacity Calculations

Structure	Contributing Area	Design Storm	Required Capacity (m^3/s)	Provided Ponding Depth (m)	Maximum Inlet Capacity (m^3/s)
CB1	PR6	10 Year 6hr SCS	0.043	0.10	0.065
Bio CB	PR5 + PR6 + PR7	10 Year 6hr SCS	0.154	0.20	0.159

As illustrated above, the ponding depth for the 10 year peak flow is sufficient to provide the required capacity for both structures. In the event that the catchbasin within PR6 is blocked, or the incoming flows exceed the capacity of the structure, an emergency overland flow route is provided that will direct flows west towards the conveyance swale within PR5.

In the event that the catchbasin within the bioretention facility is blocked, or the incoming flows exceed the capacity of the structure, an emergency weir has been designed to safely convey the uncontrolled 100 year flows from the contributing catchment areas. Calculations demonstrating the sizing and capacity of the overflow weir is included in **Appendix G.**

4.0 Operation and Maintenance

Proper inspection and maintenance is essential to ensure the long-term performance of a SWM facility. The following list identifies the required inspection and maintenance activities that should be undertaken for the bioretention facility and dry pond to ensure they are operating effectively:

1. Facility Inspection
2. Grass Cutting
3. Trash/Debris Removal
4. Removal of Accumulated Sediment

Each of these is described in further detail below.

Facility Inspection

Inspections of the swales, dry pond and bioretention facility are conducted to confirm the facility performance as well as to identify the type and frequency of additional maintenance activities. During the first two years of operation, inspections should be made after each significant rainfall event to ensure proper functioning of the system; this will average between three to six inspections per year. After this initial period, inspection frequency can be reduced to a bi-annual inspection.

Below is a checklist of items that should be inspected/reviewed during the facility inspection:

1. Observe water level – standing water could indicate blockage of outlet. If standing water is observed, inspect the outlet for debris/clogging.

2. Observe and measure sediment levels in the basin. If significant sediment is observed, it should be removed.

3. Inspect vegetation in facility and upland areas. Damaged or dead vegetation should be replaced with similar species.

4. Inspect inlet and outlet structures for signs of wear, clogging or damage.

Grass Cutting
It is preferable to maintain the facility in as natural a state as possible; longer grass and natural vegetation tend to enhance water quality and SWM performance. Grass cutting around the top perimeter of the basin can be completed on an as-required basis for aesthetic reasons but the vegetation within the basin should be left in a natural state. If the grass in the basin needs to be cut due to aesthetic concerns of residents, it should be cut as infrequently as possible to maintain an acceptable aesthetic standard.

Trash/Debris Removal
Trash/debris removal will be required for the facilities in the spring of each year, to remove debris that has accumulated over the winter season. Apart from “spring cleaning,” trash removal should be completed on a periodic basis throughout the year, in conjunction with other routine maintenance activities such as grass cutting.

Sediment Removal
Sediment will need to be removed periodically from the basin to maintain SWM performance. The rate of sediment accumulation is dependent on several factors including:

- Characteristics of upstream areas (i.e., level of imperviousness)
- Upstream land use activities, especially during the construction phase of the development prior to sodding of all yards
- Municipal winter control practices (e.g., level of sand used)

Semi-annual inspections during the first two years and annual inspections thereafter should be used to determine the rate of accumulation of sediment and when it will need to be removed. In general, sediment should be removed from the basin when the accumulated depth reaches 0.15m.

5.0 Erosion and Sediment Control

The development of the site, particularly the stripping of the site, will result in an area of exposed native soil, which in turn has the potential to erode and contribute sediment to downstream receivers. To mitigate these effects, **Erosion and Sediment Control Plan** was developed, and is included within the Detailed Design Drawings in **Appendix J**. Elements of the strategy, described below, incorporate best practices as outlined in the Erosion and Sediment Control Guidelines for Urban Construction, GGHCA.

The erosion and sediment control plan has been established to best protect downstream receivers during the construction period. A silt fence barrier will first be erected downgrade of the construction area. After the silt fence is in place the mud mat will be installed at the construction entrance. Further

Silt Fence: Silt fence will be utilized as a perimeter control and will be installed downgrade of the construction area as shown on the **Erosion and Sediment Control Plan** included in **J**. The silt fence will be installed in accordance with OPSD 219.110 and may require periodic maintenance during the construction period.

Mud Mat: A mud mat will be installed to limit impact on downstream receivers The mud mat should consist of 2 layers of 200 mm rip rap on geotextile. The mud mat will reduce the amount of mud and debris that is tracked from the site. The contractor shall maintain the mat by “turning” it as it becomes clogged or adding additional rip rap as needed to maintain the effectiveness of the mat.

Straw Bale Check Dams: Straw bale check dams have been included in the proposed swales as a means of reducing velocities in the swales and capturing sediment during the construction period. They will be installed in accordance with OPSD 219.180, and the contractor shall maintain the check dams during construction.

Summary

The development of a medical clinic at 35 Industrial Drive will impact the current water cycle, increase runoff rates, and has the potential to increase sediment/contaminant loading downstream. To mitigate these effects, a stormwater management strategy is proposed that incorporates a dry pond, various swales, storm sewer and bioretention.

Quantity control has been proposed for the catchment areas that are directed to the existing culvert in the north end of the site. A dry pond with a controlled outlet will provide the required storage volumes to alleviate peak flow to pre development rates.

Quality control for the proposed catchment areas will be achieved through infiltration within the bioretention facility. The bioretention facility has the capacity to infiltrate the first 15mm of a rain event from the impervious surfaces.

The proposed stormwater management strategy will ensure that the proposed development of Industrial drive does not have a negative impact on downstream receivers or the surrounding environment. The use of the above noted facilities will provide the required quantity and quality control for the site

Prepared by:

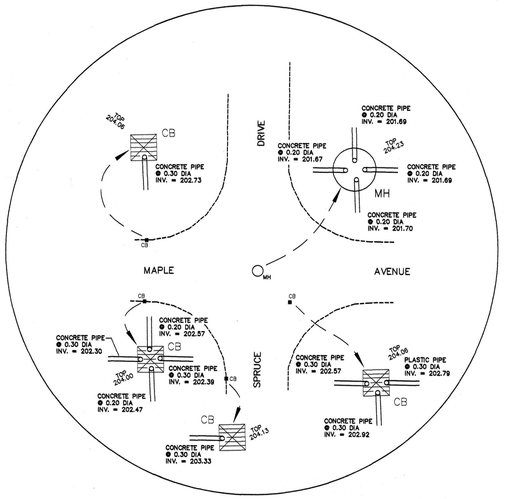
Logan Mattern,
Engineering Intern

Reviewed by:

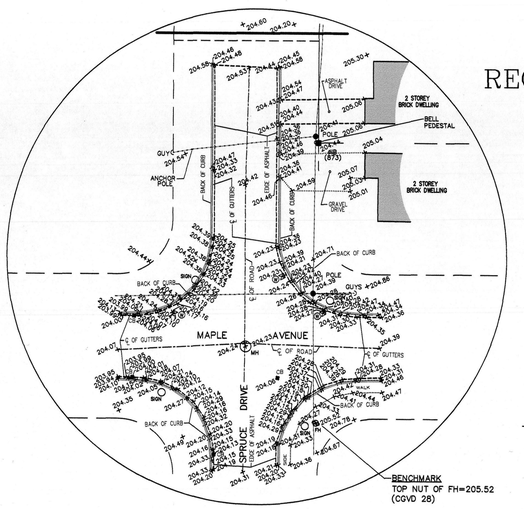
Luke Parsons, P.Eng.
Water Resources Engineer

Figure 2: Topographic Survey

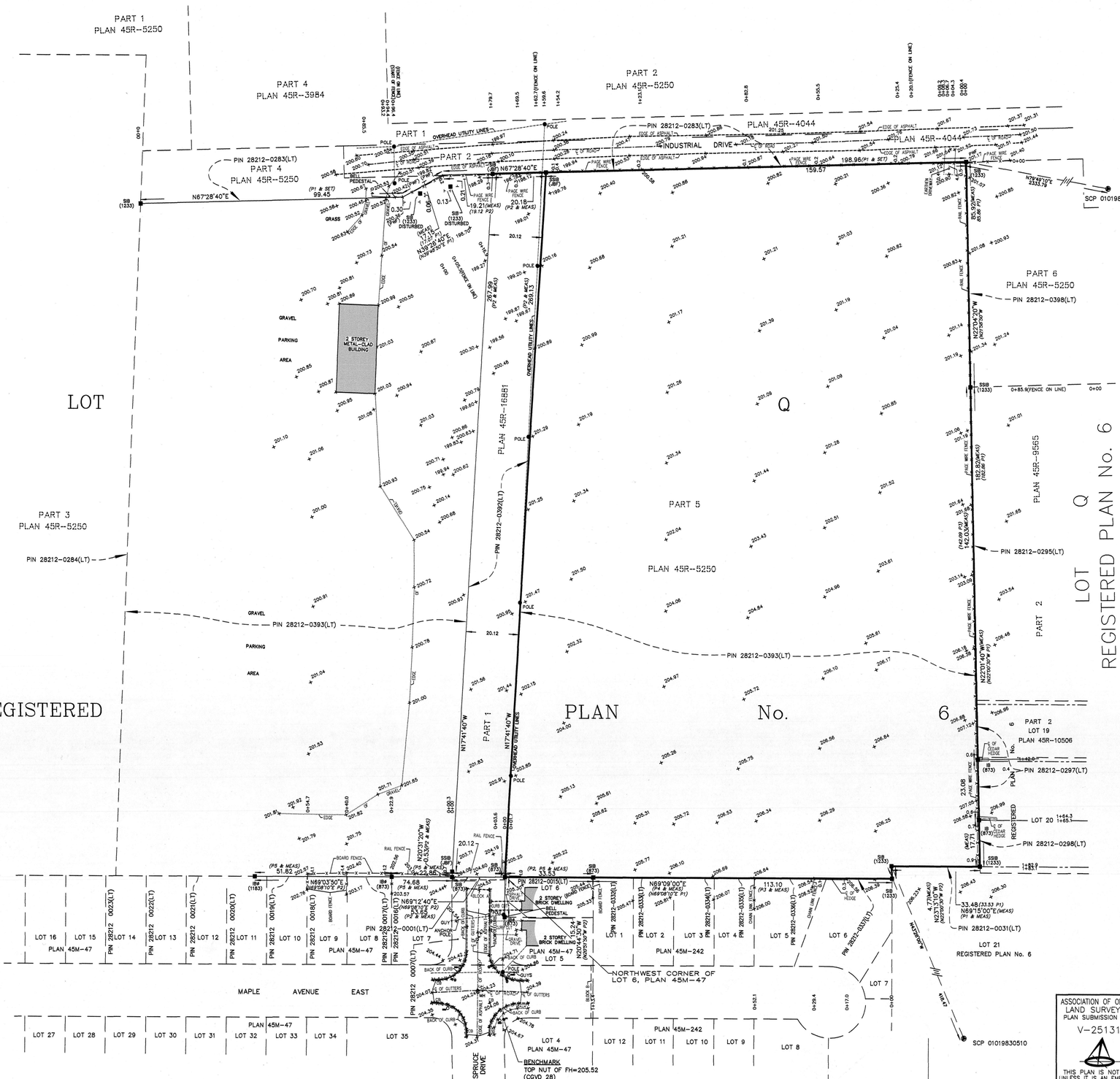
METRIC:
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048 .



DETAIL
NOT TO SCALE



DETAIL
SCALE: 1:375



PLAN OF SURVEY OF
PART OF LOT Q
REGISTERED PLAN No. 6
GEOGRAPHIC TOWNSHIP OF NORWOOD
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

SCALE: 1:750

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1) THIS SURVEY AND PLAN ARE CORRECT AND ARE IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2) THE SURVEY WAS COMPLETED ON 14 SEPTEMBER, 2022

SIGNED AT LAKEFIELD, ONTARIO
THIS 1ST DAY OF NOVEMBER, 2022

CHRISTOPHER E. MUSCLOW
ONTARIO LAND SURVEYOR

LEGEND

■	DENOTES SURVEY MONUMENT, FOUND
WIT	DENOTES WITNESS
873	DENOTES W.A. BENINGER, O.L.S.
1183	DENOTES PIERCE & LYONS, O.L.S.
1233	DENOTES PIERCE & PIERCE, O.L.S.
P1	DENOTES PLAN 45R-5250
P2	DENOTES PLAN 45R-16881
P3	DENOTES PLAN 45R-9565
P4	DENOTES PLAN 45M-242
P5	DENOTES PLAN 45M-47
PWF	DENOTES PAGE WIRE FENCE
MH	DENOTES MANHOLE
FH	DENOTES FIRE HYDRANT
WV	DENOTES WATER VALVE
CB	DENOTES CATCH BASIN
204.31+ INV.	DENOTES SPOT ELEVATION (CGVD28) / DENOTES INVERT (CGVD28)
CGVD(28)	DENOTES CANADIAN GEODETIC VERTICAL DATUM OF 1928

ELEVATIONS SHOWN HEREON ARE DERIVED FROM GPS RTK OBSERVATIONS USING THE LEICA SMARTNET REFERENCING CGVD28:78 DATUM

LOCAL BENCHMARK IS TOPNUT OF FIRE HYDRANT AT SOUTH CORNER OF MAPLE AVENUE AND SPRUCE DRIVE

BEARINGS SHOWN HEREON ARE UTM GRID, DERIVED FROM OBSERVATIONS ON SPECIFIED CONTROL POINTS (SCP) LISTED HEREON AND ARE REFERRED TO THE CENTRAL MERIDIAN OF UTM ZONE 17 (81° WEST LONGITUDE) NAD 83 (ORIGINAL).

FOR BEARING COMPARISONS, A ROTATION OF 2°05'30"COUNTER CLOCKWISE WAS APPLIED TO BEARINGS SHOWN ON P1.

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE USED TO COMPUTE GRID DISTANCES BY MULTIPLYING BY A COMBINED SCALE FACTOR OF 1.00029290

INTEGRATION DATA

COORDINATES ARE DERIVED FROM OBSERVATIONS TO SPECIFIED CONTROL POINTS AND ARE REFERRED TO UTM ZONE 17 (81°W LONGITUDE) NAD 83 (ORIGINAL).

COORDINATE VALUES ARE TO 'RURAL' ACCURACY SPECIFICATION IN ACCORDANCE WITH SEC. 14(2) OF O.REG. 216/10

SCP	UTM NORTHING	UTM EASTING
SCP 01019830506	4918593.69	743137.45
SCP 01019830510	4917616.47	741197.84

CAUTION: COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

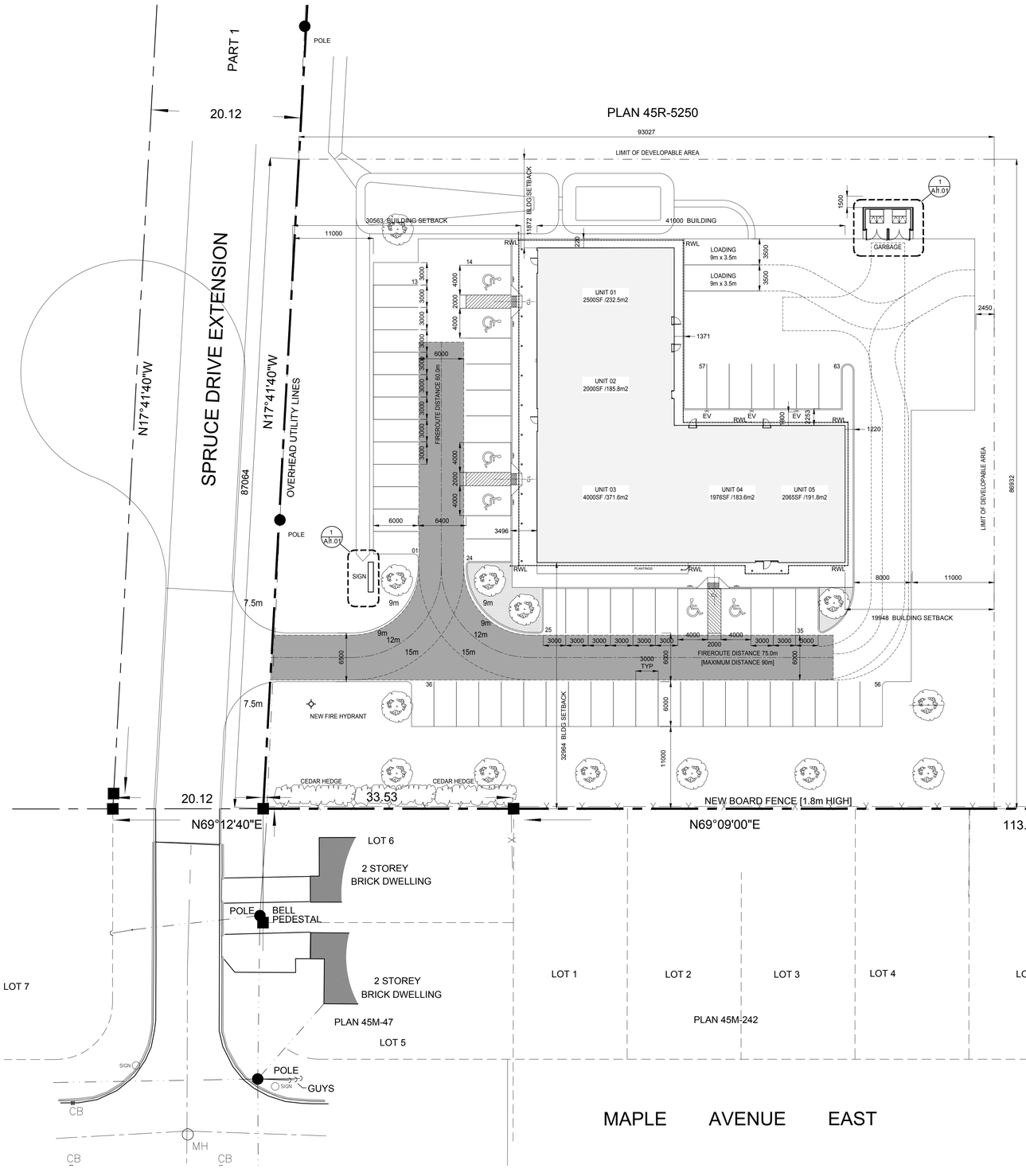
ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-25131

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR
In accordance with Regulation 1026, Section 29(3).

JBF SURVEYORS
3177 LAKEFIELD ROAD, BOX 70
LAKEFIELD, ON K0L 2H0
PHONE: 705-652-6198
INFO@JBFSURVEYORS.COM
WWW.JBFSURVEYORS.COM

PROJ. # 8564

Figure 3: Site Plan



ZONING SUMMARY
GENERAL INDUSTRIAL ZONE [M1]
[PART OF LOT 'Q', REGISTERED PLAN NO.6]

SITE STATISTICS
TOTAL LOT AREA 45,845.3m2
PROPOSED DEVELOPMENT AREA 8294.8m2 / 0.83 Ha

LOT COVERAGE
ALLOWABLE COVERAGE
MAXIMUM BUILDING COVERAGE 50%
MINIMUM LANDSCAPE COVERAGE 10%

PROPOSED COVERAGE
BLDG AREA 1192.5m2 [14.4%]
VEHICULAR AREAS 3095.7m2 [37.3%]
LANDSCAPED AREA 4006.6m2 [48.3%]

REQUIRED SETBACKS
FRONT YARD 20m
SIDE YARD 15m
REAR YARD 20m

PROPOSED SETBACKS
FRONT YARD [WEST] 30.6m
SIDE YARD [NORTH] 7.8m
SIDE YARD [SOUTH] 32.9m
REAR YARD [EAST] 19.9m

BUILDING HEIGHT
PERMITTED 12m
PROPOSED [T/O ROOF] 20'-0"/ 6.1m
[MID ROOF] 15'-0"/ 4.6m

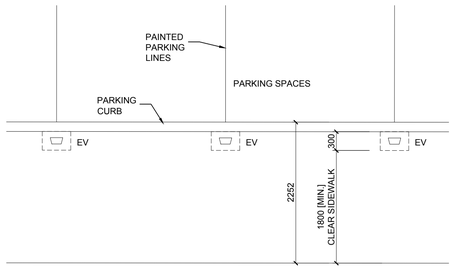
REQUIRED PARKING
TYPICAL PARKING SPACE 3m X 6m
BARRIER FREE PARKING SPACE 4m X 6m

PARKING SPACES REQUIRED 1 SPACE / 18.5m2 CLINIC AREA
BARRIER FREE SPACES REQUIRED AT LEAST 1 SPACE / SUITE
1 BF SPACE FOR FIRST 20 SPACES + 1 SPACE FOR EACH ADDITIONAL 20 SPACES

DENTAL CLINIC 232.5m2 / 18.5m2 = 13 SPACES [1 BF SPACE]
PHARMACY 185.8m2 / 18.5m2 = 10 SPACES [1 BF SPACE]
FAMILY CLINIC 371.6m2 / 18.5m2 = 20 SPACES [1 BF SPACE]
UNASSIGNED 375.4m2 / 18.5m2 = 20 SPACES [1 BF SPACE]

TOTAL REQUIRED PARKING = 63 SPACES [4 BARRIER FREE]
TOTAL PARKING PROVIDED = 63 SPACES [6 BARRIER FREE]

REQUIRED LOADING SPACES
BUILDING SIZE 279m2 - 7432m2 = 2 LOADING SPACES, 9m x 3.5m
2 LOADING SPACES PROVIDED [9m x 3.5m WIDE]



PARTIAL PLAN: FUTURE EV CHARGER
SCALE: NTS

KEY PLAN

PART 2
LOT 19
PLAN 45R-10506

aside architects inc.
148 Hunter Street W., #201
Peterborough, ON. K9H2K8
t.705.812.2451

ONTARIO ASSOCIATION OF ARCHITECTS
NEIL DEREK CAMPBELL
LICENCE 6425

NORWOOD MEDICAL
Spruce Drive
Norwood, ON

	mm/dd/yy	description
1	04/13/23	PRELIM
2	04/27/23	DEV APPLICATION
3		
4		
5		
6		
7		
8		
8		
9		
10		

SCALE 1:300

SITE PLAN

a 1.0

Figure 4: Pre-Development Catchment Area Plan

EXISTING NORTHWEST CULVERT

EXISTING NORTHEAST CULVERT

RIGHT-OF-WAY

MAPLE AVENUE EAST

NORTH

EX1
0.35 | 2.27

EX2
0.37 | 3.96

EX3
0.35 | 0.35

EXT4
0.47 | 0.17

LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- EXTERNAL CATCHMENT BOUNDARY
- OVERLAND FLOW DIRECTION
- PR1 — CATCHMENT NAME
- RUNOFF COEFFICIENT: 0.79 | 0.231 — AREA (ha)

ENGAGE ENGINEERING
www.engageeng.ca • 171 King Street, Suite 120, Peterborough, ON • Phone: (705) 755-0427

35 INDUSTRIAL DRIVE

FIGURE 4 - PRE-DEVELOPMENT CATCHMENT AREA PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
L.MATTERN	L.PARSONS	1:1250	08-03-23	22056

Figure 5: Post Development Catchment Area Plan

EXISTING NORTHWEST CULVERT

EXISTING NORTHEAST CULVERT

OUTLET CULVERT

DRY POND

SWALE

RIGHT-OF-WAY

BIO CB

BIORETENTION FACILITY

CB1

NORTHWEST CORNER OF LOT 6, PLAN 45M-47

MAPLE AVENUE EAST

PR1	0.35	2.21
PR2	0.40	1.80
PR3	0.35	0.326
PR4	0.40	1.44
PR5	0.64	0.27
PR6	0.59	0.23
PR7	0.60	0.31
PXT1	0.47	0.17

NORTH

LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- EXTERNAL CATCHMENT BOUNDARY
- OVERLAND FLOW DIRECTION
- PR1 — CATCHMENT NAME
- RUNOFF COEFFICIENT — 0.79 | 0.231 — AREA (ha)

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35 INDUSTRIAL DRIVE

FIGURE 5 - POST-DEVELOPMENT CATCHMENT AREA PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
L.MATTERN	L.PARSONS	1:1250	08-03-23	22056

Appendix A: Background Information

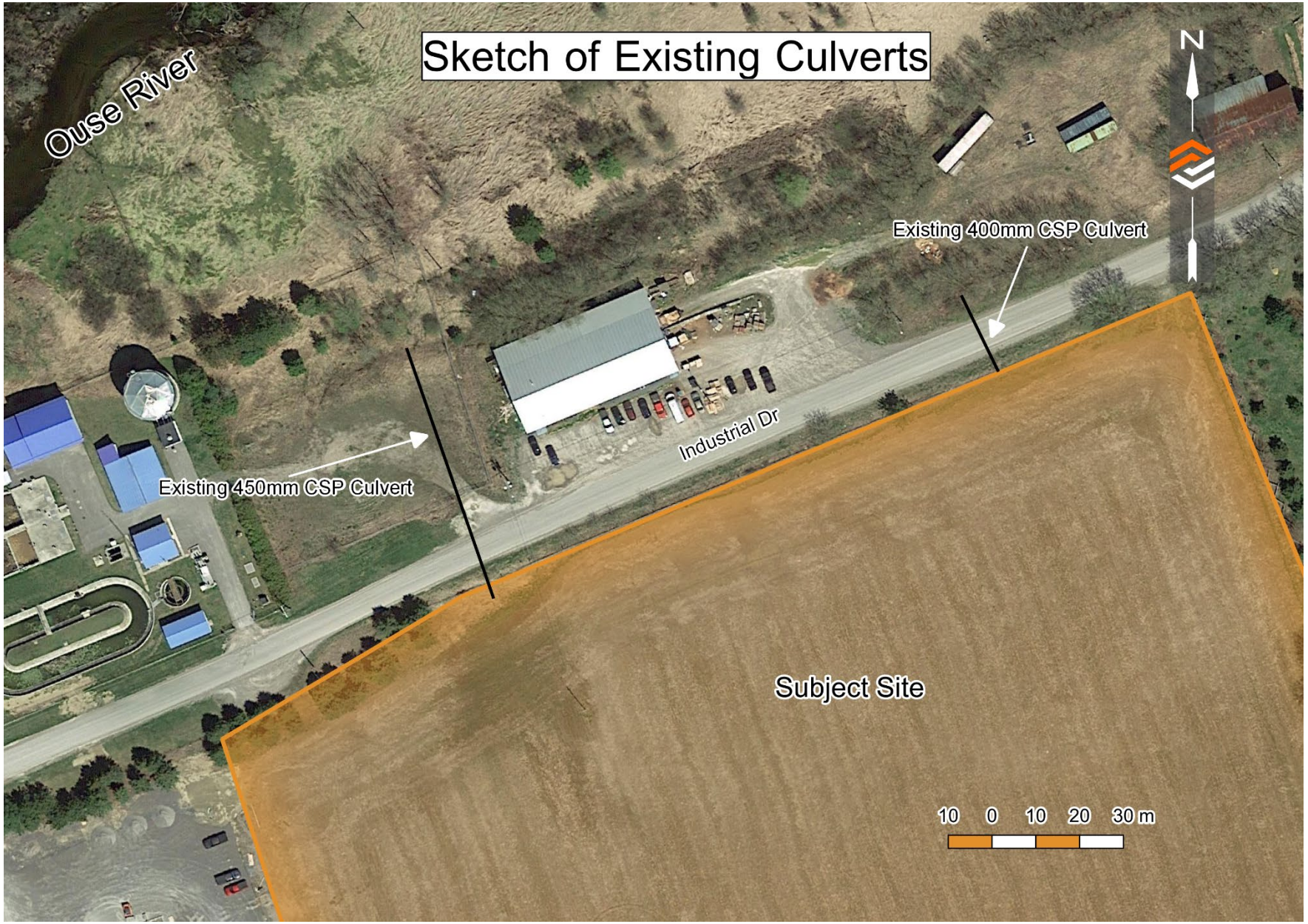

Sketch of Existing Culverts
Ouse River
N
Existing 400mm CSP Culvert
Industrial Dr
Existing 450mm CSP Culvert
Subject Site
10 0 10 20 30 m

Image 1 Existing Culvert Northwest 450mm Inlet

Image 2 Existing Culvert Northwest 450mm Outlet

Image3 Existing Culvert Northeast 400mm inlet

Appendix B: Hydraulic Parameters

Hydrologic Model and Catchment Summary

Project Name: 35 Industrial Drive **Designed By:** LM
Project No: 22056 **Date:** 2023-04-28

Catchment Name		Land Use and Areas (ha)								Hydrologic Calculations										
Name	Description	CN = 86 Wetland	CN = 61 Grass	CN = 85 Gravel	CN = 74 Crop & Other Unimproved Land	CN = 65 Pasture & Other Unimproved Land	CN = 58 Woodlands and Forests	CN = 98 Impervious	Total	CN Weighted	CN Weighted | Pervious Areas	Percent Impervious	Directly Connected Impervious	Soils Group	Total Length (m)	Average Slope: Overall (%)	Time of Concentration (Minimum 10 Minutes)	Time to Peak (Hours)	Recession Period (k)	Composite Runoff Coeffcient
EX1	To Roadside Ditch	0.000	0.000	0.000	2.273	0.000	0.000	0.000	2.273	74	74	0.0%	0%	B	210	3.0%	24.7	0.27	2.05	0.35
EX2	To Culvert	0.000	0.000	0.562	3.399	0.000	0.000	0.000	3.961	76	76	0.0%	0%	B	230	2.0%	28.7	0.32	3.30	0.37
EX3	East corner	0.000	0.000	0.000	0.348	0.000	0.000	0.000	0.348	74	74	0.0%	0%	B	65	1.4%	17.6	0.20	2.48	0.35
EXT4	External Yards	0.000	0.000	0.000	0.133	0.000	0.000	0.033	0.166	79	74	19.9%	0%	B	53	4.0%	10.0	0.11	0.86	0.46
PR1	East	0.000	0.000	0.000	2.213	0.000	0.000	0.000	2.213	74	74	0.0%	0%	B	210	3.0%	24.7	0.27	2.04	0.35
PR2	West	0.000	0.000	0.562	1.237	0.000	0.000	0.000	1.799	77	77	0.0%	0%	B	230	2.0%	27.7	0.31	2.73	0.40
PR3	South East corner	0.000	0.000	0.000	0.326	0.000	0.000	0.000	0.326	74	74	0.0%	0%	B	57	1.4%	16.5	0.18	2.44	0.35
PR4	Swale and dry Pond	0.000	0.000	0.000	1.297	0.000	0.000	0.140	1.437	76	74	9.7%	0%	B	100	4.0%	10.0	0.11	1.44	0.40
PXT1		0.000	0.000	0.000	0.133	0.000	0.000	0.033	0.166	79	74	19.9%	0%	B	53	4.0%	10.0	0.11	0.86	0.46
PR5	Entrance	0.000	0.094	0.000	0.000	0.000	0.000	0.176	0.270	85	61	65.2%	62%	B	60	4.0%	10.0	0.11	0.97	0.64
PR6	South Parinking to CB	0.000	0.094	0.000	0.000	0.000	0.000	0.134	0.228	83	61	58.8%	59%	B	30	2.0%	10.0	0.11	1.66	0.59
PR7	Back Lot	0.000	0.077	0.000	0.062	0.000	0.000	0.170	0.309	84	67	55.0%	60%	B	40	2.0%	10.0	0.11	1.79	0.60
Total to Bioretention									0.807			59.5%								

Notes:

Runoff Coefficients

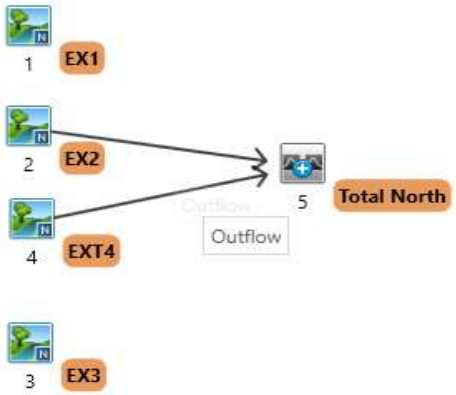
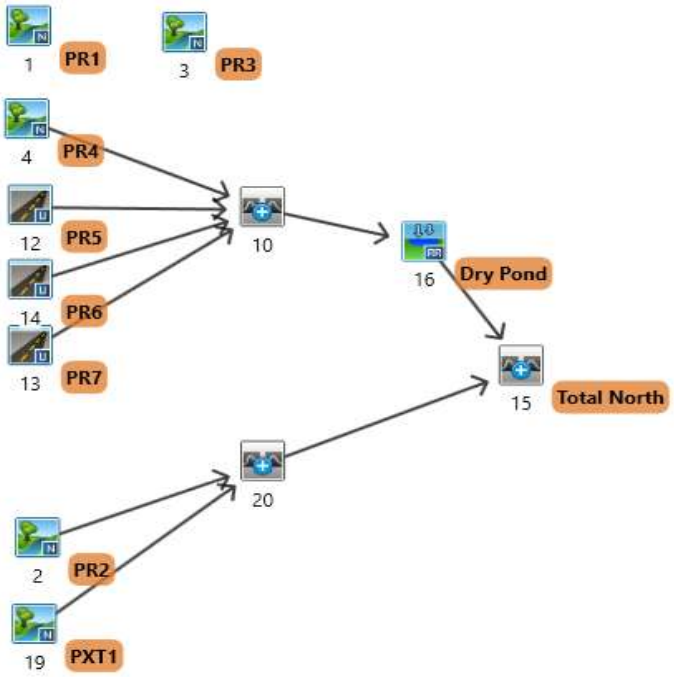
1. Runoff coefficients for Land Uses taken from MTO Drainage Manual Design Chart 1.07.
2. Runoff coefficients have been adjusted for storms exceeding the 10-year return period as follows: 25 Year - 1.10; 50-Year: 1.20; 100-Year: 1.25

Time of Concentration

1.Tc calculcated using Airport equation for C<0.4 and Bransby Willisams for C>0.4
2. Tp calculated as 0.67Tc.

Visual OTTHYMO Model

Project Name: 35 Industrial Drive
Project No: 22056
Designed By: LM
Date: 2023-04-27

PRE-DEVELOPMENT MODEL	POST-DEVELOPMENT MODEL
	

Visual OTTHYMO Input Parameters

Project Name: 35 Industrial Drive **Designed By:** LM
Project No: 22056 **Date:** 2023-04-27

Parameter	Description	EX1	EX2	EX3	EXT4
COMMAND	STANDHYD or NASHYD	NASHYD	NASHYD	NASHYD	NASHYD
AREA	Catchment Area (ha)	2.273	3.961	0.348	0.166
DT	Time Step Increment (min)	5	5	5	5
TIMP	Total Impervious Area (%)	0.0%	0.0%	0.0%	19.9%
XIMP	Directly Connected Impervious Area (%)	0.0%	0.0%	0.0%	0.0%
DWF	Dry Weather Flow (m^3/s)	0	0	0	0
CN	Pervious Weighted Curve Number	74	76	74	74
LOSS[1]	Modified CN*	78	76	73	67
IA	Initial Abstraction (Pervious)	10.0	5.0	5.0	5.0
TP	Unit Hydrograph Time to Peak (Hr)	0.27	0.32	0.20	0.11
K	Williams Recession Period (Hr)	2.05	3.30	2.48	0.86
SLPP	Average Slope Pervious Area (%)	3.0%	2.0%	1.4%	4.0%
LGP	Overland Flow Length Pervious Area (m)	210	230	65	53
MNP	Manning's Roughness Coefficient (Pervious)	-	-	-	-
SCP	Storage Coefficient Pervious Area	-	-	-	-
DPSI	Depression Storage Impervious Area (mm/hr)	-	-	-	-
SLPI	Average Slope Impervious Area (%)				
LGI	Impervious Overland Flow Length √(A/1.5) x 100 (m)	-	-	-	-
MNI	Manning's Roughness Coefficient (Impervious)	-	-	-	-
SCI	Storage Coefficient Impervious Area	-	-	-	-
RAIN	Optional Rainfall Intensity (mm/hr)	-	-	-	-

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual
2. Modified CN derived from IA and CN using functionality in Visual OTTHYMO v6
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.
4. TC calculated using Airport Equation for C<0.4 and Bransby Williams for C>0.4.
5. Time to Peak estimated at 0.67Tc.

Visual OTTHYMO Input Parameters

Project Name: 35 Industrial Drive **Designed By:** LM
Project No: 22056 **Date:** 2023-04-27

Parameter	Description	PR1	PR2	PR3	PR4
COMMAND	STANDHYD or NASHYD	NASHYD	NASHYD	NASHYD	NASHYD
AREA	Catchment Area (ha)	2.213	1.799	0.326	1.437
DT	Time Step Increment (min)	5	5	5	5
TIMP	Total Impervious Area (%)	0.0%	0.0%	0.0%	9.7%
XIMP	Directly Connected Impervious Area (%)	2.5%	0.0%	0.0%	0.0%
DWF	Dry Weather Flow (m^3/s)	0	0	0	0
CN	Pervious Weighted Curve Number	74	77	74	74
LOSS[1]	Modified CN*	78	77	73	76
IA	Initial Abstraction (Pervious)	10.0	5.0	5.0	5.0
TP	Unit Hydrograph Time to Peak (Hr)	0.27	0.31	0.18	0.11
K	Williams Recession Period (Hr)	2.04	2.73	2.44	1.44
SLPP	Average Slope Pervious Area (%)	3.0%	2.0%	1.4%	4.0%
LGP	Overland Flow Length Pervious Area (m)	210	230	57	100
MNP	Manning's Roughness Coefficient (Pervious)	-	-	-	-
SCP	Storage Coefficient Pervious Area	-	-	-	-
DPSI	Depression Storage Impervious Area (mm/hr)	-	-	-	-
SLPI	Average Slope Impervious Area (%)				
LGI	Impervious Overland Flow Length √(A/1.5) x 100 (m)	-	-	-	-
MNI	Manning's Roughness Coefficient (Impervious)	-	-	-	-
SCI	Storage Coefficient Impervious Area	-	-	-	-
RAIN	Optional Rainfall Intensity (mm/hr)	-	-	-	-

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual
2. Modified CN derived from IA and CN using functionality in Visual OTTHYMO v6
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.
4. TC calculated using Airport Equation for C<0.4 and Bransby Williams for C>0.4.
5. Time to Peak estimated at 0.67Tc.

Visual OTTHYMO Input Parameters

Project Name: 35 Industrial Drive **Designed By:** LM
Project No: 22056 **Date:** 2023-04-27

Parameter	Description	PXT1	PR5	PR6	PR7
COMMAND	STANDHYD or NASHYD	NASHYD	STANDHYD	STANDHYD	STANDHYD
AREA	Catchment Area (ha)	0.166	0.270	0.228	0.309
DT	Time Step Increment (min)	5	5	5	5
TIMP	Total Impervious Area (%)	19.9%	65.2%	58.8%	55.0%
XIMP	Directly Connected Impervious Area (%)	0.0%	65.2%	58.8%	55.0%
DWF	Dry Weather Flow (m^3/s)	0	0	0	0
CN	Pervious Weighted Curve Number	74	61	61	67
LOSS[1]	Modified CN*	78	56	56	61
IA	Initial Abstraction (Pervious)	5.0	1.5	1.5	1.5
TP	Unit Hydrograph Time to Peak (Hr)	0.11	0.11	0.11	0.11
K	Williams Recession Period (Hr)	0.86	0.97	1.66	1.79
SLPP	Average Slope Pervious Area (%)	4.0%	4.0%	2.0%	2.0%
LGP	Overland Flow Length Pervious Area (m)	53	15	10	10
MNP	Manning's Roughness Coefficient (Pervious)	-	0.25	0.25	0.25
SCP	Storage Coefficient Pervious Area	-	0	0	0
DPSI	Depression Storage Impervious Area (mm/hr)	-	1	1	1
SLPI	Average Slope Impervious Area (%)		4.0%	2.0%	2.0%
LGI	Impervious Overland Flow Length √(A/1.5) x 100 (m)	-	42.43	38.99	45.39
MNI	Manning's Roughness Coefficient (Impervious)	-	0.013	0.013	0.013
SCI	Storage Coefficient Impervious Area	-	0	0	0
RAIN	Optional Rainfall Intensity (mm/hr)	-	0	0	0

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual
2. Modified CN derived from IA and CN using functionality in Visual OTTHYMO v6
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.
4. TC calculated using Airport Equation for C<0.4 and Bransby Williams for C>0.4.
5. Time to Peak estimated at 0.67Tc.

Appendix C: VO Model Results

Pre-Development Results

```
************************************
** SIMULATION:01 Ptbo_SCS_6hr_2yr **
************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              ef9547e1-b8b7-46e2-b5ff-76d9122388c4\423a43be
| Ptotal= 38.75 mm |    Comments: Ptbo_SCS_6hr_2yr
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.60	1.50	3.90	3.00	8.50	4.50	2.30
0.25	1.60	1.75	3.90	3.25	8.50	4.75	2.30
0.50	2.30	2.00	4.60	3.50	3.90	5.00	1.60
0.75	2.30	2.25	4.60	3.75	3.90	5.25	1.60
1.00	2.30	2.50	23.20	4.00	3.10	5.50	1.60
1.25	2.30	2.75	60.40	4.25	3.10	5.75	1.60

```
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.35   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Unit Hyd Qpeak  (cms)=   0.066

     PEAK FLOW       (cms)=   0.010 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   8.902
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.230

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.27   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Unit Hyd Qpeak  (cms)=   0.322

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   8.228
     TOTAL RAINFALL   (mm)=  38.750
```

RUNOFF COEFFICIENT = 0.212

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

| CALIB NASHYD (0002) / ID= 1 DT= 5.0 min | Area (ha)= 3.96 | Curve Number (CN)= 76.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.32 |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.094 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 9.992
TOTAL RAINFALL (mm)= 38.750
RUNOFF COEFFICIENT = 0.258

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

| CALIB NASHYD (0004) | Area (ha)= 0.17 | Curve Number (CN)= 67.0 | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00 | U.H. Tp(hrs)= 0.13 |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 7.097
TOTAL RAINFALL (mm)= 38.750
RUNOFF COEFFICIENT = 0.183

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

ADD HYD (0005) / 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0002):	3.96	0.094	3.25	9.99
+ ID2= 2 (0004):	0.17	0.005	3.00	7.10
ID = 3 (0005):	4.13	0.097	3.17	9.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------------------------------------------------------------------
**********************************
** SIMULATION:02 Ptbo_SCS_6hr_5yr **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              ef9547e1-b8b7-46e2-b5ff-76d9122388c4\0d75e645
| Ptotal= 52.44 mm |    Comments: Ptbo_SCS_6hr_5yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    2.10 |  1.50    5.20 |  3.00   11.50 |  4.50    3.20
               0.25    2.10 |  1.75    5.20 |  3.25   11.50 |  4.75    3.20
               0.50    3.20 |  2.00    6.30 |  3.50    5.20 |  5.00    2.10
               0.75    3.20 |  2.25    6.30 |  3.75    5.20 |  5.25    2.10
               1.00    3.20 |  2.50   31.40 |  4.00    4.20 |  5.50    2.10
               1.25    3.20 |  2.75   81.78 |  4.25    4.20 |  5.75    2.10

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.35   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.10 | 1.583    5.20 | 3.083   11.50 |  4.58    3.20
               0.167    2.10 | 1.667    5.20 | 3.167   11.50 |  4.67    3.20
               0.250    2.10 | 1.750    5.20 | 3.250   11.50 |  4.75    3.20
               0.333    2.10 | 1.833    5.20 | 3.333   11.50 |  4.83    3.20
               0.417    2.10 | 1.917    5.20 | 3.417   11.50 |  4.92    3.20
               0.500    2.10 | 2.000    5.20 | 3.500   11.50 |  5.00    3.20
               0.583    3.20 | 2.083    6.30 | 3.583    5.20 |  5.08    2.10
               0.667    3.20 | 2.167    6.30 | 3.667    5.20 |  5.17    2.10
               0.750    3.20 | 2.250    6.30 | 3.750    5.20 |  5.25    2.10
               0.833    3.20 | 2.333    6.30 | 3.833    5.20 |  5.33    2.10
               0.917    3.20 | 2.417    6.30 | 3.917    5.20 |  5.42    2.10
               1.000    3.20 | 2.500    6.30 | 4.000    5.20 |  5.50    2.10
               1.083    3.20 | 2.583   31.40 | 4.083    4.20 |  5.58    2.10
               1.167    3.20 | 2.667   31.40 | 4.167    4.20 |  5.67    2.10
               1.250    3.20 | 2.750   31.40 | 4.250    4.20 |  5.75    2.10
               1.333    3.20 | 2.833   81.78 | 4.333    4.20 |  5.83    2.10
               1.417    3.20 | 2.917   81.78 | 4.417    4.20 |  5.92    2.10
               1.500    3.20 | 3.000   81.78 | 4.500    4.20 |  6.00    2.10

     Unit Hyd Qpeak  (cms)=   0.066

     PEAK FLOW       (cms)=   0.019 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  15.889
     TOTAL RAINFALL   (mm)=  52.445
     RUNOFF COEFFICIENT   =   0.303

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.27   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.10 | 1.583    5.20 | 3.083   11.50 |  4.58    3.20
               0.167    2.10 | 1.667    5.20 | 3.167   11.50 |  4.67    3.20
               0.250    2.10 | 1.750    5.20 | 3.250   11.50 |  4.75    3.20
               0.333    2.10 | 1.833    5.20 | 3.333   11.50 |  4.83    3.20
               0.417    2.10 | 1.917    5.20 | 3.417   11.50 |  4.92    3.20
               0.500    2.10 | 2.000    5.20 | 3.500   11.50 |  5.00    3.20
               0.583    3.20 | 2.083    6.30 | 3.583    5.20 |  5.08    2.10
               0.667    3.20 | 2.167    6.30 | 3.667    5.20 |  5.17    2.10
               0.750    3.20 | 2.250    6.30 | 3.750    5.20 |  5.25    2.10
               0.833    3.20 | 2.333    6.30 | 3.833    5.20 |  5.33    2.10
               0.917    3.20 | 2.417    6.30 | 3.917    5.20 |  5.42    2.10
               1.000    3.20 | 2.500    6.30 | 4.000    5.20 |  5.50    2.10
               1.083    3.20 | 2.583   31.40 | 4.083    4.20 |  5.58    2.10
               1.167    3.20 | 2.667   31.40 | 4.167    4.20 |  5.67    2.10
               1.250    3.20 | 2.750   31.40 | 4.250    4.20 |  5.75    2.10
               1.333    3.20 | 2.833   81.78 | 4.333    4.20 |  5.83    2.10
               1.417    3.20 | 2.917   81.78 | 4.417    4.20 |  5.92    2.10
               1.500    3.20 | 3.000   81.78 | 4.500    4.20 |  6.00    2.10

     Unit Hyd Qpeak  (cms)=   0.322

     PEAK FLOW       (cms)=   0.098 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  15.782
```

TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.301

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

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)= 3.96 Curve Number (CN)= 76.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.171 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 17.628
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.336

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

CALIB
NASHYD (0004)
ID= 1 DT= 5.0 min

Area (ha)= 0.17 Curve Number (CN)= 67.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.13

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 12.915
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.246

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

ADD HYD (0005)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0002):	3.96	0.171	3.17	17.63
+ ID2= 2 (0004):	0.17	0.009	3.00	12.92
ID = 3 (0005):	4.13	0.177	3.17	17.44

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:03 Ptbo_SCS_6hr_10yr **
****

READ STORM	Filename: C:\Users\lmattern\AppData\Local\Temp\ef9547e1-b8b7-46e2-b5ff-76d9122388c4\44ea05ac
Ptotal= 61.60 mm	Comments: Ptbo_SCS_6hr_10yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.50	1.50	6.20	3.00	13.50	4.50	3.70
0.25	2.50	1.75	6.20	3.25	13.50	4.75	3.70
0.50	3.70	2.00	7.40	3.50	6.20	5.00	2.50
0.75	3.70	2.25	7.40	3.75	6.20	5.25	2.50
1.00	3.70	2.50	36.90	4.00	4.90	5.50	2.50
1.25	3.70	2.75	95.90	4.25	4.90	5.75	2.50

CALIB			
NASHYD (0003)	Area (ha)=	0.35	Curve Number (CN)= 73.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.066

PEAK FLOW (cms)= 0.025 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 21.238
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.345

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

CALIB			
NASHYD (0001)	Area (ha)=	2.27	Curve Number (CN)= 78.0
ID= 1 DT= 5.0 min	Ia (mm)=	10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.27	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.322

PEAK FLOW (cms)= 0.137 (i)
TIME TO PEAK (hrs)= 3.167

RUNOFF VOLUME (mm)= 21.592
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.351

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

CALIB											
NASHYD (0002)	Area	(ha)=	3.96	Curve Number	(CN)= 76.0						
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)= 3.00							
	U.H. Tp(hrs)=	0.32									

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.229 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 23.409
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.380

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

CALIB											
NASHYD (0004)	Area	(ha)=	0.17	Curve Number	(CN)= 67.0						
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)= 3.00							
	U.H. Tp(hrs)=	0.13									

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 17.454
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.283

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

ADD HYD (0005)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0002):	3.96	0.229	3.17	23.41
+ ID2= 2 (0004):	0.17	0.013	3.00	17.45
ID = 3 (0005):	4.13	0.237	3.17	23.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

****
** SIMULATION:04 Ptbo_SCS_6hr_25yr **
****

READ STORM	Filename: C:\Users\lmattern\AppData\Local\Temp\ef9547e1-b8b7-46e2-b5ff-76d9122388c4\5b301ffa
Ptotal= 72.90 mm	Comments: Ptbo_SCS_6hr_25yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.90	1.50	7.30	3.00	16.00	4.50	4.40
0.25	2.90	1.75	7.30	3.25	16.00	4.75	4.40
0.50	4.40	2.00	8.80	3.50	7.30	5.00	2.90
0.75	4.40	2.25	8.80	3.75	7.30	5.25	2.90
1.00	4.40	2.50	43.70	4.00	5.80	5.50	2.90
1.25	4.40	2.75	113.70	4.25	5.80	5.75	2.90

CALIB NASHYD (0003) ID= 1 DT= 5.0 min	Area (ha)= 0.35	Curve Number (CN)= 73.0
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.066

PEAK FLOW (cms)= 0.034 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 28.431
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.390

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

CALIB NASHYD (0001) ID= 1 DT= 5.0 min	Area (ha)= 2.27	Curve Number (CN)= 78.0
	Ia (mm)= 10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.27	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.322

PEAK FLOW (cms)= 0.190 (i)

TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 29.389
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.403

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

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 3.96 Curve Number (CN)= 76.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.309 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 31.119
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.427

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

| CALIB | NASHYD (0004) | ID= 1 DT= 5.0 min |

Area (ha)= 0.17 Curve Number (CN)= 67.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.13

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.017 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 23.649
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.324

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

ADD HYD (0005)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
		ID1= 1 (0002):	3.96	0.309	3.17	31.12
		+ ID2= 2 (0004):	0.17	0.017	3.00	23.65
			==========	==========	==========	==========

```
        ID = 3 (  0005):     4.13   0.318     3.17    30.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
************************************
** SIMULATION:05 Ptbo_SCS_6hr_50yr **
************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              ef9547e1-b8b7-46e2-b5ff-76d9122388c4\35d0bce6
| Ptotal= 81.47 mm |    Comments: Ptbo_SCS_6hr_50yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.30 |  1.50    8.10 |  3.00   17.90 |  4.50    4.90
                0.25    3.30 |  1.75    8.10 |  3.25   17.90 |  4.75    4.90
                0.50    4.90 |  2.00    9.80 |  3.50    8.10 |  5.00    3.30
                0.75    4.90 |  2.25    9.80 |  3.75    8.10 |  5.25    3.30
                1.00    4.90 |  2.50   48.90 |  4.00    6.50 |  5.50    3.30
                1.25    4.90 |  2.75  127.00 |  4.25    6.50 |  5.75    3.30

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.35   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.30 | 1.583    8.10 | 3.083   17.90 |  4.58    4.90
               0.167    3.30 | 1.667    8.10 | 3.167   17.90 |  4.67    4.90
               0.250    3.30 | 1.750    8.10 | 3.250   17.90 |  4.75    4.90
               0.333    3.30 | 1.833    8.10 | 3.333   17.90 |  4.83    4.90
               0.417    3.30 | 1.917    8.10 | 3.417   17.90 |  4.92    4.90
               0.500    3.30 | 2.000    8.10 | 3.500   17.90 |  5.00    4.90
               0.583    4.90 | 2.083    9.80 | 3.583    8.10 |  5.08    3.30
               0.667    4.90 | 2.167    9.80 | 3.667    8.10 |  5.17    3.30
               0.750    4.90 | 2.250    9.80 | 3.750    8.10 |  5.25    3.30
               0.833    4.90 | 2.333    9.80 | 3.833    8.10 |  5.33    3.30
               0.917    4.90 | 2.417    9.80 | 3.917    8.10 |  5.42    3.30
               1.000    4.90 | 2.500    9.80 | 4.000    8.10 |  5.50    3.30
               1.083    4.90 | 2.583   48.90 | 4.083    6.50 |  5.58    3.30
               1.167    4.90 | 2.667   48.90 | 4.167    6.50 |  5.67    3.30
               1.250    4.90 | 2.750   48.90 | 4.250    6.50 |  5.75    3.30
               1.333    4.90 | 2.833  127.00 | 4.333    6.50 |  5.83    3.30
               1.417    4.90 | 2.917  127.00 | 4.417    6.50 |  5.92    3.30
               1.500    4.90 | 3.000  127.00 | 4.500    6.50 |  6.00    3.30

     Unit Hyd Qpeak  (cms)=   0.066

     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  34.251
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.420

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

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.27   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.30 | 1.583    8.10 | 3.083   17.90 |  4.58    4.90
               0.167    3.30 | 1.667    8.10 | 3.167   17.90 |  4.67    4.90
               0.250    3.30 | 1.750    8.10 | 3.250   17.90 |  4.75    4.90
               0.333    3.30 | 1.833    8.10 | 3.333   17.90 |  4.83    4.90
               0.417    3.30 | 1.917    8.10 | 3.417   17.90 |  4.92    4.90
               0.500    3.30 | 2.000    8.10 | 3.500   17.90 |  5.00    4.90
               0.583    4.90 | 2.083    9.80 | 3.583    8.10 |  5.08    3.30
               0.667    4.90 | 2.167    9.80 | 3.667    8.10 |  5.17    3.30
               0.750    4.90 | 2.250    9.80 | 3.750    8.10 |  5.25    3.30
               0.833    4.90 | 2.333    9.80 | 3.833    8.10 |  5.33    3.30
               0.917    4.90 | 2.417    9.80 | 3.917    8.10 |  5.42    3.30
               1.000    4.90 | 2.500    9.80 | 4.000    8.10 |  5.50    3.30
               1.083    4.90 | 2.583   48.90 | 4.083    6.50 |  5.58    3.30
               1.167    4.90 | 2.667   48.90 | 4.167    6.50 |  5.67    3.30
               1.250    4.90 | 2.750   48.90 | 4.250    6.50 |  5.75    3.30
               1.333    4.90 | 2.833  127.00 | 4.333    6.50 |  5.83    3.30
               1.417    4.90 | 2.917  127.00 | 4.417    6.50 |  5.92    3.30
               1.500    4.90 | 3.000  127.00 | 4.500    6.50 |  6.00    3.30

     Unit Hyd Qpeak  (cms)=   0.322
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PEAK FLOW (cms)= 0.231 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 35.675
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.438

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

CALIB					
NASHYD (0002)	Area (ha)=	3.96	Curve Number (CN)=	76.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.32			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.372 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 37.315
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.458

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

CALIB					
NASHYD (0004)	Area (ha)=	0.17	Curve Number (CN)=	67.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.13			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.021 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 28.723
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.353

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

ADD HYD (0005)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0002):		3.96	0.372	3.17	37.31
+ ID2= 2 (0004):		0.17	0.021	3.00	28.72

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        ================================================
        ID = 3 (  0005):     4.13   0.384     3.17    36.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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************************************
** SIMULATION:06 Ptbo_SCS_6hr_100yr **
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--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              ef9547e1-b8b7-46e2-b5ff-76d9122388c4\4d8901ed
| Ptotal= 89.93 mm |    Comments: Ptbo_SCS_6hr_100yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    3.60 |  1.50    9.00 |  3.00   19.80 |  4.50    5.40
               0.25    3.60 |  1.75    9.00 |  3.25   19.80 |  4.75    5.40
               0.50    5.40 |  2.00   10.80 |  3.50    9.00 |  5.00    3.60
               0.75    5.40 |  2.25   10.80 |  3.75    9.00 |  5.25    3.60
               1.00    5.40 |  2.50   53.90 |  4.00    7.20 |  5.50    3.60
               1.25    5.40 |  2.75  140.20 |  4.25    7.20 |  5.75    3.60

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.35   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.60 | 1.583    9.00 | 3.083   19.80 |  4.58    5.40
               0.167    3.60 | 1.667    9.00 | 3.167   19.80 |  4.67    5.40
               0.250    3.60 | 1.750    9.00 | 3.250   19.80 |  4.75    5.40
               0.333    3.60 | 1.833    9.00 | 3.333   19.80 |  4.83    5.40
               0.417    3.60 | 1.917    9.00 | 3.417   19.80 |  4.92    5.40
               0.500    3.60 | 2.000    9.00 | 3.500   19.80 |  5.00    5.40
               0.583    5.40 | 2.083   10.80 | 3.583    9.00 |  5.08    3.60
               0.667    5.40 | 2.167   10.80 | 3.667    9.00 |  5.17    3.60
               0.750    5.40 | 2.250   10.80 | 3.750    9.00 |  5.25    3.60
               0.833    5.40 | 2.333   10.80 | 3.833    9.00 |  5.33    3.60
               0.917    5.40 | 2.417   10.80 | 3.917    9.00 |  5.42    3.60
               1.000    5.40 | 2.500   10.80 | 4.000    9.00 |  5.50    3.60
               1.083    5.40 | 2.583   53.90 | 4.083    7.20 |  5.58    3.60
               1.167    5.40 | 2.667   53.90 | 4.167    7.20 |  5.67    3.60
               1.250    5.40 | 2.750   53.90 | 4.250    7.20 |  5.75    3.60
               1.333    5.40 | 2.833  140.20 | 4.333    7.20 |  5.83    3.60
               1.417    5.40 | 2.917  140.20 | 4.417    7.20 |  5.92    3.60
               1.500    5.40 | 3.000  140.20 | 4.500    7.20 |  6.00    3.60

     Unit Hyd Qpeak  (cms)=   0.066

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  40.243
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.448

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

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.27   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.60 | 1.583    9.00 | 3.083   19.80 |  4.58    5.40
               0.167    3.60 | 1.667    9.00 | 3.167   19.80 |  4.67    5.40
               0.250    3.60 | 1.750    9.00 | 3.250   19.80 |  4.75    5.40
               0.333    3.60 | 1.833    9.00 | 3.333   19.80 |  4.83    5.40
               0.417    3.60 | 1.917    9.00 | 3.417   19.80 |  4.92    5.40
               0.500    3.60 | 2.000    9.00 | 3.500   19.80 |  5.00    5.40
               0.583    5.40 | 2.083   10.80 | 3.583    9.00 |  5.08    3.60
               0.667    5.40 | 2.167   10.80 | 3.667    9.00 |  5.17    3.60
               0.750    5.40 | 2.250   10.80 | 3.750    9.00 |  5.25    3.60
               0.833    5.40 | 2.333   10.80 | 3.833    9.00 |  5.33    3.60
               0.917    5.40 | 2.417   10.80 | 3.917    9.00 |  5.42    3.60
               1.000    5.40 | 2.500   10.80 | 4.000    9.00 |  5.50    3.60
               1.083    5.40 | 2.583   53.90 | 4.083    7.20 |  5.58    3.60
               1.167    5.40 | 2.667   53.90 | 4.167    7.20 |  5.67    3.60
               1.250    5.40 | 2.750   53.90 | 4.250    7.20 |  5.75    3.60
               1.333    5.40 | 2.833  140.20 | 4.333    7.20 |  5.83    3.60
               1.417    5.40 | 2.917  140.20 | 4.417    7.20 |  5.92    3.60
               1.500    5.40 | 3.000  140.20 | 4.500    7.20 |  6.00    3.60

     Unit Hyd Qpeak  (cms)=   0.322
```

PEAK FLOW (cms)= 0.275 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 42.122
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.468

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

| CALIB | NASHYD (0002) | ID= 1 DT= 5.0 min |

Area (ha)= 3.96 Curve Number (CN)= 76.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.473

PEAK FLOW (cms)= 0.437 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 43.662
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.486

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

| CALIB | NASHYD (0004) | ID= 1 DT= 5.0 min |

Area (ha)= 0.17 Curve Number (CN)= 67.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.13

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.025 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 33.998
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.378

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

ADD HYD (0005)	1 + 2 = 3	ID1= 1 (0002):	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
			3.96	0.437	3.17	43.66

```
 + ID2= 2 (  0004):     0.17   0.025     3.00    34.00
   ==================================================
   ID = 3 (  0005):     4.13   0.451     3.17    43.27

  NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
```

Post-Development Results

```
************************************
** SIMULATION:01 Ptbo_SCS_6hr_2yr **
************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\423a43be
| Ptotal= 38.75 mm |    Comments: Ptbo_SCS_6hr_2yr
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.60	1.50	3.90	3.00	8.50	4.50	2.30
0.25	1.60	1.75	3.90	3.25	8.50	4.75	2.30
0.50	2.30	2.00	4.60	3.50	3.90	5.00	1.60
0.75	2.30	2.25	4.60	3.75	3.90	5.25	1.60
1.00	2.30	2.50	23.20	4.00	3.10	5.50	1.60
1.25	2.30	2.75	60.40	4.25	3.10	5.75	1.60

```
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.21   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Unit Hyd Qpeak  (cms)=   0.313

     PEAK FLOW       (cms)=   0.046 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=   8.228
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.212

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.33   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Unit Hyd Qpeak  (cms)=   0.062

     PEAK FLOW       (cms)=   0.010 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=   8.901
     TOTAL RAINFALL   (mm)=  38.750
```

RUNOFF COEFFICIENT = 0.230

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

CALIB NASHYD (0002) | ID= 1 DT= 5.0 min	Area (ha)= 1.80 Curve Number (CN)= 77.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.31

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.046 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 10.387
TOTAL RAINFALL (mm)= 38.750
RUNOFF COEFFICIENT = 0.268

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

CALIB NASHYD (0019) | ID= 1 DT= 5.0 min	Area (ha)= 0.17 Curve Number (CN)= 67.0 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.13

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 7.097
TOTAL RAINFALL (mm)= 38.750
RUNOFF COEFFICIENT = 0.183

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

ADD HYD (0020) | 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0019):	0.17	0.005	3.00	7.10
+ ID2= 2 (0002):	1.80	0.046	3.17	10.39
ID = 3 (0020):	1.97	0.049	3.17	10.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.44   Curve Number   (CN)= 76.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Unit Hyd Qpeak  (cms)=   0.499

     PEAK FLOW       (cms)=   0.068 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=   9.811
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.253

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0012)|   Area    (ha)=   0.27
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.20   Dir. Conn.(%)=  65.20
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.18         0.09
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       4.00         4.00
     Length            (m)=      42.43        15.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

```
     Max.Eff.Inten.(mm/hr)=      60.40     ********
               over (min)         5.00          5.00
     Storage Coeff.  (min)=       1.23 (ii)     4.26 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.33          0.23
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.00          0.032 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.00           3.00
     RUNOFF VOLUME    (mm)=      37.75          5.86          26.64
     TOTAL RAINFALL   (mm)=      38.75         38.75          38.75
     RUNOFF COEFFICIENT   =       0.97          0.15           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  56.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

CALIB								
STANDHYD (0013)	Area (ha)= 0.31							
ID= 1 DT= 5.0 min	Total Imp(%)= 55.00		Dir. Conn.(%)= 55.00					

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.17	0.14
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	45.39	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Max.Eff.Inten.(mm/hr)=		60.40	********	
over (min)		5.00	10.00	
Storage Coeff. (min)=		1.58 (ii)	5.05 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.33	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.03	0.00	0.033 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	37.75	6.95	23.88
TOTAL RAINFALL	(mm)=	38.75	38.75	38.75
RUNOFF COEFFICIENT	=	0.97	0.18	0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB								
STANDHYD (0014)	Area (ha)= 0.23							
ID= 1 DT= 5.0 min	Total Imp(%)= 58.80		Dir. Conn.(%)= 58.80					

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.13	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	38.99	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.60	1.583	3.90	3.083	8.50	4.58	2.30
0.167	1.60	1.667	3.90	3.167	8.50	4.67	2.30
0.250	1.60	1.750	3.90	3.250	8.50	4.75	2.30
0.333	1.60	1.833	3.90	3.333	8.50	4.83	2.30
0.417	1.60	1.917	3.90	3.417	8.50	4.92	2.30
0.500	1.60	2.000	3.90	3.500	8.50	5.00	2.30
0.583	2.30	2.083	4.60	3.583	3.90	5.08	1.60
0.667	2.30	2.167	4.60	3.667	3.90	5.17	1.60
0.750	2.30	2.250	4.60	3.750	3.90	5.25	1.60
0.833	2.30	2.333	4.60	3.833	3.90	5.33	1.60
0.917	2.30	2.417	4.60	3.917	3.90	5.42	1.60
1.000	2.30	2.500	4.60	4.000	3.90	5.50	1.60
1.083	2.30	2.583	23.20	4.083	3.10	5.58	1.60
1.167	2.30	2.667	23.20	4.167	3.10	5.67	1.60
1.250	2.30	2.750	23.20	4.250	3.10	5.75	1.60
1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Max.Eff.Inten.(mm/hr)=		60.40	********
over (min)		5.00	5.00
Storage Coeff. (min)=		1.44 (ii)	4.70 (ii)
Unit Hyd. Tpeak (min)=		5.00	5.00

```
     Unit Hyd. peak  (cms)=       0.33         0.22
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.025 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00           3.00
     RUNOFF VOLUME    (mm)=      37.75         5.86          24.60
     TOTAL RAINFALL   (mm)=      38.75        38.75          38.75
     RUNOFF COEFFICIENT   =       0.97         0.15           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  56.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0012):     0.27   0.032     3.00    26.64
     + ID2= 2 (  0013):     0.31   0.033     3.00    23.88
       ================================================
       ID = 3 (  0010):     0.58   0.065     3.00    25.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     0.58   0.065     3.00    25.17
     + ID2= 2 (  0014):     0.23   0.025     3.00    24.60
       ================================================
       ID = 1 (  0010):     0.81   0.091     3.00    25.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.81   0.091     3.00    25.01
     + ID2= 2 (  0004):     1.44   0.068     3.00     9.81
       ================================================
       ID = 3 (  0010):     2.24   0.159     3.00    15.28
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1550      0.0345
                          0.0450     0.0150   |   0.1850      0.0395
                          0.0850     0.0225   |   0.2150      0.0450
                          0.1150     0.0277   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)      2.244      0.159      3.00      15.28
   OUTFLOW: ID= 1 (  0016)      2.244      0.045      3.17      15.24

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.20
                TIME SHIFT OF PEAK FLOW         (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0150

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     2.24   0.045     3.17    15.24
     + ID2= 2 (  0020):     1.97   0.049     3.17    10.11
       ================================================
       ID = 3 (  0015):     4.21   0.094     3.17    12.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************
** SIMULATION:02 Ptbo_SCS_6hr_5yr **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\0d75e645
| Ptotal= 52.44 mm |    Comments: Ptbo_SCS_6hr_5yr
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.00     2.10 |  1.50     5.20 |  3.00    11.50 |  4.50     3.20
                0.25     2.10 |  1.75     5.20 |  3.25    11.50 |  4.75     3.20
                0.50     3.20 |  2.00     6.30 |  3.50     5.20 |  5.00     2.10
```

0.75	3.20	2.25	6.30	3.75	5.20	5.25	2.10
1.00	3.20	2.50	31.40	4.00	4.20	5.50	2.10
1.25	3.20	2.75	81.78	4.25	4.20	5.75	2.10

CALIB			
NASHYD (0001)	Area (ha)=	2.21	Curve Number (CN)= 78.0
ID= 1 DT= 5.0 min	Ia (mm)=	10.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.27	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.313

PEAK FLOW (cms)= 0.095 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 15.782
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.301

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

CALIB			
NASHYD (0003)	Area (ha)=	0.33	Curve Number (CN)= 73.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.062

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 15.889
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.303

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

CALIB			
NASHYD (0002)	Area (ha)=	1.80	Curve Number (CN)= 77.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.31	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.083 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 18.248
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.348

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

CALIB					
NASHYD (0019)	Area (ha)=	0.17	Curve Number (CN)=	67.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.13			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.009 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 12.915
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.246

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

ADD HYD (0020)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0019):	0.17	0.009	3.00	12.92
	+ ID2= 2 (0002):	1.80	0.083	3.17	18.25
	ID = 3 (0020):	1.97	0.088	3.17	17.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0004)	Area (ha)=	1.44	Curve Number (CN)=	76.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.11			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20

0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.121 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 17.309
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.330

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

CALIB	
STANDHYD (0012)	Area (ha)= 0.27
ID= 1 DT= 5.0 min	Total Imp(%)= 65.20 Dir. Conn.(%)= 65.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	4.00	4.00
Length	(m)=	42.43	15.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

				TOTALS
Max.Eff.Inten.(mm/hr)=		81.78	********	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.09 (ii)	3.78 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.25	
PEAK FLOW	(cms)=	0.04	0.01	0.045 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	51.45	10.36	37.14
TOTAL RAINFALL	(mm)=	52.45	52.45	52.45
RUNOFF COEFFICIENT	=	0.98	0.20	0.71

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0013)	Area (ha)= 0.31
ID= 1 DT= 5.0 min	Total Imp(%)= 55.00 Dir. Conn.(%)= 55.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.17	0.14
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	45.39	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Max.Eff.Inten.(mm/hr)=	81.78	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.40 (ii)	4.47 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.33	0.23		
			TOTALS	
PEAK FLOW (cms)=	0.04	0.01	0.048 (iii)	
TIME TO PEAK (hrs)=	3.00	3.00	3.00	
RUNOFF VOLUME (mm)=	51.44	12.17	33.76	
TOTAL RAINFALL (mm)=	52.45	52.45	52.45	
RUNOFF COEFFICIENT =	0.98	0.23	0.64	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0014)	Area (ha)= 0.23
ID= 1 DT= 5.0 min	Total Imp(%)= 58.80 Dir. Conn.(%)= 58.80

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.13	0.09
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	2.00	2.00
Length (m)=	38.99	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Max.Eff.Inten.(mm/hr)=	81.78	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.28 (ii)	4.17 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.33	0.24		
			TOTALS	
PEAK FLOW (cms)=	0.03	0.01	0.036 (iii)	
TIME TO PEAK (hrs)=	3.00	3.00	3.00	
RUNOFF VOLUME (mm)=	51.44	10.36	34.50	
TOTAL RAINFALL (mm)=	52.45	52.45	52.45	
RUNOFF COEFFICIENT =	0.98	0.20	0.66	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0012):     0.27   0.045     3.00    37.14
     + ID2= 2 (  0013):     0.31   0.048     3.00    33.76
       ================================================
       ID = 3 (  0010):     0.58   0.093     3.00    35.34

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     0.58   0.093     3.00    35.34
     + ID2= 2 (  0014):     0.23   0.036     3.00    34.50
       ================================================
       ID = 1 (  0010):     0.81   0.129     3.00    35.10

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.81   0.129     3.00    35.10
     + ID2= 2 (  0004):     1.44   0.121     3.00    17.31
       ================================================
       ID = 3 (  0010):     2.24   0.250     3.00    23.71

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1550      0.0345
                          0.0450     0.0150   |   0.1850      0.0395
                          0.0850     0.0225   |   0.2150      0.0450
                          0.1150     0.0277   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)      2.244      0.250      3.00      23.71
   OUTFLOW: ID= 1 (  0016)      2.244      0.085      3.17      23.67

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.97
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0226

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--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     2.24   0.085     3.17    23.67
     + ID2= 2 (  0020):     1.97   0.088     3.17    17.80
       ================================================
       ID = 3 (  0015):     4.21   0.173     3.17    20.93

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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**********************************
** SIMULATION:03 Ptbo_SCS_6hr_10yr **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\44ea05ac
| Ptotal= 61.60 mm |    Comments: Ptbo_SCS_6hr_10yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.50 |  1.50    6.20 |  3.00   13.50 |  4.50    3.70
                0.25    2.50 |  1.75    6.20 |  3.25   13.50 |  4.75    3.70
                0.50    3.70 |  2.00    7.40 |  3.50    6.20 |  5.00    2.50
                0.75    3.70 |  2.25    7.40 |  3.75    6.20 |  5.25    2.50
                1.00    3.70 |  2.50   36.90 |  4.00    4.90 |  5.50    2.50
                1.25    3.70 |  2.75   95.90 |  4.25    4.90 |  5.75    2.50

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.21   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.313

PEAK FLOW (cms)= 0.133 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 21.592
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.351

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

CALIB / NASHYD (0003)	Area (ha)= 0.33	Curve Number (CN)= 73.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.20	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.062

PEAK FLOW (cms)= 0.024 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 21.238
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.345

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

CALIB / NASHYD (0002)	Area (ha)= 1.80	Curve Number (CN)= 77.0
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.31	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50

1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.111 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 24.175
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.392

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

CALIB					
NASHYD (0019)	Area (ha)=	0.17	Curve Number (CN)=	67.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.13			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.013 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 17.454
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.283

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

ADD HYD (0020)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0019):	0.17	0.013	3.00	17.45
+ ID2= 2 (0002):	1.80	0.111	3.17	24.17
ID = 3 (0020):	1.97	0.118	3.17	23.61

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0004)	Area (ha)=	1.44	Curve Number (CN)=	76.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.11			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50

1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.161 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 22.985
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.373

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

CALIB STANDHYD (0012) ID= 1 DT= 5.0 min	Area (ha)= 0.27 Total Imp(%)= 65.20 Dir. Conn.(%)= 65.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	4.00	4.00
Length	(m)=	42.43	15.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

				TOTALS
Max.Eff.Inten.(mm/hr)=	95.90	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.02 (ii)	3.54 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.26		
PEAK FLOW (cms)=	0.05	0.01		0.054 (iii)
TIME TO PEAK (hrs)=	3.00	3.00		3.00
RUNOFF VOLUME (mm)=	60.60	13.91		44.34
TOTAL RAINFALL (mm)=	61.60	61.60		61.60
RUNOFF COEFFICIENT =	0.98	0.23		0.72

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 5.0 min	Area (ha)= 0.31 Total Imp(%)= 55.00 Dir. Conn.(%)= 55.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.17	0.14
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	45.39	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50

1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Max.Eff.Inten.(mm/hr)=	95.90	********	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.31 (ii)	4.20 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.24	
			TOTALS
PEAK FLOW (cms)=	0.05	0.01	0.057 (iii)
TIME TO PEAK (hrs)=	3.00	3.00	3.00
RUNOFF VOLUME (mm)=	60.60	16.23	40.63
TOTAL RAINFALL (mm)=	61.60	61.60	61.60
RUNOFF COEFFICIENT =	0.98	0.26	0.66

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0014)	Area (ha)=	0.23	
ID= 1 DT= 5.0 min	Total Imp(%)=	58.80	Dir. Conn.(%)= 58.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.13	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	38.99	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Max.Eff.Inten.(mm/hr)=	95.90	********	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.20 (ii)	3.91 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.33	0.25	
			TOTALS
PEAK FLOW (cms)=	0.04	0.01	0.043 (iii)
TIME TO PEAK (hrs)=	3.00	3.00	3.00
RUNOFF VOLUME (mm)=	60.60	13.91	41.35
TOTAL RAINFALL (mm)=	61.60	61.60	61.60
RUNOFF COEFFICIENT =	0.98	0.23	0.67

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	0.27	0.054	3.00	44.34
+ ID2= 2 (0013):	0.31	0.057	3.00	40.63
ID = 3 (0010):	0.58	0.111	3.00	42.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     0.58   0.111     3.00    42.36
      + ID2= 2 (  0014):     0.23   0.043     3.00    41.35
        ================================================
        ID = 1 (  0010):     0.81   0.154     3.00    42.07

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):     0.81   0.154     3.00    42.07
      + ID2= 2 (  0004):     1.44   0.161     3.00    22.99
        ================================================
        ID = 3 (  0010):     2.24   0.315     3.00    29.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1550      0.0345
                          0.0450     0.0150   |   0.1850      0.0395
                          0.0850     0.0225   |   0.2150      0.0450
                          0.1150     0.0277   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)     2.244      0.315      3.00      29.85
   OUTFLOW: ID= 1 (  0016)     2.244      0.115      3.17      29.82

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.43
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0280

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     2.24   0.115     3.17    29.82
      + ID2= 2 (  0020):     1.97   0.118     3.17    23.61
        ================================================
        ID = 3 (  0015):     4.21   0.233     3.17    26.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************
** SIMULATION:04 Ptbo_SCS_6hr_25yr **
**********************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\5b301ffa
| Ptotal= 72.90 mm |    Comments: Ptbo_SCS_6hr_25yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.90 |  1.50    7.30 |  3.00   16.00 |  4.50    4.40
                0.25    2.90 |  1.75    7.30 |  3.25   16.00 |  4.75    4.40
                0.50    4.40 |  2.00    8.80 |  3.50    7.30 |  5.00    2.90
                0.75    4.40 |  2.25    8.80 |  3.75    7.30 |  5.25    2.90
                1.00    4.40 |  2.50   43.70 |  4.00    5.80 |  5.50    2.90
                1.25    4.40 |  2.75  113.70 |  4.25    5.80 |  5.75    2.90

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.21   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.90 | 1.583    7.30 | 3.083   16.00 |  4.58    4.40
               0.167    2.90 | 1.667    7.30 | 3.167   16.00 |  4.67    4.40
               0.250    2.90 | 1.750    7.30 | 3.250   16.00 |  4.75    4.40
               0.333    2.90 | 1.833    7.30 | 3.333   16.00 |  4.83    4.40
               0.417    2.90 | 1.917    7.30 | 3.417   16.00 |  4.92    4.40
               0.500    2.90 | 2.000    7.30 | 3.500   16.00 |  5.00    4.40
               0.583    4.40 | 2.083    8.80 | 3.583    7.30 |  5.08    2.90
               0.667    4.40 | 2.167    8.80 | 3.667    7.30 |  5.17    2.90
               0.750    4.40 | 2.250    8.80 | 3.750    7.30 |  5.25    2.90
               0.833    4.40 | 2.333    8.80 | 3.833    7.30 |  5.33    2.90
               0.917    4.40 | 2.417    8.80 | 3.917    7.30 |  5.42    2.90
               1.000    4.40 | 2.500    8.80 | 4.000    7.30 |  5.50    2.90
```

1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.313

PEAK FLOW (cms)= 0.185 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 29.389
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.403

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

CALIB					
NASHYD (0003)	Area (ha)=	0.33	Curve Number (CN)=	73.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.20			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.062

PEAK FLOW (cms)= 0.032 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 28.431
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.390

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

CALIB					
NASHYD (0002)	Area (ha)=	1.80	Curve Number (CN)=	77.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.31			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.149 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 32.057
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.440

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

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--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=   0.17   Curve Number   (CN)= 67.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.13

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

```
     Unit Hyd Qpeak  (cms)=   0.049

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  23.649
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.324

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

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--------------------
| ADD HYD  (  0020)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0019):     0.17   0.017     3.00    23.65
      + ID2= 2 (  0002):     1.80   0.149     3.17    32.06
        ==================================================
        ID = 3 (  0020):     1.97   0.158     3.17    31.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   1.44   Curve Number   (CN)= 76.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.11

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

```
     Unit Hyd Qpeak  (cms)=   0.499

     PEAK FLOW       (cms)=   0.214 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  30.555
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.419

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

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--------------------
| CALIB            |
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| STANDHYD (0012)| Area (ha)= 0.27
|ID= 1 DT= 5.0 min | Total Imp(%)= 65.20 Dir. Conn.(%)= 65.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	4.00	4.00
Length	(m)=	42.43	15.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Max.Eff.Inten.(mm/hr)=		113.70	********	
over (min)		5.00	5.00	
Storage Coeff. (min)=		0.96 (ii)	3.31 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.34	0.26	
				TOTALS
PEAK FLOW	(cms)=	0.06	0.01	0.065 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	71.90	18.81	53.41
TOTAL RAINFALL	(mm)=	72.90	72.90	72.90
RUNOFF COEFFICIENT	=	0.99	0.26	0.73

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0013)| Area (ha)= 0.31
ID= 1 DT= 5.0 min	Total Imp(%)= 55.00 Dir. Conn.(%)= 55.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.17	0.14
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	45.39	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Max.Eff.Inten.(mm/hr)=		113.70	********	
over (min)		5.00	5.00	
Storage Coeff. (min)=		1.23 (ii)	3.92 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.33	0.24	
				TOTALS
PEAK FLOW	(cms)=	0.05	0.02	0.070 (iii)

```
     TIME TO PEAK    (hrs)=       3.00         3.00          3.00
     RUNOFF VOLUME    (mm)=      71.90        21.81         49.35
     TOTAL RAINFALL   (mm)=      72.90        72.90         72.90
     RUNOFF COEFFICIENT   =       0.99         0.30          0.68

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  61.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0014)|   Area    (ha)=   0.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.80   Dir. Conn.(%)=  58.80
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.13         0.09
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      38.99        10.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                         ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    2.90 | 1.583    7.30 | 3.083   16.00 |  4.58    4.40
  0.167    2.90 | 1.667    7.30 | 3.167   16.00 |  4.67    4.40
  0.250    2.90 | 1.750    7.30 | 3.250   16.00 |  4.75    4.40
  0.333    2.90 | 1.833    7.30 | 3.333   16.00 |  4.83    4.40
  0.417    2.90 | 1.917    7.30 | 3.417   16.00 |  4.92    4.40
  0.500    2.90 | 2.000    7.30 | 3.500   16.00 |  5.00    4.40
  0.583    4.40 | 2.083    8.80 | 3.583    7.30 |  5.08    2.90
  0.667    4.40 | 2.167    8.80 | 3.667    7.30 |  5.17    2.90
  0.750    4.40 | 2.250    8.80 | 3.750    7.30 |  5.25    2.90
  0.833    4.40 | 2.333    8.80 | 3.833    7.30 |  5.33    2.90
  0.917    4.40 | 2.417    8.80 | 3.917    7.30 |  5.42    2.90
  1.000    4.40 | 2.500    8.80 | 4.000    7.30 |  5.50    2.90
  1.083    4.40 | 2.583   43.70 | 4.083    5.80 |  5.58    2.90
  1.167    4.40 | 2.667   43.70 | 4.167    5.80 |  5.67    2.90
  1.250    4.40 | 2.750   43.70 | 4.250    5.80 |  5.75    2.90
  1.333    4.40 | 2.833  113.70 | 4.333    5.80 |  5.83    2.90
  1.417    4.40 | 2.917  113.70 | 4.417    5.80 |  5.92    2.90
  1.500    4.40 | 3.000  113.70 | 4.500    5.80 |  6.00    2.90
```

```
     Max.Eff.Inten.(mm/hr)=     113.70     ********
               over (min)          5.00         5.00
     Storage Coeff.  (min)=       1.12 (ii)    3.65 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.34         0.25
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.01          0.052 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00           3.00
     RUNOFF VOLUME    (mm)=      71.90        18.81          50.02
     TOTAL RAINFALL   (mm)=      72.90        72.90          72.90
     RUNOFF COEFFICIENT   =       0.99         0.26           0.69

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  56.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0012):     0.27   0.065     3.00    53.41
     + ID2= 2 (  0013):     0.31   0.070     3.00    49.35
       ================================================
       ID = 3 (  0010):     0.58   0.135     3.00    51.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     0.58   0.135     3.00    51.25
     + ID2= 2 (  0014):     0.23   0.052     3.00    50.02
       ================================================
       ID = 1 (  0010):     0.81   0.187     3.00    50.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     0.81   0.187     3.00    50.90
     + ID2= 2 (  0004):     1.44   0.214     3.00    30.56
       ================================================
       ID = 3 (  0010):     2.24   0.401     3.00    37.87

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1550      0.0345
                          0.0450     0.0150   |   0.1850      0.0395
                          0.0850     0.0225   |   0.2150      0.0450
                          0.1150     0.0277   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)     2.244      0.401      3.00      37.87
   OUTFLOW: ID= 1 (  0016)     2.244      0.154      3.17      37.84

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 38.46
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0349

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     2.24   0.154     3.17    37.84
     + ID2= 2 (  0020):     1.97   0.158     3.17    31.35
       ================================================
       ID = 3 (  0015):     4.21   0.313     3.17    34.81

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
************************************
** SIMULATION:05 Ptbo_SCS_6hr_50yr **
************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\35d0bce6
| Ptotal= 81.47 mm |    Comments: Ptbo_SCS_6hr_50yr
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.30	1.50	8.10	3.00	17.90	4.50	4.90
0.25	3.30	1.75	8.10	3.25	17.90	4.75	4.90
0.50	4.90	2.00	9.80	3.50	8.10	5.00	3.30
0.75	4.90	2.25	9.80	3.75	8.10	5.25	3.30
1.00	4.90	2.50	48.90	4.00	6.50	5.50	3.30
1.25	4.90	2.75	127.00	4.25	6.50	5.75	3.30

```
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.21   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                              ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

```
    Unit Hyd Qpeak  (cms)=   0.313

    PEAK FLOW       (cms)=   0.225 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  35.675
    TOTAL RAINFALL   (mm)=  81.475
    RUNOFF COEFFICIENT   =   0.438
```

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

CALIB					
NASHYD (0003)	Area (ha)=	0.33	Curve Number (CN)=	73.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.20			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.062

PEAK FLOW (cms)= 0.038 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 34.251
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.420

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

CALIB					
NASHYD (0002)	Area (ha)=	1.80	Curve Number (CN)=	77.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.31			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.179 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 38.376
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.471

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

CALIB					
NASHYD (0019)	Area (ha)=	0.17	Curve Number (CN)=	67.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.13			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90

0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.021 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 28.723
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.353

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

ADD HYD (0020)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0019):		0.17	0.021	3.00	28.72
+ ID2= 2 (0002):		1.80	0.179	3.17	38.38
ID = 3 (0020):		1.97	0.190	3.17	37.56

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0004)	Area	(ha)=	1.44	Curve Number (CN)=	76.0
ID= 1 DT= 5.0 min	Ia	(mm)=	5.00	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=		0.11		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.256 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 36.639
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.450

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

CALIB			
STANDHYD (0012)	Area	(ha)=	0.27
ID= 1 DT= 5.0 min	Total Imp(%)=	65.20	Dir. Conn.(%)= 65.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	4.00	4.00
Length	(m)=	42.43	15.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Max.Eff.Inten.(mm/hr)=	127.00	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	0.92 (ii)	3.17 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.27		
			TOTALS	
PEAK FLOW (cms)=	0.06	0.01	0.074 (iii)	
TIME TO PEAK (hrs)=	3.00	3.00	3.00	
RUNOFF VOLUME (mm)=	80.48	22.88	60.42	
TOTAL RAINFALL (mm)=	81.48	81.48	81.48	
RUNOFF COEFFICIENT =	0.99	0.28	0.74	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0013)	Area (ha)=	0.31	
ID= 1 DT= 5.0 min	Total Imp(%)=	55.00	Dir. Conn.(%)= 55.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.17	0.14
Dep. Storage (mm)=	1.00	1.50
Average Slope (%)=	2.00	2.00

Length (m)=	45.39	10.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Max.Eff.Inten.(mm/hr)=	127.00	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.17 (ii)	3.75 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.25		
			TOTALS	
PEAK FLOW (cms)=	0.06	0.02	0.080 (iii)	
TIME TO PEAK (hrs)=	3.00	3.00	3.00	
RUNOFF VOLUME (mm)=	80.47	26.39	56.13	
TOTAL RAINFALL (mm)=	81.48	81.48	81.48	
RUNOFF COEFFICIENT =	0.99	0.32	0.69	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB            |
| STANDHYD (  0014)|   Area    (ha)=   0.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.80   Dir. Conn.(%)=  58.80
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.13	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	38.99	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Max.Eff.Inten.(mm/hr)		127.00	********	
over (min)		5.00	5.00	
Storage Coeff. (min)		1.07 (ii)	3.49 (ii)	
Unit Hyd. Tpeak (min)		5.00	5.00	
Unit Hyd. peak (cms)		0.34	0.26	
				TOTALS
PEAK FLOW	(cms)=	0.05	0.01	0.059 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	80.48	22.88	56.74
TOTAL RAINFALL	(mm)=	81.48	81.48	81.48
RUNOFF COEFFICIENT	=	0.99	0.28	0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	0.27	0.074	3.00	60.42
+ ID2= 2 (0013):	0.31	0.080	3.00	56.13
ID = 3 (0010):	0.58	0.154	3.00	58.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.58	0.154	3.00	58.13
+ ID2= 2 (0014):	0.23	0.059	3.00	56.74
ID = 1 (0010):	0.81	0.213	3.00	57.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |
--------------------
```

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	0.81	0.213	3.00	57.74
+ ID2= 2 (0004):	1.44	0.256	3.00	36.64
ID = 3 (0010):	2.24	0.469	3.00	44.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |
--------------------
```

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1550	0.0345
0.0450	0.0150	0.1850	0.0395

```
                        0.0850     0.0225   |   0.2150      0.0450
                        0.1150     0.0277   |   0.0000      0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0010)      2.244      0.469      3.00      44.23
   OUTFLOW: ID= 1 (  0016)      2.244      0.186      3.08      44.19

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 39.61
                    TIME SHIFT OF PEAK FLOW         (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0402

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0016):     2.24   0.186     3.08    44.19
     + ID2= 2 (  0020):     1.97   0.190     3.17    37.56
       ================================================
       ID = 3 (  0015):     4.21   0.376     3.17    41.10

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
************************************
** SIMULATION:06 Ptbo_SCS_6hr_100yr **
************************************

--------------------
|    READ STORM    |    Filename: C:\Users\lmattern\AppD
|                  |              ata\Local\Temp\
|                  |              349c3b05-cc77-4dc8-a972-550f364ff8bf\4d8901ed
| Ptotal= 89.93 mm |    Comments: Ptbo_SCS_6hr_100yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    3.60 |  1.50    9.00 |  3.00   19.80 |  4.50    5.40
               0.25    3.60 |  1.75    9.00 |  3.25   19.80 |  4.75    5.40
               0.50    5.40 |  2.00   10.80 |  3.50    9.00 |  5.00    3.60
               0.75    5.40 |  2.25   10.80 |  3.75    9.00 |  5.25    3.60
               1.00    5.40 |  2.50   53.90 |  4.00    7.20 |  5.50    3.60
               1.25    5.40 |  2.75  140.20 |  4.25    7.20 |  5.75    3.60

--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   2.21   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.27

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    3.60 | 1.583    9.00 | 3.083   19.80 |  4.58    5.40
                0.167    3.60 | 1.667    9.00 | 3.167   19.80 |  4.67    5.40
                0.250    3.60 | 1.750    9.00 | 3.250   19.80 |  4.75    5.40
                0.333    3.60 | 1.833    9.00 | 3.333   19.80 |  4.83    5.40
                0.417    3.60 | 1.917    9.00 | 3.417   19.80 |  4.92    5.40
                0.500    3.60 | 2.000    9.00 | 3.500   19.80 |  5.00    5.40
                0.583    5.40 | 2.083   10.80 | 3.583    9.00 |  5.08    3.60
                0.667    5.40 | 2.167   10.80 | 3.667    9.00 |  5.17    3.60
                0.750    5.40 | 2.250   10.80 | 3.750    9.00 |  5.25    3.60
                0.833    5.40 | 2.333   10.80 | 3.833    9.00 |  5.33    3.60
                0.917    5.40 | 2.417   10.80 | 3.917    9.00 |  5.42    3.60
                1.000    5.40 | 2.500   10.80 | 4.000    9.00 |  5.50    3.60
                1.083    5.40 | 2.583   53.90 | 4.083    7.20 |  5.58    3.60
                1.167    5.40 | 2.667   53.90 | 4.167    7.20 |  5.67    3.60
                1.250    5.40 | 2.750   53.90 | 4.250    7.20 |  5.75    3.60
                1.333    5.40 | 2.833  140.20 | 4.333    7.20 |  5.83    3.60
                1.417    5.40 | 2.917  140.20 | 4.417    7.20 |  5.92    3.60
                1.500    5.40 | 3.000  140.20 | 4.500    7.20 |  6.00    3.60

    Unit Hyd Qpeak  (cms)=   0.313

    PEAK FLOW       (cms)=   0.267 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  42.122
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.468

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

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.33   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


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

0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.062

PEAK FLOW (cms)= 0.045 (i)
TIME TO PEAK (hrs)= 3.083
RUNOFF VOLUME (mm)= 40.243
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.448

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

CALIB					
NASHYD (0002)	Area (ha)=	1.80	Curve Number (CN)=	77.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.31			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.222

PEAK FLOW (cms)= 0.209 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 44.838
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.499

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

CALIB					
NASHYD (0019)	Area (ha)=	0.17	Curve Number (CN)=	67.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.13			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60

1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.049

PEAK FLOW (cms)= 0.025 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 33.998
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.378

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

ADD HYD (0020)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0019):		0.17	0.025	3.00	34.00
+ ID2= 2 (0002):		1.80	0.209	3.17	44.84
ID = 3 (0020):		1.97	0.223	3.17	43.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0004)	Area (ha)=	1.44	Curve Number (CN)=	76.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.11			

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.299 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 42.871
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.477

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

CALIB			
STANDHYD (0012)	Area (ha)=	0.27	
ID= 1 DT= 5.0 min	Total Imp(%)=	65.20	Dir. Conn.(%)= 65.20

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.18	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	4.00	4.00
Length	(m)=	42.43	15.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60

1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Max.Eff.Inten.(mm/hr)=	140.20	********	
over (min)	5.00	5.00	
Storage Coeff. (min)=	0.88 (ii)	3.04 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.27	
			TOTALS
PEAK FLOW (cms)=	0.07	0.01	0.083 (iii)
TIME TO PEAK (hrs)=	3.00	3.00	3.00
RUNOFF VOLUME (mm)=	88.93	27.15	67.42
TOTAL RAINFALL (mm)=	89.93	89.93	89.93
RUNOFF COEFFICIENT =	0.99	0.30	0.75

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0013)	Area (ha)=	0.31	
ID= 1 DT= 5.0 min	Total Imp(%)=	55.00	Dir. Conn.(%)= 55.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.17	0.14
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	45.39	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Max.Eff.Inten.(mm/hr)=	140.20	********	
over (min)	5.00	5.00	
Storage Coeff. (min)=	1.13 (ii)	3.61 (ii)	
Unit Hyd. Tpeak (min)=	5.00	5.00	
Unit Hyd. peak (cms)=	0.34	0.25	
			TOTALS
PEAK FLOW (cms)=	0.07	0.02	0.090 (iii)
TIME TO PEAK (hrs)=	3.00	3.00	3.00
RUNOFF VOLUME (mm)=	88.92	31.17	62.93
TOTAL RAINFALL (mm)=	89.93	89.93	89.93
RUNOFF COEFFICIENT =	0.99	0.35	0.70

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 61.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
STANDHYD (0014)	Area (ha)=	0.23	
ID= 1 DT= 5.0 min	Total Imp(%)=	58.80	Dir. Conn.(%)= 58.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.13	0.09
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	38.99	10.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.60	1.583	9.00	3.083	19.80	4.58	5.40
0.167	3.60	1.667	9.00	3.167	19.80	4.67	5.40
0.250	3.60	1.750	9.00	3.250	19.80	4.75	5.40
0.333	3.60	1.833	9.00	3.333	19.80	4.83	5.40
0.417	3.60	1.917	9.00	3.417	19.80	4.92	5.40
0.500	3.60	2.000	9.00	3.500	19.80	5.00	5.40
0.583	5.40	2.083	10.80	3.583	9.00	5.08	3.60
0.667	5.40	2.167	10.80	3.667	9.00	5.17	3.60
0.750	5.40	2.250	10.80	3.750	9.00	5.25	3.60
0.833	5.40	2.333	10.80	3.833	9.00	5.33	3.60
0.917	5.40	2.417	10.80	3.917	9.00	5.42	3.60
1.000	5.40	2.500	10.80	4.000	9.00	5.50	3.60
1.083	5.40	2.583	53.90	4.083	7.20	5.58	3.60
1.167	5.40	2.667	53.90	4.167	7.20	5.67	3.60
1.250	5.40	2.750	53.90	4.250	7.20	5.75	3.60
1.333	5.40	2.833	140.20	4.333	7.20	5.83	3.60
1.417	5.40	2.917	140.20	4.417	7.20	5.92	3.60
1.500	5.40	3.000	140.20	4.500	7.20	6.00	3.60

Max.Eff.Inten.(mm/hr)=	140.20	********		
over (min)	5.00	5.00		
Storage Coeff. (min)=	1.03 (ii)	3.36 (ii)		
Unit Hyd. Tpeak (min)=	5.00	5.00		
Unit Hyd. peak (cms)=	0.34	0.26		
			TOTALS	
PEAK FLOW (cms)=	0.05	0.01	0.066 (iii)	
TIME TO PEAK (hrs)=	3.00	3.00	3.00	
RUNOFF VOLUME (mm)=	88.92	27.15	63.47	
TOTAL RAINFALL (mm)=	89.93	89.93	89.93	
RUNOFF COEFFICIENT =	0.99	0.30	0.71	

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 56.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	0.27	0.083	3.00	67.42
+ ID2= 2 (0013):	0.31	0.090	3.00	62.93
ID = 3 (0010):	0.58	0.172	3.00	65.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	0.58	0.172	3.00	65.03
+ ID2= 2 (0014):	0.23	0.066	3.00	63.47
ID = 1 (0010):	0.81	0.239	3.00	64.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	0.81	0.239	3.00	64.59
+ ID2= 2 (0004):	1.44	0.299	3.00	42.87
ID = 3 (0010):	2.24	0.538	3.00	50.68

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0016) OVERFLOW IS OFF
IN= 2---> OUT= 1
DT= 5.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.1550	0.0345
0.0450	0.0150	0.1850	0.0395
0.0850	0.0225	0.2150	0.0450
0.1150	0.0277	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0010)	2.244	0.538	3.00	50.68
OUTFLOW: ID= 1 (0016)	2.244	0.215	3.08	50.64

PEAK FLOW REDUCTION [Qout/Qin](%)= 40.03
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.0457

```
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     2.24   0.215     3.08    50.64
      + ID2= 2 (  0020):     1.97   0.223     3.17    43.92
        ================================================
        ID = 3 (  0015):     4.21   0.438     3.17    47.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

Appendix D: Stage Storage Discharge Calculations

Volume Calculations

ENGAGE ENGINEERING

Project Name: 35 Industrial Drive
Project No: 22056
Designed By: LM
Date: 2023-04-27

Dry Pond Volume				
Contour Elevation (m)	Contour Area (m^2)	Depth (m)	Incremental Volume (m^3)	Total Volume (m^3)
199.00	645.5	-	0	0
199.05	645.6	0.05	32.3	32.3
199.10	662.6	0.05	32.7	65.0
199.15	679.6	0.05	33.6	98.5
199.20	696.7	0.05	34.4	132.9
199.25	714.1	0.05	35.3	168.2
199.30	731.5	0.05	36.1	204.4
199.35	749.1	0.05	37.0	241.4
199.40	766.8	0.05	37.9	279.3
199.45	784.6	0.05	38.8	318.0
199.50	802.6	0.05	39.7	357.7
199.55	820.7	0.05	40.6	398.3
199.60	838.9	0.05	41.5	439.8
199.65	857.3	0.05	42.4	482.2
199.70	875.9	0.05	43.3	525.5
199.75	894.5	0.05	44.3	569.8
199.80	913.3	0.05	45.2	615.0
199.85	932.3	0.05	46.1	661.1
199.90	951.5	0.05	47.1	708.2
199.95	970.8	0.05	48.1	756.3
200.00	990.6	0.05	49.0	805.3

Stormwater Management Facility Outlet Sizing

Project Name: 35 Industrial Drive
Project Number: 22056
Designed By: LM
Date: 2023-04-27

Number of Stages (Max 5): 1

Outlet Configuration				
		Stage Number:	Stage 1	Total
		Control Type:	Culvert	
		Orifice Diameter / Weir Width (m):	0.450	
		Invert Elevations (m):	199.05	
		Top of Catch Basin (m) / Included Angle (°):	0.00	

Discharge Table:	Elevation (m)	Storage (m^3)	Controlled Discharge Rate (m^3/s)	
	199.00	0.0	0.000	0.000
	199.05	32.3	0.000	0.000
	199.10	65.0	0.005	0.005
	199.15	98.5	0.010	0.010
	199.20	132.9	0.025	0.025
2 Year	199.25	168.2	0.045	0.045
	199.30	204.4	0.065	0.065
5 year	199.35	241.4	0.085	0.085
	199.40	279.3	0.110	0.110
10 Year	199.42	294.8	0.115	0.115
	199.45	318.0	0.130	0.130
25 Year	199.50	357.7	0.155	0.155
	199.55	398.3	0.180	0.180
50 Year	199.57	414.9	0.185	0.185
	199.60	439.8	0.200	0.200
100 Year	199.63	465.2	0.215	0.215
	199.65	482.2	0.225	0.225
	199.70	525.5	0.240	0.240
	199.75	569.8	0.255	0.255
Bottom of overflow weir	199.80	615.0	0.265	0.265
	199.85	661.1	0.280	0.280
	199.90	708.2	0.295	0.295
	199.95	756.3	0.305	0.305
Top of Dry Pond	200.00	805.3	0.320	0.320

Note: Controled Discharge Rates extracted from Hydraflow model results

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 18 2023

Dry Pond Culvert

Invert Elev Dn (m)	=	198.5000
Pipe Length (m)	=	24.5000
Slope (%)	=	2.2450
Invert Elev Up (m)	=	199.0500
Rise (mm)	=	450.0
Shape	=	Circular
Span (mm)	=	450.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

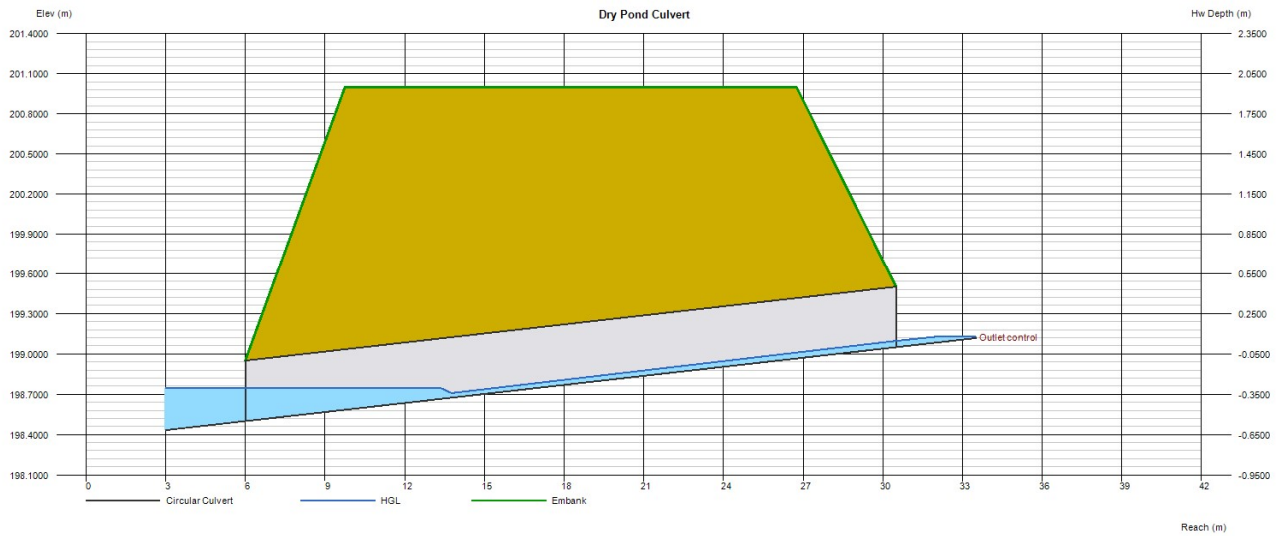
Top Elevation (m)	=	201.0000
Top Width (m)	=	17.0000
Crest Width (m)	=	10.0000

Calculations

Qmin (cms)	=	0.0000
Qmax (cms)	=	0.3500
Tailwater Elev (m)	=	(dc+D)/2

Highlighted

Qtotal (cms)	=	0.0050
Qpipe (cms)	=	0.0050
Qovertop (cms)	=	0.0000
Veloc Dn (m/s)	=	0.0555
Veloc Up (m/s)	=	0.5623
HGL Dn (m)	=	198.7486
HGL Up (m)	=	199.0973
Hw Elev (m)	=	199.1279
Hw/D (m)	=	0.1731
Flow Regime	=	Outlet Control



Hydraflow Express - Dry Pond Culvert Results Grid

Q Total (cms)	Q Pipe (cms)	Q Over (cms)	Veloc Dn (m/s)	Veloc Up (m/s)	Depth Dn (mm)	Depth Up (mm)	HGL Dn (m)	HGL Up (m)	HGL Hw (m)	HGL Hw/D
0.005	0.005	0	0.0555	0.5623	248.6174	47.2529	199.0486	199.0973	199.1279	0.1731
0.01	0.01	0	0.1057	0.674	258.5517	67.1215	199.0585	199.1171	199.1612	0.247
0.015	0.015	0	0.1531	0.7514	266.2163	82.4322	199.0662	199.1324	199.159	0.2423
0.02	0.02	0	0.1983	0.8115	272.7461	95.4918	199.0727	199.1455	199.178	0.2843
0.025	0.025	0	0.2418	0.8624	278.5318	107.0632	199.0785	199.1571	199.1951	0.3223
0.03	0.03	0	0.2839	0.9068	283.778	117.5742	199.0838	199.1676	199.2109	0.3575
0.035	0.035	0	0.3248	0.9467	288.6335	127.2853	199.0886	199.1773	199.2258	0.3907
0.04	0.04	0	0.3646	0.9838	293.1356	136.2894	199.0931	199.1863	199.2401	0.4223
0.045	**0.045**	**0**	**0.4035**	**1.0175**	**297.4144**	**144.8284**	**199.0974**	**199.1948**	**199.2537**	**0.4526**
0.05	0.05	0	0.4414	1.0487	301.4886	152.9953	199.1015	199.203	199.2669	0.4819
0.055	0.055	0	0.4787	1.0787	305.3581	160.6972	199.1054	199.2107	199.2797	0.5104
0.06	0.06	0	0.5152	1.1065	309.0974	168.1758	199.1091	199.2182	199.2922	0.5382
0.065	0.065	0	0.5511	1.1337	312.6507	175.2823	199.1127	199.2253	199.3044	0.5654
0.07	0.07	0	0.5864	1.1592	316.1109	182.2214	199.1161	199.2322	199.3164	0.592
0.075	0.075	0	0.6212	1.1843	319.4224	188.8629	199.1194	199.2389	199.3282	0.6183
0.08	0.08	0	0.6555	1.2084	322.6594	195.3183	199.1227	199.2453	199.3399	0.6441
0.085	**0.085**	**0**	**0.6893**	**1.2319**	**325.7848**	**201.5691**	**199.1258**	**199.2516**	**199.3513**	**0.6696**
0.09	0.09	0	0.7226	1.2542	328.873	207.7269	199.1289	199.2577	199.3627	0.6949
0.095	0.095	0	0.7556	1.2763	331.8495	213.68	199.1319	199.2637	199.3739	0.7198
0.1	0.1	0	0.7883	1.2985	334.7144	219.4099	199.1347	199.2694	199.3851	0.7447
0.105	0.105	0	0.8204	1.3192	337.5794	225.1583	199.1376	199.2752	199.3962	0.7692
0.11	0.11	0	0.8524	1.3403	340.3327	230.665	199.1403	199.2807	199.4072	0.7937
0.115	**0.115**	**0**	**0.8839**	**1.3602**	**343.086**	**236.1716**	**199.1431**	**199.2862**	**199.4181**	**0.818**
0.12	0.12	0	0.9152	1.3806	345.7277	241.455	199.1457	199.2915	199.429	0.8422
0.125	0.125	0	0.9463	1.4009	348.295	246.6082	199.1483	199.2966	199.4398	0.8663
0.13	0.13	0	0.977	1.4203	350.8809	251.7428	199.1509	199.3018	199.4507	0.8903
0.135	0.135	0	1.0075	1.4397	353.3924	256.7657	199.1534	199.3068	199.4614	0.9142
0.14	0.14	0	1.0378	1.4584	355.8853	261.7701	199.1559	199.3118	199.4722	0.9381
0.145	0.145	0	1.068	1.478	358.2665	266.5326	199.1583	199.3165	199.4829	0.9619
0.15	0.15	0	1.0978	1.497	360.6477	271.2765	199.1606	199.3213	199.4936	0.9858
0.155	**0.155**	**0**	**1.1275**	**1.5155**	**363.0104**	**276.0017**	**199.163**	**199.326**	**199.5043**	**1.0095**
0.16	0.16	0	1.157	1.5343	365.2986	280.5968	199.1653	199.3306	199.515	1.0333
0.165	0.165	0	1.1863	1.5527	367.5869	285.1547	199.1676	199.3352	199.5257	1.0571
0.17	0.17	0	1.2156	1.5714	369.8007	289.5823	199.1698	199.3396	199.5364	1.0808
0.175	0.175	0	1.2448	1.5905	371.9401	293.8797	199.1719	199.3439	199.5471	1.1047
0.18	0.18	0	1.2736	1.6086	374.1353	298.2702	199.1741	199.3483	199.5578	1.1285
0.185	0.185	0	1.3026	1.6278	376.2003	302.4001	199.1762	199.3524	199.5686	1.1523
0.19	0.19	0	1.3313	1.6461	378.3025	306.6045	199.1783	199.3566	199.5793	1.1762
0.195	0.195	0	1.36	1.6649	380.3303	310.6787	199.1803	199.3607	199.5901	1.2001
0.2	0.2	0	1.3885	1.6835	382.3581	314.7157	199.1824	199.3647	199.6009	1.2241
0.205	0.205	0	1.4169	1.702	384.3672	318.7154	199.1844	199.3687	199.6117	1.2481
0.21	0.21	0	1.4454	1.721	386.302	322.585	199.1863	199.3726	199.6225	1.2722
0.215	**0.215**	**0**	**1.4737**	**1.7399**	**388.2182**	**326.4359**	**199.1882**	**199.3764**	**199.6334**	**1.2964**
0.22	0.22	0	1.5022	1.7594	390.0599	330.1194	199.1901	199.3801	199.6443	1.3206
0.225	0.225	0	1.5303	1.7782	391.9389	333.8773	199.1919	199.3839	199.6552	1.3449
0.23	0.23	0	1.5586	1.7975	393.762	337.505	199.1938	199.3875	199.6683	1.3739
0.235	0.235	0	1.5869	1.8174	395.4921	341.0024	199.1955	199.391	199.685	1.411
0.24	0.24	0	1.615	1.8367	397.2781	344.5371	199.1973	199.3945	199.702	1.4488
0.245	0.245	0	1.6433	1.8566	398.971	347.9601	199.199	199.398	199.7194	1.4875
0.25	0.25	0	1.6714	1.8766	400.6639	351.3274	199.2007	199.4013	199.7371	1.5269
0.255	0.255	0	1.6997	1.897	402.2824	354.5644	199.2023	199.4046	199.7552	1.5671
0.26	0.26	0	1.7279	1.9171	403.9195	357.8572	199.2039	199.4079	199.7737	1.6082
0.265	0.265	0	1.7561	1.9377	405.5008	361.0198	199.2055	199.411	199.7925	1.65
0.27	0.27	0	1.7844	1.9588	407.0263	364.0336	199.207	199.414	199.8117	1.6927
0.275	0.275	0	1.8128	1.98	408.5146	367.0287	199.2085	199.417	199.8313	1.7361
0.28	0.28	0	1.8412	2.0013	409.9843	369.9681	199.21	199.42	199.8512	1.7803
0.285	0.285	0	1.8695	2.0227	411.4353	372.8703	199.2114	199.4229	199.8714	1.8254
0.29	0.29	0	1.898	2.0446	412.8306	375.6608	199.2128	199.4257	199.8921	1.8712
0.295	0.295	0	1.9265	2.0666	414.1887	378.3955	199.2142	199.4284	199.913	1.9178
0.3	0.3	0	1.9549	2.0887	415.5467	381.093	199.2155	199.4311	199.9344	1.9653
0.305	0.305	0	1.9836	2.1114	416.8304	383.6603	199.2168	199.4337	199.9561	2.0134
0.31	0.31	0	2.0122	2.1342	418.0954	386.1904	199.2181	199.4362	199.9781	2.0624
0.315	0.315	0	2.041	2.1574	419.3046	388.6088	199.2193	199.4386	200.0005	2.1123

Appendix E: Water Quality Calculations

Water Quality Sizing Criteria

Project Name:	Industrial Drive	**Designed By:**	LM
Project No:	22056	**Date:**	2023-04-27

Site Data			
Protection Level:		Enhanced	
Facility Type:		Infiltration	
Area	=	0.807	ha
% Impervious Calculated	=	59.50	%
Impervious Area	=	0.48	ha
Required Infiltration Volume (Ved)			
Vs	=	32	m^3/ha
	=	25	m^3

Notes:

Table 3.2: Water Quality Storage Requirements based on Receiving Waters (MOE SWMPD Manual)

		Storage Volume (m^3/ha) for Impervious Level				
Protection Level	SWMP Type	0%	35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	16.25	25	30	35	40
	Wetlands	36.25	80	105	120	140
	Hybrid Wet Pond/Wetland	40	110	150	175	195
	Wet Pond	52.5	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	20	25	30
	Wetlands	42.5	60	70	80	90
	Hybrid Wet Pond/Wetland	48.75	75	90	105	120
	Wet Pond	55	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20	20
	Wetlands	60	60	60	60	60
	Hybrid Wet Pond/Wetland	42.5	60	70	75	80
	Wet Pond	33.75	60	75	85	95
	Dry Pond (Continuous Flow)	0	90	150	200	240

Volume Calculations

Project Name: 35 Industrial Drive
Project No: 22056
Designed By: LM
Date: 2023-04-27

East Bioretention Cell Volume

	Contour Elevation (m)	Contour Area (m^2)	Depth (m)	Incremental Volume (m^3)	Total Ponding Volume (m^3)
	204.05	51.0	0.05	0.0	0.0
	204.10	55.8	0.05	2.7	2.7
	204.15	60.7	0.05	2.9	5.6
	204.20	65.8	0.05	3.2	8.7
	204.25	70.9	0.05	3.4	12.2
	204.30	76.2	0.05	3.7	15.8
	204.35	81.7	0.05	3.9	19.8
Overflow ->	204.40	87.2	0.05	4.2	24.0
	204.45	92.9	0.05	4.5	28.5
	204.50	98.7	0.05	4.8	33.3
	204.55	104.9	0.05	5.1	38.4
	204.60	111.0	0.05	5.4	43.8

Subsurface Volume = Media Depth (m) X Contour Area (m^2) X Void ratio (-)
Subsurface Volume = 0.70m x 51.0m^2 x 0.4
Subsurface Volume = 14.28m^3
Total Volume below overflow = 14.28m^3 + 24.0 m^3 = **38.28m^3**

West Bioretention Cell Volume

	Contour Elevation (m)	Contour Area (m^2)	Depth (m)	Incremental Volume (m^3)	Total Ponding Volume (m^3)
	203.00	85.3	0.05	0.0	0.0
	203.05	90.5	0.05	4.4	4.4
	203.10	95.8	0.05	4.7	9.1
	203.15	101.2	0.05	4.9	14.0
	203.20	106.6	0.05	5.2	19.2
	203.25	112.1	0.05	5.5	24.6
	203.30	117.7	0.05	5.7	30.4
	203.35	123.4	0.05	6.0	36.4
Overflow CB->	203.40	129.1	0.05	6.3	42.7
	203.45	134.9	0.05	6.6	49.3
	203.50	140.8	0.05	6.9	56.2
	203.55	146.7	0.05	7.2	63.4
Overflow Weir ->	203.60	150.7	0.05	7.4	70.8

Subsurface Volume = Media Depth (m) X Contour Area (m^2) X Void ratio (-)
Subsurface Volume = 0.70m x 85.3m^2 x 0.4
Subsurface Volume = 23.88m^3
Total Volume below overflow CB = 23.88m^3 + 42.7m^3 = **66.58m^3**

Appendix F: Existing Culvert Analysis

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 25 2023

Existing Culvert East

Invert Elev Dn (m)	=	199.2000
Pipe Length (m)	=	20.0000
Slope (%)	=	6.5001
Invert Elev Up (m)	=	200.5000
Rise (mm)	=	400.0
Shape	=	Circular
Span (mm)	=	400.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

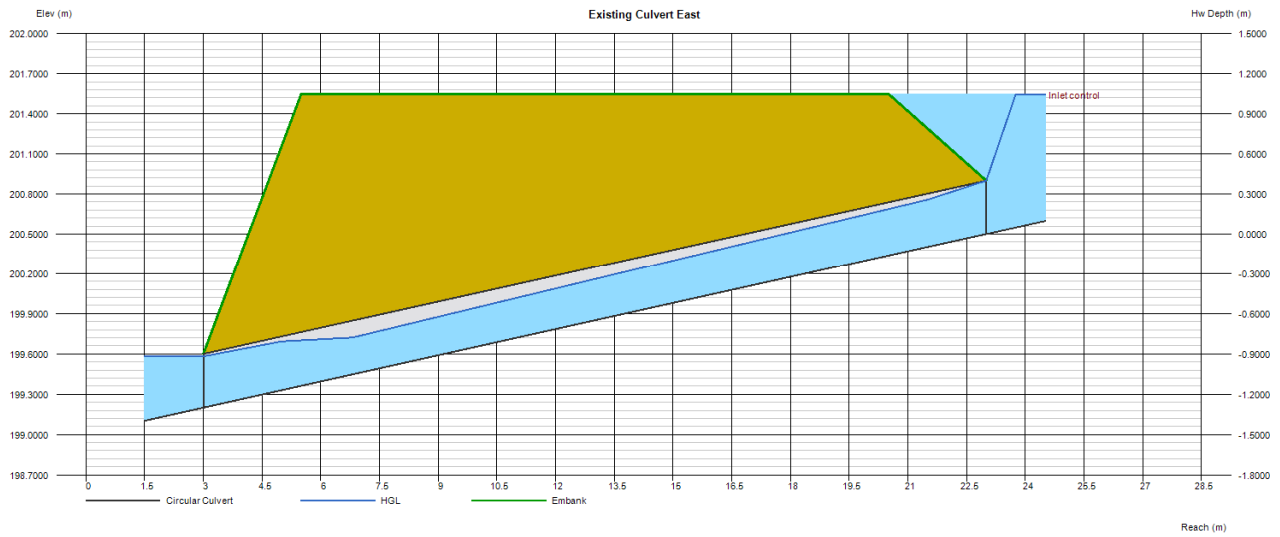
Top Elevation (m)	=	201.5500
Top Width (m)	=	15.0000
Crest Width (m)	=	60.0000

Calculations

Qmin (cms)	=	0.0000
Qmax (cms)	=	0.2800
Tailwater Elev (m)	=	(dc+D)/2

Highlighted

Qtotal (cms)	=	0.2750
Qpipe (cms)	=	0.2706
Qovertop (cms)	=	0.0044
Veloc Dn (m/s)	=	2.1900
Veloc Up (m/s)	=	2.2581
HGL Dn (m)	=	199.5815
HGL Up (m)	=	200.8631
Hw Elev (m)	=	201.5446
Hw/D (m)	=	2.6114
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Apr 25 2023

Existing Culvert West

Invert Elev Dn (m)	=	197.1250
Pipe Length (m)	=	55.0000
Slope (%)	=	2.5000
Invert Elev Up (m)	=	198.5000
Rise (mm)	=	450.0
Shape	=	Circular
Span (mm)	=	450.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Projecting
Coeff. K,M,c,Y,k	=	0.034, 1.5, 0.0553, 0.54, 0.9

Embankment

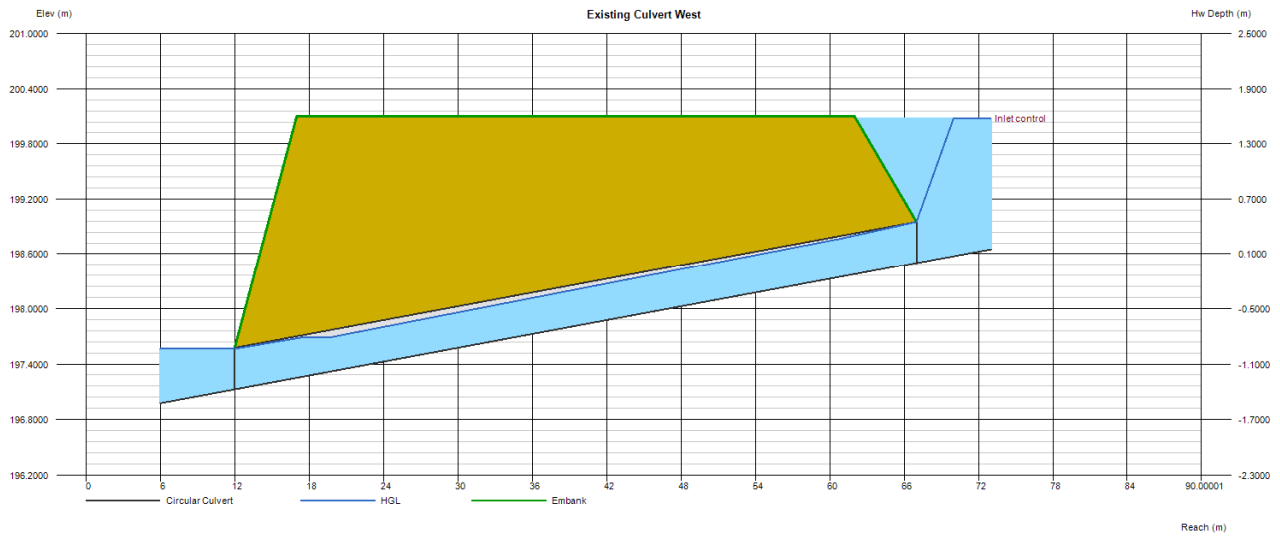
Top Elevation (m)	=	200.1000
Top Width (m)	=	45.0000
Crest Width (m)	=	60.0000

Calculations

Qmin (cms)	=	0.0000
Qmax (cms)	=	0.4500
Tailwater Elev (m)	=	(dc+D)/2

Highlighted

Qtotal (cms)	=	0.4500
Qpipe (cms)	=	0.4328
Qovertop (cms)	=	0.0172
Veloc Dn (m/s)	=	2.7403
Veloc Up (m/s)	=	2.7756
HGL Dn (m)	=	197.5634
HGL Up (m)	=	198.9267
Hw Elev (m)	=	200.0808
Hw/D (m)	=	3.5128
Flow Regime	=	Inlet Control



Appendix G: Conveyance Calculations

Channel Design Sheet

Project Name: 35 Industrial Drive
Project No: 22056

Designed By: LM
Date: 2023-04-27

Location		Contributing Area and Flow		Channel Properties						Hydraulics					
Channel Description	Description	Flow (m^3/s)	Bed Slope	Side Slope (X:1)	Bottom Width (m)	Depth (m)	Lining Material	Manning's n	Channel Capacity (m^3)	% Capacity	Cross Sectional Area (m^2)	Wetted Perimter (m)	Flow Depth (m)	Velocity (m/s)
Site to Dry Pond	100 Year	0.538	0.0050	3.000	0.75	0.50	Grass	0.03	1.16	47%	1.125	3.91	0.35	0.84
PR5 Conveyance Swale	100 Year	0.083	0.0050	3.000	0.0	0.30	Grass	0.03	0.17	48%	0.270	1.90	0.20	0.69

Weir Sizing Dry Pond

Project Name: 35 Industrial Drive
Project No: 22056

Designed By: LM
Date: 2023-04-28

Weir Parameters					
Type:[1]	Broad Crested Rectangular		Weir Invert:	199.8	m
Peak Flow:	0.538	m^3/s	Weir Height:	0.2	m
			Width:	4.5	m

Stage Discharge

Elevation (m)	Weir Flow (m^3/s)
199.80	0.000
199.85	0.086
199.90	0.243
199.95	0.446
200.00	0.686

Weir Overflow Results

Pond Elevation at Peak Flow:	199.970	m
Freeboard:	0.030	m
Velocity:	0.703	m/s

Notes:

1. Flows over rectangular broad crested weir calculated based on weir equations in MTO Drainage Manual Chapter 8, Section Flow Over Weirs and Notches.

Weir Sizing Bioretention

Project Name: 35 Industrial Drive
Project No: 22056

Designed By: LM
Date: 2023-04-28

Weir Parameters					
Type:[1]	Broad Crested Rectangular		Weir Invert:	203.6	m
Peak Flow:	0.239	m^3/s	Weir Height:	0.2	m
			Width:	2.5	m

Stage Discharge	
Elevation (m)	Weir Flow (m^3/s)
203.60	0.000
203.65	0.048
203.70	0.135
203.75	0.248
203.80	0.381

Weir Overflow Results		
Pond Elevation at Peak Flow:	203.746	m
Freeboard:	0.054	m
Velocity:	0.653	m/s

Notes:

1. Flows over rectangular broad crested weir calculated based on weir equations in MTO Drainage Manual Chapter 8, Section Flow Over Weirs and Notches.

Storm Sewer Design Sheet

Project Name: 35 Industrial Drive
Project No: 22056

Design Storm: 10 Year
Rain Station: Peterborough
Initial ToC: 10
Max Capacity: 80 %

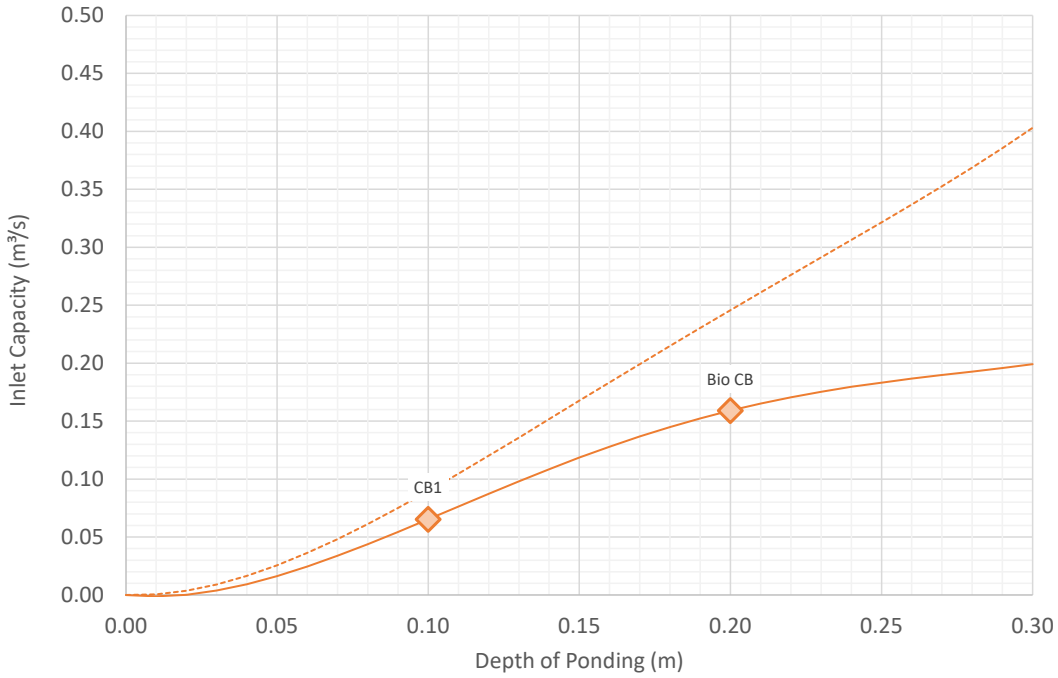
Designed By: LM
Date: 2023-04-27

Location			Hydrologic Parameters						Peak Flow			Pipe Properties					Hydraulics			
Location/Description	From Structure	To Structure	Area (ha)	Runoff Coefficient	A*C	Cumulative A*C	Time of Concentration (min)	Intensity (mm/hr)	Extraneous Flow (m^3/s)	Cumulative Extraneous Flow (m^3/s)	Total Peak Flow (m^3/s)	Pipe Diameter (mm)	Pipe Slope (%)	Pipe Length (m)	Pipe Material	Manning's Coefficient, n	Velocity in Sewer (m/s)	Pipe Capacity (m^3/s)	% Capacity	Actual Velocity (m/s)
PR 6	CB1	MH1	0.234	0.59	0.14	0.14	10.00	105.2	0.00	0.00	**0.040**	300	0.50	29.7	PVC	0.013	0.97	0.068	59.0%	1.01
	MH1	Bioretention	0.000	0.00	0.00	0.14	10.51	103.2	0.00	0.00	**0.040**	300	0.50	55.8	PVC	0.013	0.97	0.068	57.9%	1.00

Appendix H: Inlet Capacity Calculations

Inlet Capacity Design Sheet

Project Name: 292 Lansdowne St
Project Number: 21075
Date: 2023-04-27
Designer: LM



Inlet Parameters

Inlet ID	Inlet Type	Depth of Ponding (m)	Inlet Capacity (m^3/s)
CB1	Single	0.10	0.065
Bio CB	Single	0.20	0.159

Inlet capacity is based upon section 4.19 of the Ministry of Transportation drainage design standards.

Single OPSD Twin OPSD

Appendix I: Geotechnical Investigation

Geotechnical Investigation Report – Norwood Medical Centre - 35 Industrial Drive, Norwood, Ontario

2023-04-21

Prepared for:
2339213 Ontario Ltd.

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1.0 Introduction

Cambium Inc. (Cambium) was retained by Engage Engineering Ltd. on behalf of 2339213 Ontario Ltd. (Client) to complete a geotechnical investigation. The investigation is to assist in the design and construction of a proposed Medical Centre including a two-storey 1119.5m^2 building structure, associated parking areas, stormwater management, and an extension of Spruce Drive including watermain and sanitary sewer extensions, located at 35 Industrial Drive in Norwood, Ontario (Site). It is understood that the there is no basement proposed for the building. The facility is currently proposed to be located in the southeast portion of the Site, bounded by Spruce Drive and Maple Avenue East to the south, and Industrial Drive to the north. The Site is currently vacant and undeveloped with a relatively flat topography.

The geotechnical investigation was required to confirm existing subsurface conditions, including soil and groundwater, and prepare design and construction recommendations for the proposed development. A Site Plan, including site location and borehole locations, are included as Figure 1 and Figure 2 of this report.

At the time of writing this report, the actual finished floor elevations (FFE) were not provided. It is understood that this area of the Site will undergo some cut and fill during site preparation but should not exceed approximately +/- 1.0 m in change from the existing grades.

This report presents the methodology and findings of the geotechnical investigation at the Site and address requirements and constraints for the design and construction of the commercial development.

2.0 Methodology

2.1 Borehole Investigation

A borehole investigation was conducted on March 27, 2023 to assess the subsurface conditions at the Site. Nine (9) boreholes, designated as BH101-23 through BH109-23, were advanced throughout the Site to obtain subsurface conditions for geotechnical purposes. Three (3) of the boreholes, BH105-23, BH106-23, and BH107-23 were advanced within the proposed building footprint. The remaining boreholes were advanced within the proposed Spruce Drive extension, parking areas/driveway and stormwater management area. All boreholes, with the exception of borehole BH101-23, were terminated due to auger refusal on presumed bedrock at depths ranging between 1.9 m below ground surface (mbgs) to 3.1 mbgs. Borehole BH101-23 did not encounter bedrock to the termination depth of 3.5 mbgs.

The Site location and borehole locations are shown in Figure 1 and Figure 2 respectively. The locations and elevations of the boreholes were measured in the field using a Real Time Kinematic (RTK) survey unit. The boreholes elevations were tied to geodetic using a known benchmark/cosine monument station 00819668554B. The benchmark is a tablet set on the concrete bridge carrying Highway 45 over Ouse Creek in Norwood, ON, set horizontally in the west face of the north abutment, with a known elevation of 197.707 m above sea level (mASL).

Drilling and sampling was completed using a track-mounted drill rig under the supervision of a Cambium technician. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers with 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) N values were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive materials. Soil samples were collected at 0.75 m intervals up to 3.0 m depth and 1.5 m intervals beyond 3.0 m depth. The encountered soil units were logged in the field using visual and tactile methods and samples were placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage.

One (1) of the boreholes from the investigation, BH104-23 was outfitted as a monitoring well to allow for measurement of the static groundwater level at the Site. Open boreholes were checked for groundwater and general stability prior to backfilling. All boreholes were backfilled and sealed in accordance with Ontario Regulation (O.Reg.) 903, as amended.

Borehole logs are provided in Appendix A. Site soil and groundwater conditions are described, and geotechnical recommendations are discussed in the following sections of this report.

2.2 Physical Laboratory Testing

Physical laboratory testing, including five (5) particle distribution analyses (LS-702,705), was completed on selected soil samples to confirm textural classification, and assess geotechnical parameters. Moisture content testing was completed on all soil samples. Testing results are provided in Appendix B and are discussed in subsequent sections of this report.

2.3 Permeameter Testing

During the drilling investigation, Cambium completed in-situ permeameter testing in one (1) location predetermined by Engage Engineering Ltd, in the approximate area of the proposed Stormwater Management feature. The location of the permeameter/infiltration test is shown in Figure 2. The testing was performed to establish hydraulic conductivity of the natural soils and to provide and estimated infiltration rate.

The permeameter testing involved augering a hole to a required depth with a drill rig and outfitting the hole with a Guelph Permeameter (GP). The test consists of measuring the drop in water level from the device’s reservoir over time. The results provide the hydraulic conductivity of the soil as well as the estimated infiltration rate. The testing results are provided in Section 3.6.

3.0 Subsurface Conditions

Subsurface conditions at the Site are fairly consistent and comprise of a surficial topsoil layer overlying glacial till material with a gravelly sandy silt to gravel and sand texture, that extends to the borehole termination depths of 1.9 mbgs to 3.5 mbgs. The exception was a cohesive clayey silt to silt and clay soil that was encountered beneath the topsoil in borehole BH101-23 and extended to a depth of 2.2 mbgs where it transitioned to the glacial till soil. Auger refusal was encountered on presumed bedrock in all borehole locations, with the exception of borehole BH101-23, at depths between 1.9 mbgs and 3.1 mbgs.

The individual soil units are described in detail below and are shown on the borehole logs provided in Appendix A.

3.1 Topsoil

A surficial layer of topsoil was encountered in all 9 borehole locations. The topsoil thickness ranged from 50 mm to 600 mm with an average thickness of 310 mm.

Assessment of organic matter content or other topsoil quality tests were beyond the scope of this study. It is noted that the number of test holes was small when compared to the area of the Site. True delineation of the average topsoil thickness would require additional test pits spaced in a relatively tight grid pattern.

3.2 Clayey Silt to Silt and Clay

A clayey silt to silt and clay with trace sand layer was encountered beneath the topsoil in borehole BH101-23 and extended to 2.2 m depth. The cohesive soils were brown in colour and were generally about plastic limit (APL) at the time of the investigation, with natural moisture content varying from 19% to 33% based on laboratory testing. The clayey silt to silty and clay have a soft to firm consistency based on SPT N values of 4.

One (1) sample of the cohesive material was submitted to Cambium’s Materials Testing laboratory for particle size distribution analysis. The testing results are provided in and are summarized in Table 2 based on the Unified Soil Classification System (USCS).

Table 1 Particle Size Distribution Analysis – Cohesive Material

Borehole and Sample #	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay	% Moisture
BH101-23 SS2	0.6 – 1.2	Clayey Silt, trace sand, trace gravel	1	7	70	22	25.2

3.3 Glacial Till

Deposits of glacial till were encountered underlying the cohesive soils in borehole BH101-23 and beneath the surficial deposits of topsoil in all borehole locations.

Glacial till is naturally a heterogeneous mixture of all grain sizes and will vary across the Site slightly. At this Site, the glacial till is composed of a gravelly sandy silt to gravel and sand with various amounts of silt and clay and frequent cobbles throughout. The glacial till extends to the borehole termination depths, where presumed bedrock was encountered, at depths ranging from 1.9 mbgs to 3.5 mbgs. The till soils were brown in colour and were generally dry to moist at the time of the investigation, with natural moisture content varying from 4% to 13%. Wet soils were encountered in borehole BH101-23 at a depth of 2.2 mbgs during drilling operations. The relative density of the glacial till was generally compact to dense based on SPT N values ranging from 10 to greater than 50 blows per 305 mm of penetration. Loose glacial till soils were encountered to a depth of 1.4 mbgs in borehole BH107-23, and to a depth of 0.5 mbgs in boreholes BH103-23 and BH106-23.

Four (4) samples of the glacial till soils submitted to Cambium’s Materials Testing laboratory for particle size distribution analyses. The testing results are provided in and are summarized in Table 2 based on the Unified Soil Classification System (USCS).

Table 2 Particle Size Distribution Analysis – Glacial Till

Borehole and Sample #	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay	% Moisture
BH103-23 SS3	1.5 – 2.1	Silty Sand, some gravel, trace clay	15	44	33	7	4.9
BH106-23 SS2	0.6 – 1.2	Sandy Gravel, some silt, trace clay	46	31	19	4	5.5
BH107-23 SS2	0.6 – 1.2	Gravelly Sandy Silt, trace clay	27	27	39	7	12.8
BH109-23 SS2	0.6 – 1.2	Sandy Silty Gravel, some clay	39	28	22	11	5.6

3.4 Bedrock

Eight (8) of the boreholes were terminated due to auger refusal on presumed bedrock at depths between 1.9 mbgs and 3.1 mbgs. The remaining borehole, BH101-23, was terminated a depth of 3.5 mbgs in subgrade soils. The depth to bedrock and bedrock elevation is summarized in Table 3. Overall, the bedrock elevation varies from 203.42 m ASL to 201.13 mASL. Coring the bedrock was not part of the scope of work for this project.

Table 3 Depth and Elevation of Presumed Bedrock

Borehole	Borehole Elevation (mASL)	Depth to Bedrock (mbgs)	Bedrock Elevation (mASL)
BH102-23	204.08	1.93	202.15
BH103-23	203.43	2.29	201.14
BH104-23	205.07	2.03	203.04
BH105-23	204.25	1.88	202.37
BH106-23	205.16	1.93	203.23
BH107-23	205.22	2.87	202.35
BH108-23	205.27	3.12	202.12
BH109-23	205.35	1.93	203.42

3.5 Groundwater

All boreholes were open, and dry upon drilling completion with the exception of borehole BH101-23 which encountered groundwater seepage at a depth of 1.7 mbgs (199.51 mASL)

upon drilling completion. It should be noted that borehole BH101-23 was advanced in an existing low grade area, and the surficial elevation is the lowest of all boreholes. The groundwater elevation of 199.51 mASL in borehole BH101-23 was lower than all of the remaining borehole termination depths.

Borehole BH104-23 was outfitted as a monitoring well, in a pre-determined location by Engage Engineering Ltd., within the area of the proposed stormwater management feature. The monitoring well was surveyed and utilized to measure the static groundwater level at the Site. The monitoring well was dry upon drilling completion and again on April 12, 2023 (lower than 2.03 mbgs or 203.04 mASL).

All soils within the investigation were brown in colour; grey soils were not encountered. Grey colour of the soil would indicate prolonged exposure to groundwater, providing reducing, anoxic conditions.

Based on these observations, the groundwater table at the Site appears to be lower than 203.04 mASL elevation, approximately at 199.51 mASL, which appears to be mostly within the bedrock depths at the Site, especially within the proposed building footprint area.

It should be noted that soil moisture and groundwater levels are affected by seasonal climatic conditions, due to changing precipitation and evaporation rates.

3.6 Permeameter Testing

The results of the GP testing have been outlined in Tables 4 and 5. The hydraulic conductivities determined from the GP testing were assigned corresponding infiltration rates and percolation times as per the Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario (Ontario Ministry of Municipal Affairs and Housing, 1997). The testing was completed at the predetermined location, immediately adjacent to borehole BH103-23, at a predetermined depth of 2.0 mbgs. The infiltration testing location is shown in Figure 2. The soil at this location and depth was a silty sand, some gravel, trace clay glacial till. The soil was dry to moist at the time of the investigation.

Table 4 Guelph Permeameter Testing Results

Infiltration Location	Testing Depth (mbgs)	Soil at Testing Depth	Hydraulic Conductivity (m/s)	Percolation Time (min/cm)	Infiltration Rate (mm/hr)
BH103-23	2.0	Silty Sand, some gravel, trace clay	4.18×10^{-6}	9	67

The infiltration rates used to design a stormwater infiltration system to best management practice (BMP) are given a safety correction factor that compensates for the change in soil strata and permeability within 1.5 m below the bottom of the BMP, potential reductions in soil permeability due to compaction or smearing during construction, and gradual accumulation of fine sediments over the lifespan of the BMP. A safety factor of 2.5 has been given to determine the design infiltration rate in Table 5 below.

Table 5 Design Infiltration Rate

Infiltration Location	Testing Depth (mbgs)	Infiltration Rate (mm/hr)	Safety Correction Factor	Design Infiltration Rate (mm/hr)
BH103-23	2.0	67	2.5	27

4.0 Geotechnical Considerations

The following recommendations are based on the borehole information and are intended to assist designers. Recommendations should not be construed as providing instructions to contractors, who should form their own opinions about site conditions. It is possible that subsurface conditions beyond the borehole locations may vary from those observed. If significant variations are found before or during construction, Cambium should be contacted so that we can reassess our findings, if necessary.

4.1 Site Preparation

All topsoil, organic soil and any other non-natural material should be excavated and removed from areas of the Site to be developed. The subgrade should be inspected by a qualified Geotechnical Engineer and proof rolled prior to backfilling up to required grades. Any loose soils identified at the time of the inspection that are unable to be uniformly compacted should be subexcavated and removed. The excavations created through the removal of these materials should be backfilled with approved engineered fill consistent with the recommendations provided herein.

The near surface silt soils can be very unstable if they are wet or saturated. Such conditions are common in the spring and late fall. Under these conditions, temporary use of granular fill and possible reinforcing geotextiles, may be required to prevent severe rutting on construction access routes.

4.2 Frost Penetration

Based on climate data and design charts, the maximum frost penetration depth below the pavement at the Site is estimated at 1.5 mbgs.

Footings for the proposed building structure should be situated below this depth for frost protection or should be protected with insulation.

It is assumed that any pavement structure thickness will be less than 1.5 m; therefore, grading and drainage are important for good pavement and life expectancy. Any services/utilities should be located below this depth or be appropriately insulated.

4.3 Excavations and Shoring

All excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). The loose to dense native soils may be classified as Type 3 soils above the groundwater table and may be excavated with unsupported side slopes no steeper than 1H:1V or have shoring. Excavations below the groundwater table may be classified as Type 4 soils in accordance with OHSA with unsupported side slopes no steeper than 3H:1V, or the excavation should be fully supported (shored).

Test excavations should be carried out prior to construction to assess soil integrity and water levels to determine shoring requirements. If shoring is required, options would be Soldier piles and lagging (provided the bottom of the lagging does not extend below the groundwater table), interlocking sheet piles or interlocking caissons.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs on instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions or excavation sidewalls must be fully supported (shored).

Larger size particles, such as cobbles and boulders may be encountered within the subgrade material. The size and distribution of such obstructions cannot be predicted during a limited investigation, however should be anticipated.

If bedrock needs to be removed to install underground utilities, excavations will likely require a hoe ram and/or blasting depending on the degree of fracturing of the bedrock.

Excavations made into bedrock can be cut vertically, provided that the rock faces are scaled and maintained to preclude the possibility of spalling. Where this is not possible, in areas

where workers and/or equipment must enter the excavation, a protective mesh can be draped over the rock face. Alternatively, a trench box can be used in narrow excavation.

4.4 Dewatering

Based on the above observations, the groundwater table at the Site is approximately at 199.51 mASL in elevation. Only borehole BH101-23 encountered groundwater seepage upon drilling completion; all remaining boreholes were dry. As such, excavations for the installation of conventional strip and spread footings should not encounter significant groundwater seepage. Depending if grades are to be cut in the proposed Spruce Drive extension footprint (boreholes BH101-23 and BH102-23), groundwater seepage could be encountered during the excavations for the installation of the underground utilities assuming they will be installed at a minimum depth of 1.5 mbgs.

Any perched groundwater or minor infiltration of groundwater should be controllable with filtered sumps and pumps within the excavations. Registration on the Environmental Activity and Sector Registry (EASR) or a Permit to Take Water (PTTW) is likely not required from the Ministry of the Environment, Conservation and Parks (MOECP) as pumping rates should not exceed 50,000 L/day or 400,000 L/day respectively. However, if grades are to be cut in the proposed Spruce Drive extension, depending on construction season, advanced dewatering through a well point system may be required to install the proposed watermain and sewers at a depth of 1.5 mbgs. Advanced dewatering will require a PTTW and/or registration on the EASR.

It would be recommended to minimize cutting down the grades in the Spruce Drive extension footprint, specifically in the borehole BH101-23 area, to avoid advanced dewatering if the watermain/sewer are to be installed here, and/or potentially excavating into the bedrock as described in Section 4.3.

It should be noted that the groundwater table is influenced by seasonal fluctuations and major precipitation events.

4.5 Backfill and Compaction

Any existing vegetation, topsoil, organic and non-organic fills, and any loose soils shall be removed down to a competent base. Excavated till soils below the topsoil from the Site may be appropriate for use as fill below grading areas, provided that the actual or adjusted moisture content at the time of construction is within a range that permits compactions to required densities. Backfill areas must be approved by a qualified geotechnical engineer prior to placement of any new fill, to ensure suitability of subgrade conditions.

Geotechnical inspections and testing of engineered fill are required to confirm acceptable quality.

Any engineered fill should consist of free-draining granular material meeting the specifications of OPSS 1010 Granular B or an approved equivalent and should be placed in 200 mm thick lifts compacted to a minimum of 98% of standard Proctor maximum dry density (SPMDD). In the event that conditions are wet at the time of construction, compaction of granular fill may not be possible and 19 mm diameter crushed clear stone wrapped in a geotextile fabric (Terrafix 270R or equivalent) should be used in place of engineered fill when placed atop native soils.

Foundation wall backfill, any buried utility backfill and any backfill below foundations should consist of imported, free-draining granular material meeting the specifications of OPSS 1010 Granular B, or an approved equivalent, compacted to 98% of SPMDD. Backfill adjacent to the structural elements (i.e., foundations walls) should be compacted to 95% of SPMDD taking care not to damage the adjacent structures.

Placement of trench backfill shall be completed in lifts not exceeding 200 mm in thickness, or appropriate to the type of compaction equipment used, and be compacted to 98% of SPMDD, confirmed by nuclear densometer testing. The degree of compaction should be increased to 100% of SPMDD within the upper 300 mm and 500 mm below the pavement subgrade elevation for the building/parking area and Spruce Drive extension respectively.

Placement of engineered fill should be verified by onsite compaction testing during construction.

4.5.1 Engineered Fill

Where the fill material is treated as an engineered fill to support structural elements such as foundations and/or floor slabs the following is recommended:

I. Remove any and all existing vegetation, surficial topsoil / organics, organic fills or fills and any loose/disturbed soils to a competent subgrade for a suitable envelope.

II. The area of the engineered fill should extend horizontally 1 m beyond the outside edge of the foundations then extend downward at an imaginary 1H:1V slope to the competent approved native soil. The exposed edges of the engineered fill should be sloped at a maximum of 3H:1V to avoid weakening of the engineered fill edges due to slope movement. If fill is required adjacent to sloped banks (i.e., slope steeper than 3H:1V), the fill shall be placed in stepped planes to avoid a plane weakness.

III. The subgrade or base of the engineered fill area must be approved by Cambium prior to placement of any new fill, to ensure that suitability of subgrade condition.

IV. Place approved OPSS 1010.MUNI SSM or Granular ‘B’ Type I material at a moisture content at or near optimum moisture in suitable maximum 200 mm thick lifts, compacted to 98% of SPMDD. If native soils from the site are not used as engineered fill, imported material for engineered fill should consist of clean, non-organic soils, free of chemical contamination or deleterious material. Any frost penetration into the fill material must be removed prior to placement of subsequent lifts of fill and reviewed by Cambium.

V. The engineered fill should be placed at least 600 mm above the elevation of the proposed underside of footing.

VI. Due to the potential negative effects of differential settlement between the engineered fill and the native soils, in any block where footings are to be placed partly on engineered fill and partly on native soils, reinforcing steel bars should be included and placed within the footings and the top of the foundation walls. All tie reinforcing steel bars should be included and placed within the top of the foundation walls. All tie

reinforcing steel bars should have at least 600 mm of overlap. The actual steel reinforcement design should be confirmed / designed by the project structural engineer.

VII. Full time testing and inspection of the engineered fill will be required for it to be used as a founding material, as outlined in Section 4.2.2.2 of the Ontario Building Code.

4.6 Foundation Design

Assuming that the Site is prepared as outlined above and the grades are to remain relatively consistent with the existing at the time of the investigation, the Medical Centre building may be founded on conventional strip and spread footings, founded below the frost penetration depth on native soils or bedrock. Exterior footings can be placed on the undisturbed compact to dense native glacial till textured soils at a minimum depth of 1.5 mbgs (below final adjacent grade for frost protection). Footings on these soils may be designed for an allowable bearing capacity of 150 kPa at serviceability limit state (SLS) and 225 kPa at ultimate limit state (ULS). Settlement potential at the noted SLS loadings is less than 25 mm and differential settlement should be less than 10 mm.

Interior footings in heated areas may be set on approved engineered fill at a depth of 0.5 m below the floor slab. Design loadings for interior footings on engineered fill are 150 kPa (SLS) and 225 kPa (ULS).

Alternatively, the conventional strip and spread footings can be founded on the encountered limestone bedrock, especially if grades are to be cut approximately 1.0 m within the proposed building footprint area. In boreholes BH105-23, BH106-23 and BH107-23, bedrock was encountered between depths 1.9 mbgs to 2.9 mbgs (203.2 mASL to 202.4 mASL). However, if the existing grades were to be cut approximately 1.0 m, the depths to bedrock would be 0.9 mbgs to 1.9 mbgs. In this scenario, it would especially be recommended to set all footings on clean, smooth bedrock free of debris and weathering for optimal bearing capacity. The limestone bedrock may be designed for an allowable bearing capacity of 800 kPa at ULS. This bearing capacity should be confirmed upon exposure of bedrock of bedrock during excavations. Footings on clean, unweathered bedrock will not require 1.5 m of soil cover for frost protection. Any loose, weathered rock present at footing depth for the proposed building

should be scraped and cleaned to provide a smooth bearing surface for footing placement. Settlement of footings set on bedrock will negligible, so SLS resistances are not relevant.

The building may also be founded on engineered fill consisting of OPSS 1010 Granular A or B Type 1 or 2 material with a maximum thickness of 300 mm overlying the limestone bedrock. Any granular fill beneath the foundation for the proposed building shall be compacted in maximum 200 mm thick lifts to at least 98% SPMDD. Granular B Type 1 or 2 material placed and compacted beneath the footings may also be designed for an allowable bearing capacity of 150 kPa at SLS and 225 kPa at ULS. Granular A material placed and compacted beneath the footings may be designed for an allowable bearing capacity of 200 kPa at SLS and 300 kPa at ULS. All Granular material beneath the footings must be placed on sound bedrock with a 0.6 m overbuild on each side of the footing. If any 19 mm diameter crushed clear stone is used in place of Granular material beneath the footing lines it will additionally need to be wrapped in geotextile filter (Terrafix 270R or equivalent) extending along the base and up the side walls of the place fill.

Placement of granular fill should be verified by onsite compaction tests during construction. The quality of the subgrade (most notably around BH107-23) and bedrock should be inspected by Cambium during construction, prior to constructing the footings, to confirm bearing capacity estimates and identify any loose bearing soils that would need to be subexcavated and replaced with suitable engineered fill as identified in Section 4.5 (if footings are founded on native soils).

4.7 Floor Slabs

The floor slab should be constructed on a minimum of 200 mm of OPSS 1010 Granular A compacted to 100% of SPMDD in order to create a stable working surface, to distribute loadings, and for drainage purposes. Subgrade soils should be leveled, proof-rolled, and inspected by a Geotechnical Engineer. Any soft or loose areas identified would need to be subexcavated.

Within any interior areas that may be exposed to freezing conditions for extended periods of time, the floor slab may be susceptible to frost heaving, depending on the composition of the

subgrade. The subgrade underlying these areas should be adequately insulated to prevent frost penetration.

4.8 Subdrainage

Given that groundwater was not encountered within the proposed building footprint, and assuming no basement will be constructed, foundation subdrains are not required around the perimeter of the building foundation, provided that the underside of the floor slab is at least 200 mm above the prevailing grade of the Site and the surrounding surfaces are sloped away from the building at a minimum gradient of 2%.

4.9 Buried Utilities

Trench excavations above the groundwater table should generally consider Type 3 soil conditions, which require side slopes no steeper than 1H:1V.

Any services/utilities should be located 1.5 m below final grade or be appropriately insulated. Assuming the buried utilities are installed at or below 1.5 m below final grade, the utilities are to be founded on the generally compact native soil or on bedrock. Both are competent to support the placement of the bedding material, provided geotechnical inspection during construction to confirm the subgrade conditions and the integrity of the base of the trench and subgrade can be maintained during construction.

Bedding and cover material for any services should consist of OPSS 1010-3 Granular A or B Type II, placed in accordance with pertinent Ontario Provincial Standard Drawings (OPSD 802.013) in dry conditions. The bedding and cover material shall be placed in maximum 200 mm thick lifts and should be compacted to at least 98% SPMDD. The bedding should consist of at least 150 mm of Granular A. Depending upon the invert elevations and success of the contractor’s groundwater control methods (if any), a thicker of bedding layer (300 mm) may be required at some locations where wet/soft or loose soil conditions are present. The cover material shall be a minimum of 300 mm over the top of the pipe and compacted to 98% SPMDD, taking care not to damage the utility pipes during compaction. In wet conditions where compaction of Granular A or B is not possible, 19 mm diameter crushed clear stone

wrapped in a geotextile filter fabric should be used for bedding. Trench backfill should consist of native, non-organic, non-cohesive soils from the excavation that are at a moisture content that will allow proper compaction or OPSS SSM or Granular B compacted in lifts up to the road subgrade level.

4.10 Manhole Structures

Any manhole structures should be designed to resist hydrostatic uplift pressure and buoyancy for an assumed water level at the regional flood level. The uplift forces pressure and resisting forces should be evaluated at detailed design stage. The frost depth at the Site if 1.5 m and the requirements for waterproofing of the manhole structures should be assessed by the designer. Free draining material, that is having less than 5% fines, should be used as backfill adjacent to the manhole structures. In the unlikely event that cohesive soils are used as backfill to control upward groundwater pressures, the hydrostatic pressure acting on the manhole should be considered in the manhole design together with any active earth pressures.

4.11 Seismic Site Classification

The Ontario Building Code (OBC) specifies that the structures should be designed to withstand forces due to earthquakes. For the purpose of earthquake design, geotechnical information shall be used to determine the “Site Class”.

The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the OBC (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the Site stratigraphy, where shear wave velocity (V_s) measurements have been taken. Alternatively, the classification is estimated based on rational analysis of undrained shear strength (S_u) or penetration resistances (N_{60} values).

Based on the explored subsurface properties, it is recommended that Site Class “C” (very dense soil and soft rock) be applied for the structural design at the Site. It is assumed that the soils/bedrock encountered in the samples retrieved remain continuous to a minimum depth of 30 m below the bottom of any foundations. If Site Class “B” or “A” is required or would be

preferable, consideration could be given to carrying out shear wave velocity testing (Multichannel Analysis of Surface Waves, “MASW”) to evaluate whether an improved seismic site class can be obtained. Further details regarding shear wave velocity testing could be provided upon request.

4.12 Pavement Design

The performance of the pavement is dependent upon proper subgrade preparation. All topsoil and organic materials within the upper 1.0 m should be removed from the site and backfilled with approved engineered fill or native material, compacted to 98% of SPMDD. The subgrade should be proof rolled and inspected by a Geotechnical Engineer. Any areas where boulders, rutting, or appreciable deflection is noted should be sub excavated and replaced with suitable fill. The fill should be compacted to at least 98% of SPMDD.

Deposits of soft/loose material or organic material will be encountered and require subexcavation. Provisions for this additional subexcavation should be anticipated.

The most severe loading conditions on pavement subgrades may occur during construction, and subgrades may become disturbed due to construction operations. Therefore, the recommended pavement structure provided may not be adequate due to the presence of localized disturbed areas and it may be necessary to increase the thickness of the Granular B Type ll subbase and/or incorporate a woven geotextile separator between the subgrade surface and the granular base. The requirement for an increase in the pavement structure and/or incorporating geotextile will be evaluated by Cambium personnel during proof roll inspections.

The pavement structure recommended in Table 6 below assumes that the subgrade will be prepared as described above.

Table 6 Recommended Minimum Pavement Structure

Pavement Layer	Light Duty (Parking Areas and Spruce Drive extension)	Heavy-Duty (Emergency Routes, if any, and truck traffic)
Surface Course Asphalt	40 mm HL3 or HL4	40 mm HL3 or HL4
Binder Course Asphalt	50 mm HL8	70 mm HL8
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	300 mm OPSS 1010 Granular B	400 mm OPSS 1010 Granular B

Material and thickness substitutions must be approved by the Design Engineer.

The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement. Asphalt materials should be rolled and compacted as per OPSS 310.

Compaction of the subgrade should be verified by the Engineer prior to placing the granular fill. Granular layers should be placed in 150 mm thick maximum loose lifts and compacted to at least 98% of SPMDD.

The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing.

The final asphalt surface should be sloped at a minimum of 2% to shed runoff. Abutting pavements should be saw cut to provide clean vertical joints with new pavement areas.

4.13 Design Review and Inspections

Testing and inspections should be carried out during construction operations to examine and approve subgrade conditions, placement and compaction of fill materials, granular base courses, and asphaltic concrete. Concrete used during construction should also be tested for slump, air entrainment and compressive strength.

We should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at this site for excavation and backfill procedures, deleterious soil removal, subgrade inspections and compaction and concrete testing.

5.0 Closing

We trust that the information contained in this report meets your current requirements. If you have any questions or comments regarding this document, please contact the undersigned at 705-752-7900.

Respectfully submitted,

Cambium Inc.

Prepared by:

Juan Monroy, P.Eng.
Project Coordinator

Reviewed by:

Stuart Baird, M.Eng., P.Eng.
Director – Geotechnical and Construction Monitoring

SEB/jdm

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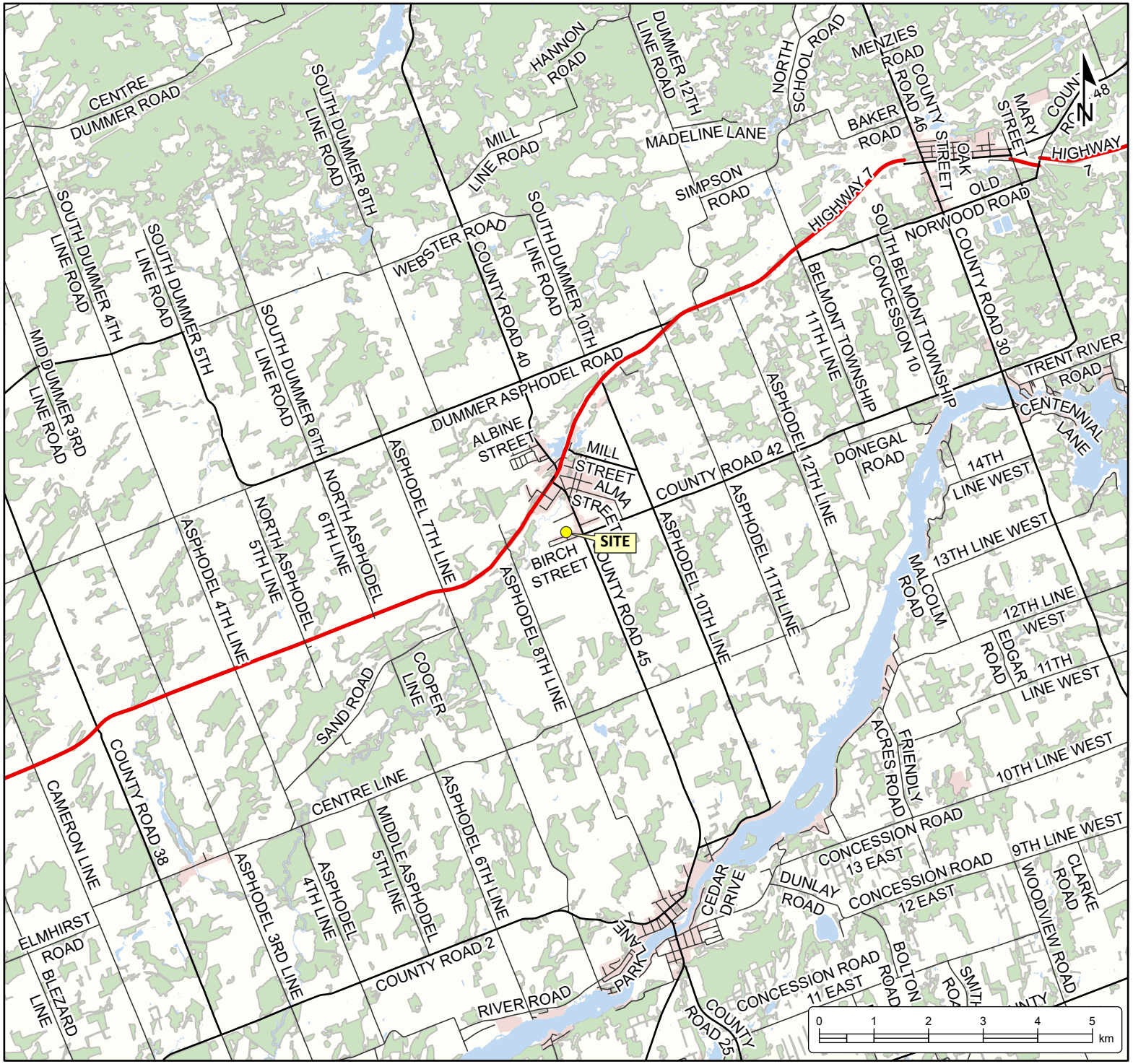
Appended Figures



GEOTECHNICAL INVESTIGATION

2339213 ON LTD.
35 Industrial Drive,
Norwood, Ontario

LEGEND

- Highway
- Major Road
- Minor Road
- Provincial Park
- Water Area
- Wooded Area
- Federal Protected Areas
- Built Up Area

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2019 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

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SITE LOCATION MAP

Project No.: 17291-001		Date: April 2023	Rev.:
Scale: 1:100,000		Projection: NAD 1983 UTM Zone 17N	
Created by: MAT	Checked by: JM	Figure: 1	

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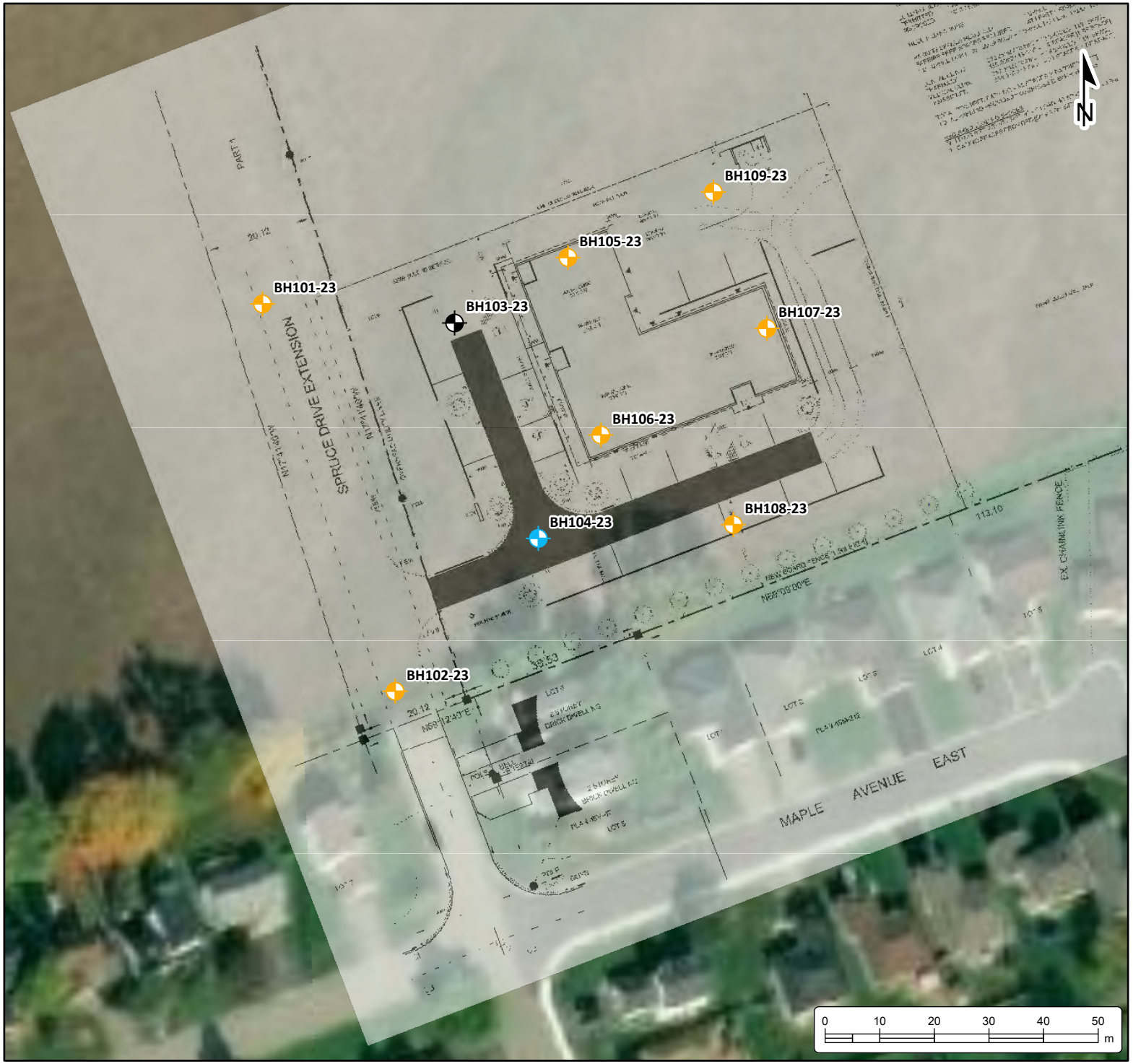
GEOTECHNICAL INVESTIGATION

2339213 ON LTD.
35 Industrial Drive,
Norwood, Ontario



LEGEND

- Benchmark
- Borehole
- Borehole / Infiltration Test
- Monitoring Well

Notes:
- Site Plan overlay was created by Aside Architects Inc., for Norwood Medical, drawing no. a 1.0, dated March 17, 2023
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Benchmark:
BM1 - COSINE vertical control benchmark 00819668554B, elevation of 197.707 (GCVD2013)

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BOREHOLE LOCAITON PLAN

Project No.: 17291-001		Date: April 2023 Rev.:	
Scale: 1:1,000		Projection: NAD 1983 UTM Zone 17N	
Created by: MAT	Checked by: JM	Figure:	2

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Appendix A
Borehole Logs

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Log of Borehole: BH101-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262725.64 E, 4917808.56 N	**Elevation:**	201.19 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
202 / -1										
201 / 0		TOPSOIL: 150 mm thick topsoil layer	1A	SS						
		CLAYEY SILT: Brown, clayey silt, trace sand, trace gravel, at plastic limit, soft to firm	1B	SS	33	4				
200 / 1			2	SS	75	4				SS2 GSA: 1% gravel 7% sand 70% silt 22% clay
		SILT AND CLAY: Brown, silt and clay, trace sand, trace gravel, at plastic limit, soft to firm	3	SS	100	4				Groundwater first encountered at 1.52 mbgs Water level at 1.68 mbgs upon completion
199 / 2		TILL: (TILL) Brown, gravel and sand, trace silt, wet, compact	4	SS	58	22				Cobble beginning at 2.29 mbgs
198 / 3		-coarse sand in tip of spoon	5	SS	42	20				No caving occurred upon completion
		Borehole terminated at 3.51 mbgs in gravel and sand till								

Logged By: J. Riseling **Input By:** J. Riseling

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Log of Borehole: BH102-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262744.70 E, 4917735.99 N	**Elevation:**	204.08 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
205 / -1										
204 / 0		TOPSOIL: 50 mm thick topsoil layer	~~1A~~	~~SS~~						
		TILL: (TILL) Brown, sandy gravel, some silt, trace clay, moist, compact	1B	SS	42	14				
203 / -1			2	SS	33	17				Cobble throughout
		-becomes dry to moist	3	SS	50	50/ 400				Borehole open and dry upon completion
202 / -2		Borehole terminated at 1.93 mbgs on presumed bedrock								
201 / -3										

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Log of Borehole: BH103-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262760.48 E, 4917802.50 N	**Elevation:**	203.43 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
204 / -1										
203 / 0		TOPSOIL: 300 mm thick topsoil layer	1A	SS	58	3				
		TILL: (TILL) Brown, silty sand, some gravel, trace clay, moist, very loose	1B	SS						
202 / 1		-becomes light brown, dry to moist, dense	2	SS	67	37				Cobble throughout
201 / 2		-becomes dry	3	SS	50	42				SS3 GSA: 16% gravel 44% sand 33% silt 7% clay
200 / 3		Borehole terminated at 2.29 mbgs on presumed bedrock								Borehole open and dry upon completion

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Log of Borehole: BH104-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262772.90 E, 4917762.01 N	**Elevation:**	205.07 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
205 / 0		TOPSOIL: 200 mm thick topsoil layer	1A	SS					Cap	
		TILL: (TILL) Brown, sandy gravel, some silt, trace clay, moist, compact	1B	SS	58	10			Monument	
									PVC Riser	
204 / 1		-becomes dry to moist, dense	2	SS	58	32			Bentonite Plug	Cobble throughout
									Sand Pack	
									PVC Screen	
203 / 2		-becomes very dense	3	SS	40	50/ 500			Cap	Borehole open and dry upon completion
		Borehole terminated at 2.03 mbgs on presumed bedrock								No water level found when measured on April 12, 2023
202 / 3										

Logged By: J. Riseling **Input By:** J. Riseling

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Log of Borehole: BH105-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262782.07 E, 4917812.95 N	**Elevation:**	204.25 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
205 / -1										
204 / 0		TOPSOIL: 250 mm thick topsoil layer	1A	SS						
		TILL: (TILL) Brown, sandy silty gravel, some clay, moist, compact	1B	SS	58	12				
		-becomes dense	2	SS	67	42				Cobble throughout
203 / 1										
		-becomes dry to moist, very dense	3	SS	50	50/ 350				Borehole open and dry upon completion
202 / 2		Borehole terminated at 1.88 mbgs on presumed bedrock								
201 / 3										

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Log of Borehole: BH106-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262785.71 E, 4917780.08 N	**Elevation:**	205.16 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
206 / -1										
205 / 0		TOPSOIL: 350 mm thick topsoil layer	1A	SS	62	5				
		TILL: (TILL) Brown, sandy gravel, some silt, trace clay, moist, loose	1B	SS						
204 / -1		-becomes dry to moist, light brown, compact	2	SS	50	19				SS2 GSA: 46% gravel 31% sand 19% silt 4% clay
										Cobble throughout
203 / -2		-becomes very dense	3	SS	62	50/ 400				
		Borehole terminated at 1.93 mbgs on presumed bedrock								Borehole open and dry upon completion
202 / -3										

Logged By: J. Riseling **Input By:** J. Riseling

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Log of Borehole: BH107-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262817.48 E, 4917797.32 N	**Elevation:**	205.22 mASL

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
205 / 0		TOPSOIL: 600 mm thick topsoil layer	1	SS	50	2				
204 / 1		TILL: (TILL) Brown, gravelly sandy silt, trace clay, moist, loose	2	SS	75	7				SS2 GSA: 27% gravel 27% sand 39% silt 7% clay
203 / 2		TILL: (TILL) Brown, sandy gravel, some silt, trace clay, moist, dense	3	SS	25	30				Cobble beginning at 1.52 mbgs
		-becomes dry to moist, very dense	4	SS	78	50/ 575				Borehole open and dry upon completion
202 / 3		Borehole terminated at 2.87 mbgs on presumed bedrock								

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Log of Borehole: BH108-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262808.71 E, 4917761.90 N	**Elevation:**	205.27 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
206 / -1										
205 / 0		TOPSOIL: 600 mm thick topsoil layer	1	SS	33	3				
204 / 1		TILL: (TILL) Light brown, sandy gravel, some silt, trace clay, dry to moist, dense	2	SS	33	36				Cobble beginning at 0.9 mbgs
		-becomes very dense	3	SS	50	56				Borehole open and dry upon completion
203 / 2		-becomes dry, dense	4	SS	50	45				
202 / 3		-becomes very dense	5	SS	56	50/ 225				
		Borehole terminated at 3.12 mbgs on presumed bedrock								

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Log of Borehole: BH109-23

Client:	2339213 ON Ltd	**Project Name:**	GEO - 35 Industrial Drive, Norwood	**Project No.:**	17291-001
Contractor:	ACE Drilling	**Method:**	Solid Stem Auger	**Date Completed:**	March 27, 2023
Location:	35 Industrial Drive, Norwood	**UTM:**	18T 262809.53 E, 4917822.96 N	**Elevation:**	205.35 mASL

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
205 / 0		TOPSOIL: 300 mm thick topsoil layer	1A	SS	58	10				
		TILL: (TILL) Brown, sandy silty gravel, some clay, moist, compact	1B	SS						
		-becomes light brown, dry to moist	2	SS	50	26				SS2 GSA: 39% gravel 28% sand 22% silt 11% clay
204 / 1										
		-becomes very dense	3	SS	88	50/ 400				Cobble throughout
203 / 2		Borehole terminated at 1.93 mbgs on presumed bedrock								Borehole open and dry upon completion
202 / 3										

Logged By: J. Riseling **Input By:** J. Riseling

Appendix B
Physical Laboratory Testing Results

Grain Size Distribution Chart

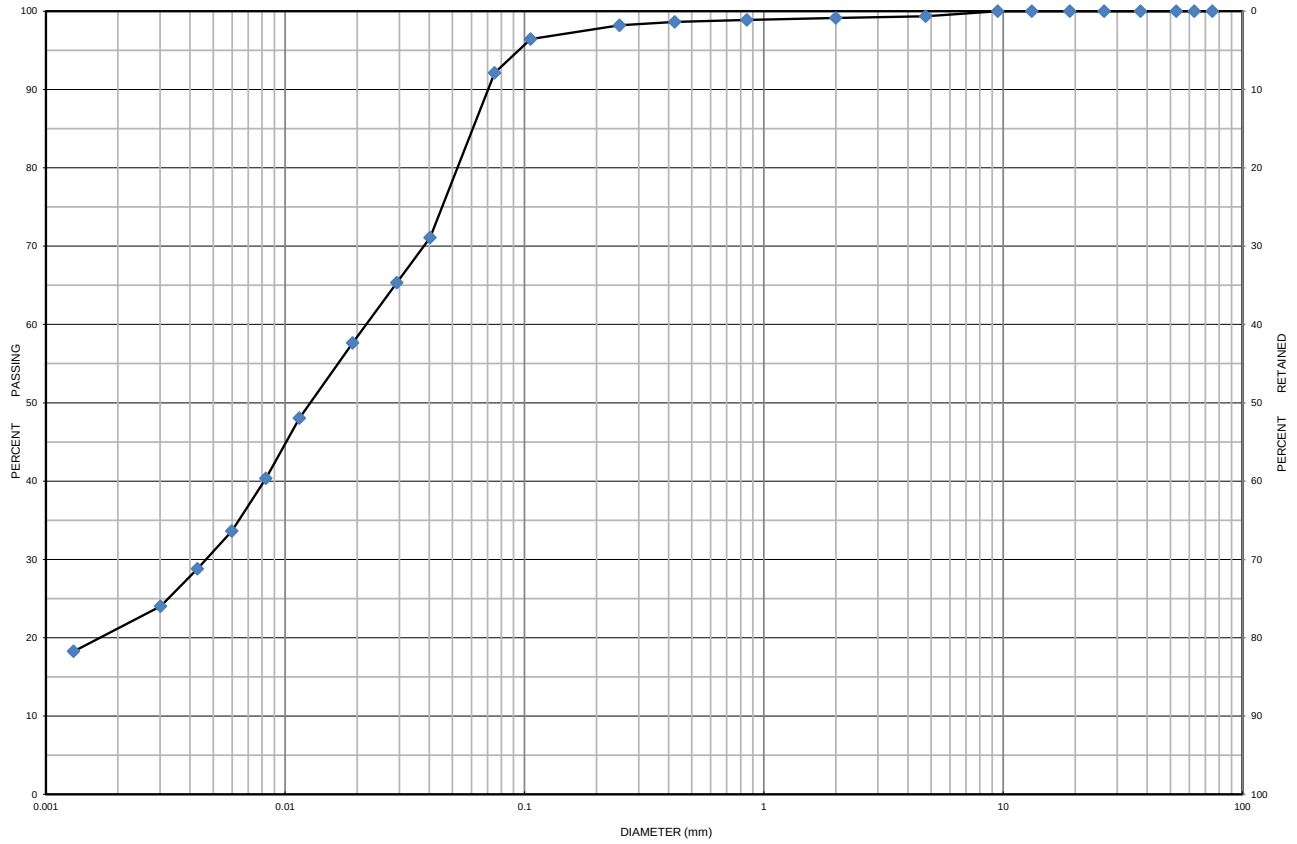
Project Number: *17291-001* **Client:** *2339213 Ontario Ltd*

Project Name: *35 Industrial Drive, Norwood*

Sample Date: *March 27, 2023* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 101-23 SS 2* **Depth:** *0.6 m to 1.2 m* **Lab Sample No:** *S-23-0557*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-23	SS 2	0.6 m to 1.2 m	1	7	70	22	25.2

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Clayey Silt trace Sand trace Gravel	ML	0.0220	0.0046	-	-	-

Additional information available upon request

Issued By: _____ *Date Issued:* *April 4, 2023*

(Senior Project Manager)

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Grain Size Distribution Chart

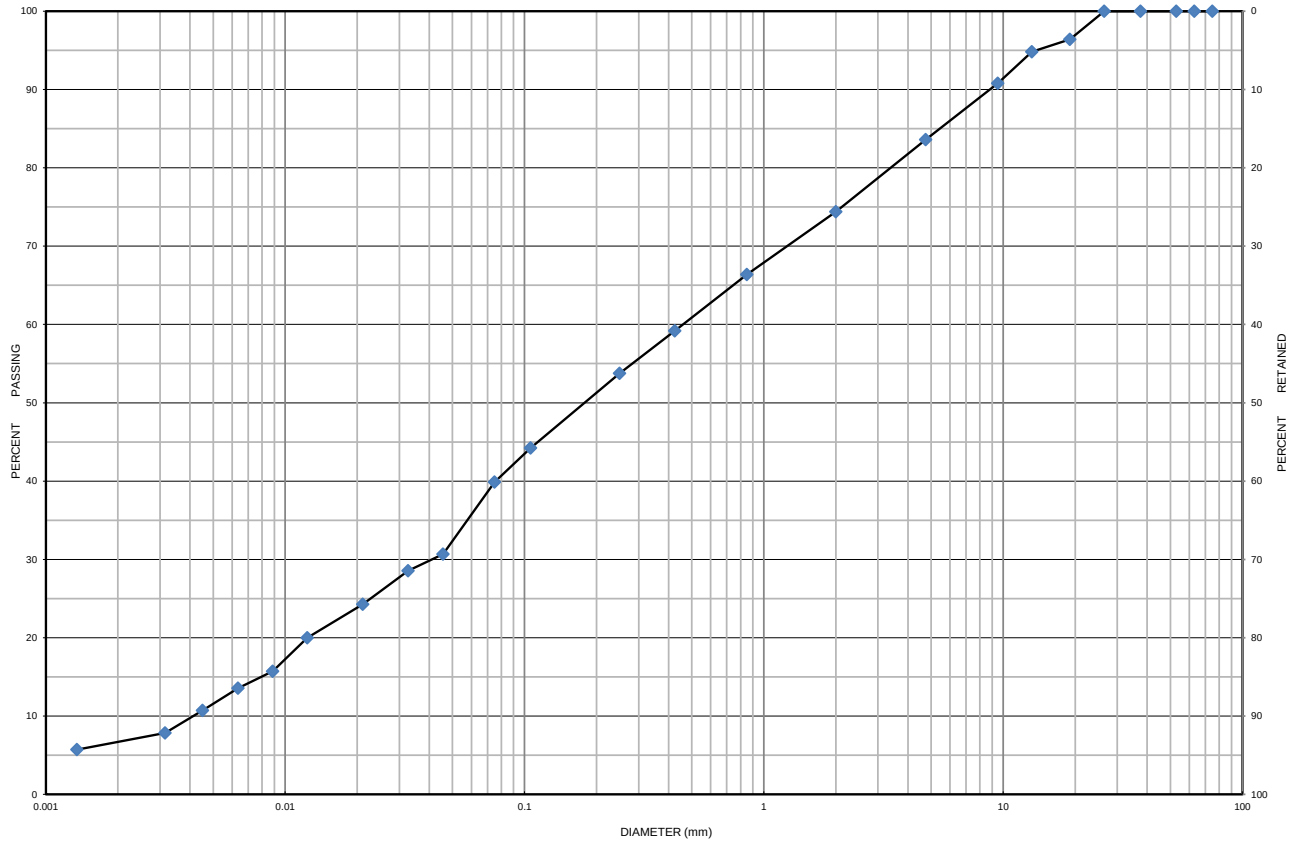
Project Number: *17291-001* **Client:** *2339213 Ontario Ltd*

Project Name: *35 Industrial Drive, Norwood*

Sample Date: *March 27, 2023* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 103-23 SS 3* **Depth:** *1.5 m to 2.1 m* **Lab Sample No:** *S-23-0558*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 103-23	SS 3	1.5 m to 2.1 m	16	44	33	7	4.9

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Gravel trace Clay	SM	0.4600	0.0410	0.0042	109.52	0.87

Additional information available upon request

Issued By: _____ *Date Issued:* *April 4, 2023*

(Senior Project Manager)

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Grain Size Distribution Chart

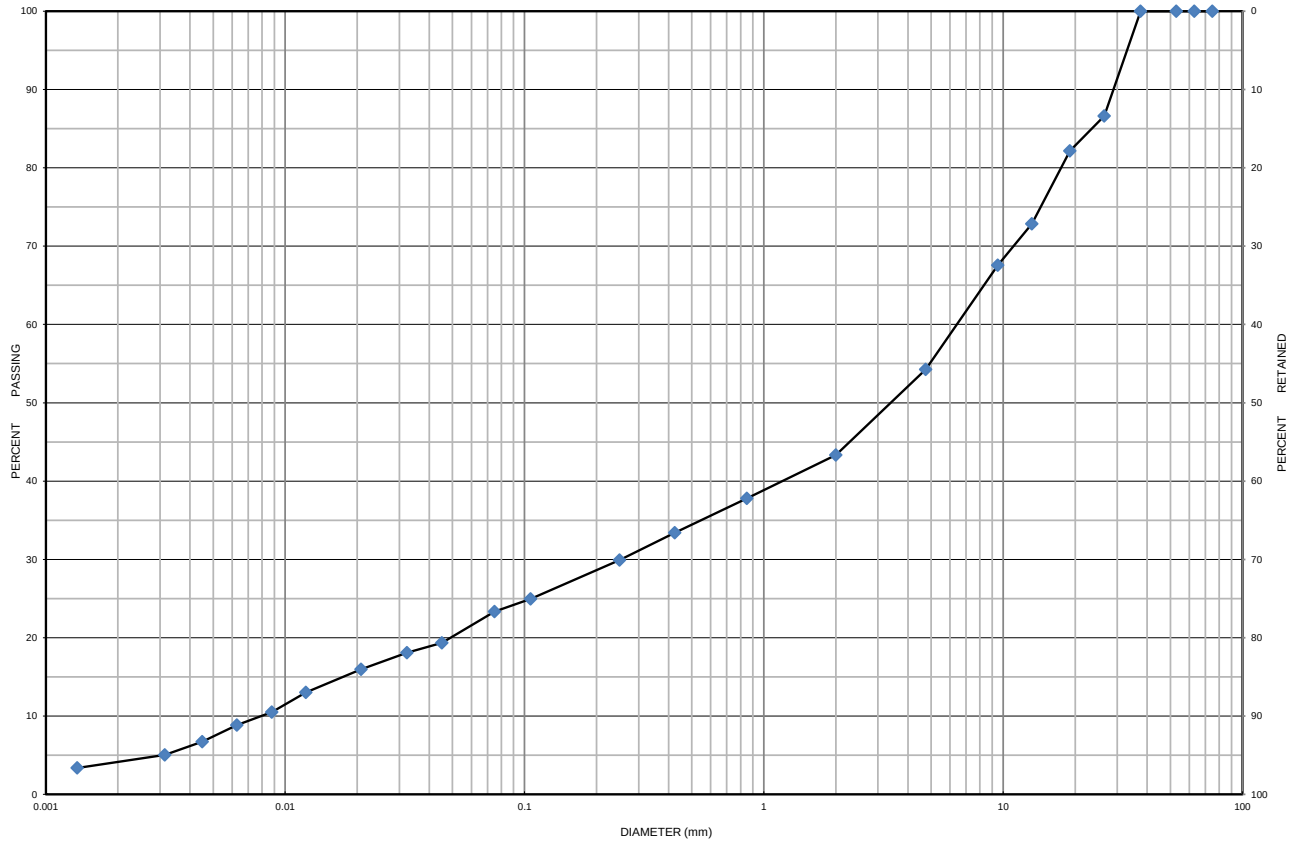
Project Number: *17291-001* **Client:** *2339213 Ontario Ltd*

Project Name: *35 Industrial Drive, Norwood*

Sample Date: *March 27, 2023* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 106-23 SS 2* **Depth:** *0.6 m to 1.2 m* **Lab Sample No:** *S-23-0559*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 106-23	SS 2	0.6 m to 1.2 m	46	31	19	4	5.5

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sandy Gravel some Silt trace Clay	SM	6.400	0.260	0.008	800.00	1.32

Additional information available upon request

Issued By: _____ *Date Issued:* *April 4, 2023*

(Senior Project Manager)

Cambium Inc. (Laboratory)
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Grain Size Distribution Chart

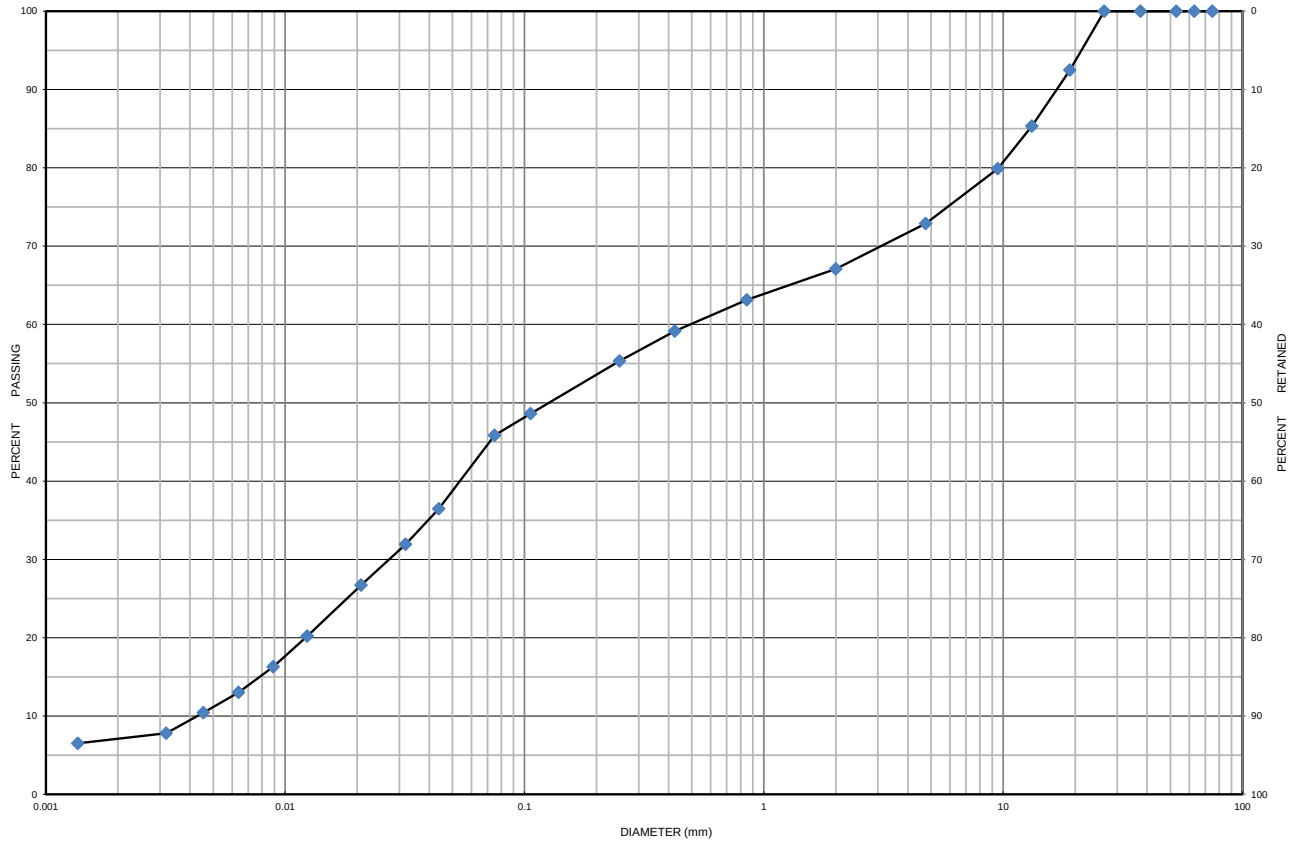
Project Number: *17291-001* **Client:** *2339213 Ontario Ltd*

Project Name: *35 Industrial Drive, Norwood*

Sample Date: *March 27, 2023* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 107-23 SS 2* **Depth:** *0.6 m to 1.2 m* **Lab Sample No:** *S-23-0560*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 107-23	SS 2	0.6 m to 1.2 m	27	27	39	7	12.8

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Gravelly Sandy Silt trace Clay	SM	0.4900	0.0270	0.0041	119.51	0.36

Additional information available upon request

Issued By: _____ *Date Issued:* *April 4, 2023*

(Senior Project Manager)

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Grain Size Distribution Chart

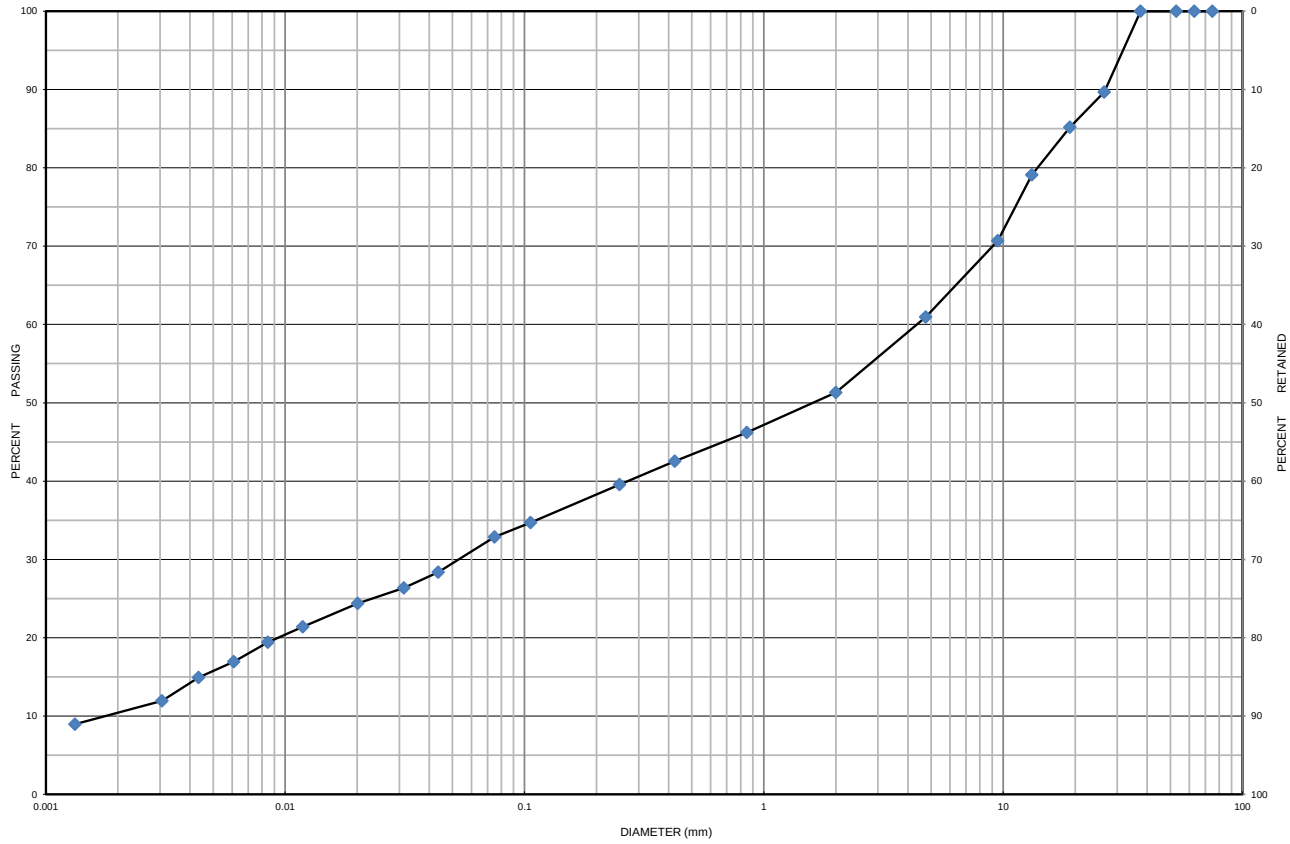
Project Number: *17291-001* **Client:** *2339213 Ontario Ltd*

Project Name: *35 Industrial Drive, Norwood*

Sample Date: *March 27, 2023* **Sampled By:** *Josh Riseling - Cambium Inc.*

Location: *BH 109-23 SS 2* **Depth:** *0.6 m to 1.2 m* **Lab Sample No:** *S-23-0561*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 109-23	SS 2	0.6 m to 1.2 m	39	28	22	11	5.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sandy Silty Gravel some Clay	SM	4.4000	0.0520	0.0017	2588.24	0.36

Additional information available upon request

Issued By: _____ *Date Issued:* *April 4, 2023*

(Senior Project Manager)

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Appendix J: Detailed Design Drawings

LEGEND

UNDERGROUND SERVICES

SEWERS:

- PROPOSED SANITARY SEWER MAIN AND MANHOLE
- EXISTING SANITARY SEWER MAIN AND MANHOLE
- PROPOSED STORM SEWER MAIN AND MANHOLE
- EXISTING STORM SEWER MAIN AND MANHOLE
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED DOUBLE CATCH BASIN MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED DOUBLE CATCH BASIN
- EXISTING CATCH BASIN MANHOLE
- EXISTING DOUBLE CATCH BASIN MANHOLE
- EXISTING CATCH BASIN
- EXISTING DOUBLE CATCH BASIN
- EXISTING DITCH INLET CATCH BASIN

WATER:

- PROPOSED WATER MAIN AND VALVE CHAMBER
- EXISTING WATER MAIN AND VALVE CHAMBER
- PROPOSED HYDRANT SET
- EXISTING HYDRANT SET
- PROPOSED WATER VALVE
- EXISTING WATER VALVE
- CURB STOP VALVE
- LAWN SPRINKLER HEAD
- MONITORING WELL

NATURAL GAS:

- EXISTING GAS MAIN
- EXISTING GAS VALVE
- EXISTING VENT PIPE

ROAD SURFACE FEATURES:

- EXISTING CONCRETE CURB
- EXISTING FENCE
- EXISTING CONCRETE SIDEWALK
- CONCRETE BARRIER CURB (OPSD 600.110)
- CONCRETE CURB AND GUTTER (OPSD 600.040)
- RESIDENTIAL DRIVEWAY ENTRANCES / DROP CURB
- COMMERCIAL / INDUSTRIAL REINFORCED DROP CURB
- PROPOSED CONCRETE SIDEWALK
- PROPOSED ASPHALT SURFACE
- PROPOSED GRAVEL SURFACE
- PROPOSED INTERLOCKING CONCRETE PAVERS
- PROPOSED STAMPED CONCRETE
- PROPOSED ASHPALT BOULEVARD

LEGAL AND CONTROL SYMBOLS:

- IRON BAR
- ROUND IRON BAR
- IRON PIPE
- CUT CROSS
- HORIZONTAL CONTROL MONUMENT
- VERTICAL CONTROL MONUMENT
- TEMPORARY BENCHMARK
- BENCHMARK
- STATION CHAINAGE

UTILITIES:

ELECTRICAL:

- HYDRO POLE
- HYDRO POLE LIGHT STANDARD
- HYDRO POLE LIGHT STANDARD WITH TRANSFORMER
- LIGHT STANDARD
- TRAFFIC SIGNAL POLE
- HANDWELL
- GUY ANCHOR
- DIRECT BURIED ELECTRICAL DUCT/CABLE
- CONCRETE ENCASED ELECTRICAL DUCT

TELECOMMUNICATIONS:

- BELL HYDRO POLE
- BELL POLE
- BELL ROGERS POLE
- PEDESTAL
- DIRECT BURIED TELECOMM DUCT/CABLE
- DIRECT BURIED TELECOMM DUCT

SIGNAGE:

- RAIL ROAD SIGN
- MK
- ROAD SIGN
- DISPLAY BOARD SIGN

VEGETATION:

- HEDGE
- TREE CONIFEROUS
- SHRUB CONIFEROUS
- TREE DECIDUOUS
- SHRUB DECIDUOUS
- STUMP

MISCELLANEOUS:

- BOREHOLE
- TEST PIT
- WATER DATUM LINE
- POST
- PARKING METER
- MAILBOX
- BOULDER / ROCK
- BOLLARD
- PILLAR
- POLE
- TRASH CAN
- OVERHEAD DOOR
- MAN DOOR
- ACCESSIBLE MAN DOOR
- OVERLAND FLOW ROUTE
- 100 PONDING LIMIT

ONTARIO PROVINCIAL STANDARDS

MAINTENANCE HOLE, SQUARE FRAME, CIRCULAR COVER	OPSD-401.010	OPSS-407 (NOV 2014) OPSS-402 (NOV 2013)
MAINTENANCE HOLE STEPS SOLID ALUMINUM	OPSD-405.020	OPSS-407 (NOV 2014)
CONCRETE BARRIER CURB	OPSD-600.110	OPSS-353 (NOV 2010)
1200mm PRECAST MANHOLE	OPSD-701.010	OPSS-407 (NOV 2014) OPSS-402 (NOV 2013)
SANITARY MANHOLE BENCHING DETAILS	OPSD-701.021	OPSS-407 (NOV 2014)
1200mm PRECAST MANHOLE COMPONENTS	OPSD-701.030	OPSS-407 (NOV 2014)
FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION	OPSD-802.010	OPSS-410 (NOV 2013)
RIGID PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION TYPE 1 OR 2 SOIL	OPSD-802.030	OPSS-410 (NOV 2013)
CONCRETE SIDEWALK	OPSD-310.010 OPSD-310.020	OPSS-351 (NOV 2010)

GENERAL:

1. ALL CONSTRUCTION AND MATERIALS TO BE IN ACCORDANCE WITH:
   - TOWNSHIP OF ASPHODEL-NORWOOD DESIGN STANDARDS
   - ONTARIO PROVINCIAL STANDARD DRAWINGS & SPECIFICATIONS
   - APPLICABLE CONTRACT DOCUMENTS AND ALL SPECIFICATIONS REFERENCED HEREIN.
2. THE CONTRACTOR SHALL CONSTRUCT ALL WORK IN ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT, HEALTH AND SAFETY REGULATIONS FOR CONSTRUCTION PROJECTS.
3. THE CONTRACTOR SHALL RESTORE OR REPLACE DAMAGED SERVICES TO EXISTING OR BETTER CONDITION.
4. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO EXISTING OR BETTER CONDITION, OR PER THE ENGINEERING AND LANDSCAPE SPECIFICATIONS REFERENCED HEREIN.
5. THE CONTRACTOR SHALL COORDINATE AND PAY FOR ALL TRAFFIC CONTROL AND SAFETY MEASURES IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL, BOOK 7, TEMPORARY CONDITIONS.
6. THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS IN ACCORDANCE WITH THE MINISTRY OF THE ENVIRONMENT GUIDELINES AND LOCAL MUNICIPAL BYLAWS.
7. WHERE UTILITIES, SEWERS, WATERMAIN AND OTHER UNDERGROUND INFRASTRUCTURE ARE SHOWN ON THE CONTRACT DRAWINGS, THEIR LOCATION IS APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES AND SERVICES PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS TO COMPLETE THE WORK INCLUDING ROAD OCCUPANCY PERMITS, ROAD CUT PERMITS, OCCUPANCY PERMITS, ENCROACHMENT AGREEMENTS.
9. ANY UTILITY POLES THAT MAY BE UNDERMINED BY THE CONSTRUCTION ACTIVITY ARE TO BE BRACED. THE CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS TO HAVE THE POLES BRACED IN ACCORDANCE WITH THE APPROPRIATE UTILITY REQUIREMENTS; THE COST FOR THIS WORK IS INCLUDED IN THE UNIT PRICES FOR THE WORK ITEMS AFFECTED.
10. ALL EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED ON THE CONTRACT DRAWINGS ARE TO BE IN PLACE PRIOR TO THE START OF CONSTRUCTION.
11. ACCESS TO ADJACENT PRIVATE PROPERTIES SURROUNDING THE CONSTRUCTION SITE SHALL BE MAINTAINED AT ALL TIMES. TEMPORARY ACCESS RESTRICTIONS WILL ONLY BE PERMITTED WHERE REQUIRED TO FACILITATE UNDERGROUND SERVICING, ASPHALT AND CONCRETE PLACEMENT. THE CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE TO THE TOWN AND THE AFFECTED PROPERTY OWNERS PRIOR TO ACCESS INTERRUPTION.
12. ALL PROPERTY BARS DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR AT THE CONCLUSION OF THE CONTRACT, AT THEIR EXPENSE.
13. ALL MANHOLE AND CATCHBASIN FRAMES AND GRATES WITHIN THE TRAVELED PORTION OF THE ROAD SHALL BE SET TO BASE ASPHALT ELEVATION AND RAISED PRIOR TO PLACEMENT OF SURFACE ASPHALT.
14. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
15. EXISTING SIGNAGE WITHIN THE PROJECT LIMITS SHALL BE REMOVED AND SALVAGED BY THE CONTRACTOR PRIOR TO CONSTRUCTION AND REINSTALLED UPON COMPLETION. REGULATORY SIGNAGE SHALL REMAIN IN PLACE AT ALL TIMES.
16. ALL COSTS IN RELATION TO THE RESTORATION OF THE RIGHT OF WAY SHALL BE THAT OF THE GENERAL CONTRACTOR.
17. RESPECTING ALL WORK IN THE MUNICIPAL RIGHT OF WAY, THE CONTRACTOR IS TO CONTACT THE TOWNSHIP OF ASPHODEL-NORWOOD 48 HOURS PRIOR TO COMMENCEMENT OF ANY WORKS.
18. ALL AREAS WITHIN THE MUNICIPAL RIGHT OF WAY DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THE SATISFACTION OF THE TOWNSHIP.

SEWER:

1. THE CONTRACTOR SHALL INSTALL CONCRETE CATCHBASIN MANHOLES COMPLETE WITH FRAME, GRATE AS PER OPSD 701.010 AND 401.081 RESPECTIVELY UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
2. THE CONTRACTOR SHALL INSTALL CONCRETE MANHOLES COMPLETE WITH FRAME, GRATE AS PER OPSD 701.010, AND 401.010 UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
3. THE CONTRACTOR SHALL INSTALL CONCRETE CATCHBRASINS COMPLETE WITH FRAME, GRATE AS PER OPSD 705.010 AND 401.081 RESPECTIVELY UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
4. THE CONTRACTOR SHALL INSTALL CONCRETE DOUBLE CATCHBASIN MANHOLES COMPLETE WITH FRAME, GRATE AS PER OPSD 701.020 AND 401.081 RESPECTIVELY UNLESS OTHERWISE SPECIFIED ON THE DRAWINGS.
5. THE CONTRACTOR SHALL PERFORM LEAK AND DEFLECTION TESTING ON ALL STORM AND SANITARY SEWERS IN ACCORDANCE WITH CONTRACT DOCUMENTS AND OPSS 410 RESPECTIVELY.
6. THE CONTRACTOR SHALL CLEAN AND PERFORM CCTV INSPECTION ON ALL STORM AND SANITARY SEWERS IN ACCORDANCE WITH CONTRACT DOCUMENTS AND OPSS 409 RESPECTIVELY.
7. THE CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE TO THE ENGINEER PRIOR TO CONDUCTING PIPE LEAK AND DEFLECTION TESTING, CCTV INSPECTIONS AND/OR CLEANING OF THE STORM SEWER.
8. PIPE BEDDING, COVER AND BACKFILL SHALL BE IN ACCORDANCE WITH THE OPSD 802.010 FOR FLEXIBLE PIPE AND OPSD 802.030 FOR CONCRETE PIPE. BEDDING AND COVER SHALL BE GRANULAR "A" COMPACTED TO 100 % SPDD; BACKFILL SHALL BE APPROVED NATIVE MATERIAL OR GRANULAR "B", COMPACTED TO 100 % SPDD.
9. ALL STORM AND SANITARY MANHOLES SHALL BE BENCHED IN ACCORDANCE WITH OPSD 701.021.
10. ALL CATCH BASIN MANHOLES AND STORM MANHOLES TO HAVE 0.3m SUMP
11. THE CONTRACTOR SHALL INSTALL STORM SERVICE CONNECTIONS IN ACCORDANCE WITH OPSD 1006.010.

ASPHALT, SIDEWALKS, AND CURB

1. ALL CONCRETE CURB SHALL BE RESTORED TO MATCH EXISTING CONCRETE CURB ALONG SPRUCE DRIVE.
2. ROAD SUBGRADE AND PARKING AREAS SHALL BE COMPACTED TO 98% SPMDD. SUBGRADE SHALL BE PROOF-ROLLED PRIOR TO PLACEMENT OF GRANULAR MATERIAL.
3. PAVEMENT STRUCTURE SHALL CONSIST OF THE FOLLOWING:

   ROAD RESTORATION

   THE RESTORATION SHALL MATCH THE EXISTING DEPTHS OF GRANULAR 'A', GRANULAR 'B' , BASE COURSE ASPHALT, AND SURFACE COURSE ASPHALT.

   PARKING LOT - HEAVY DUTY
   - 40mm HL3 or HL4
   - 70mm HL8
   - 150mm GRAN 'A'
   - 400mm GRAN 'B'

   PARKING LOT - LIGHT DUTY
   - 40mm HL3 or HL4
   - 150mm GRAN 'A'
   - 300mm GRAN 'B'

   TEMPORARY TURNING BASIN
   - 150mm GRAN 'A'
   - 300mm GRAN 'B'

WATERMAIN:

1. THE CONTRACTOR SHALL PROVIDE 48HR NOTICE TO THE CONTRACT ADMINISTRATOR PRIOR TO COMMENCING WATERMAIN CONSTRUCTION.
2. THE CONTRACTOR SHALL INSTALL TRACER WIRE ON ALL NEW PVC WATERMAIN.
3. THE CONTRACTOR SHALL INSTALL CATHODIC PROTECTION AS PER OPSD 1109.0110.
4. THE CONTRACTOR SHALL INSTALL RETAINING GLAND RINGS ON ALL WATERMAIN FITTINGS AND CONNECTIONS WHERE THRUST BLOCKS CANNOT BE CONSTRUCTED ON SOLID GROUND.
5. THE CONTRACTOR SHALL INSTALL BEDDING AND BACKFILL AS PER OPSD 802.010.
6. THE CONTRACTOR SHALL INSTALL ALL WATERMAIN AND SERVICES AT A MINIMUM DEPTH OF 1.80 METRES FROM THE PROPOSED FINISH GRADE TO THE TOP OF PIPE.
7. THE CONTRACTOR SHALL MAINTAIN A MINIMUM VERTICAL CLEARANCE BETWEEN WATERMAIN AND SEWER OF 0.50 METRES BELOW OR 0.15 METRES ABOVE.
8. THE CONTRACTOR SHALL INSTALL WATER SERVICES AS PER OPSD 1104.0100, AND AT RIGHT ANGLES TO THE WATERMAIN WHERE POSSIBLE.
9. THE CONTRACTOR SHALL INSTALL THRUST BLOCKS FOR VERTICAL BENDS AS PER OPSD 1103.020. THE CONTRACTOR SHALL INSTALL THRUST BLOCKS FOR HORIZONTAL BENDS AS PER OPSD 1103.010.
10. THE CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE TO THE CONTRACT ADMINISTRATOR PRIOR TO CONDUCTING WATERMAIN TESTING.
11. THE CONTRACTOR SHALL PROVIDE ALL WATERMAIN TESTING RESULTS (INCLUDING CHLORINATION, BACTERIOLOGICAL, PRESSURE AND FLOW) IN ACCORDANCE WITH REGION SPECIFICATIONS. THE CONTRACTOR SHALL PROVIDE 2 COPIES OF ALL TEST RESULTS.
12. ONLY REPRESENTATIVES FROM THE TOWNSHIP ARE AUTHORIZED TO OPERATE WATER VALVES.

BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

NOTES:

1. ALL CONSTRUCTION AND MATERIALS TO BE IN ACCORDANCE WITH:
   -ONTARIO PROVINCIAL STANDARD DRAWINGS & SPECIFICATIONS
   -APPLICABLE CONTRACT DOCUMENTS AND ALL SPECIFICATIONS REFERENCED HEREIN.
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5. THE CONTRACTOR SHALL DISPOSE OF ALL WASTE MATERIALS IN ACCORDANCE WITH THE MINISTRY OF THE ENVIRONMENT GUIDELINES AND LOCAL MUNICIPAL BYLAWS.
6. WHERE UTILITIES ARE SHOWN ON THE CONTRACT DRAWINGS, THEIR LOCATION IS APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
7. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS TO COMPLETE THE WORK INCLUDING ROAD CUT PERMITS, OCCUPANCY PERMITS, ENCROACHMENT AGREEMENTS.
8. ANY UTILITY POLES THAT MAY BE UNDERMINED BY THE CONSTRUCTION ACTIVITY ARE TO BE BRACED. THE CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS TO HAVE THE POLES BRACED IN ACCORDANCE WITH THE APPROPRIATE UTILITY REQUIREMENTS.
9. ALL EROSION AND SEDIMENT CONTROL MEASURES IDENTIFIED ON THE CONTRACT DRAWINGS ARE TO BE IN PLACE PRIOR TO THE START OF CONSTRUCTION.
10. ACCESS TO ALL PRIVATE PROPERTIES FRONTING THE CONSTRUCTION SHALL BE MAINTAINED AT ALL TIMES. TEMPORARY ACCESS RESTRICTIONS WILL ONLY BE PERMITTED WHERE REQUIRED TO FACILITATE UNDERGROUND SERVICING, ASPHALT AND CONCRETE PLACEMENT. THE CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE TO THE TOWNSHIP AND THE AFFECTED PROPERTY OWNERS PRIOR TO ACCESS INTERRUPTION.
11. ALL PROPERTY BARS DISTURBED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR AT THE CONCLUSION OF THE CONTRACT, AT THEIR EXPENSE.
12. ALL DIMENSIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.

No.	REVISION	BY	DATE
1.	ISSUED FOR 1ST SUBMISSION	JD	2023-04-28

ENGAGE ENGINEERING
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INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

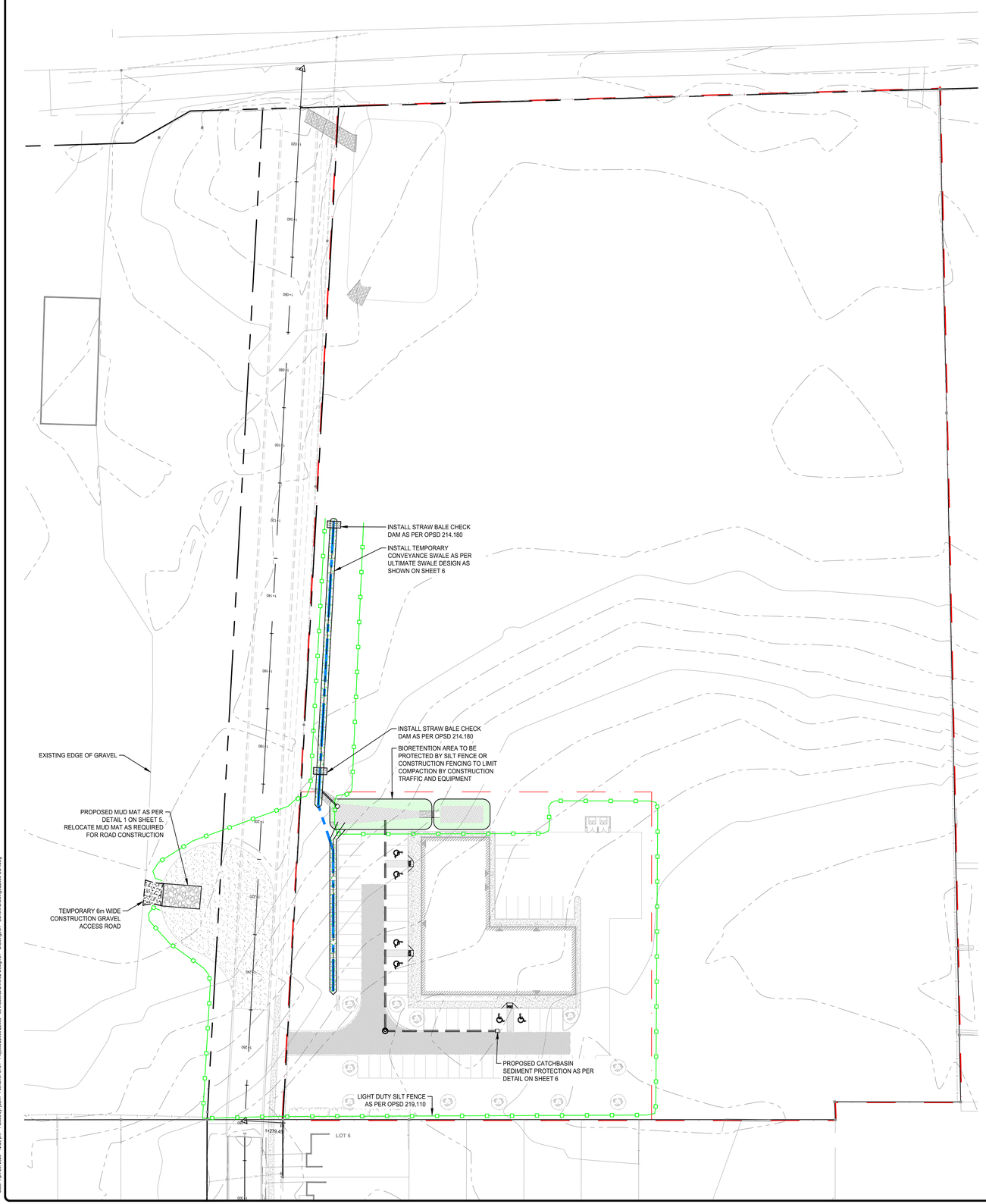
STANDARD NOTES & LEGEND

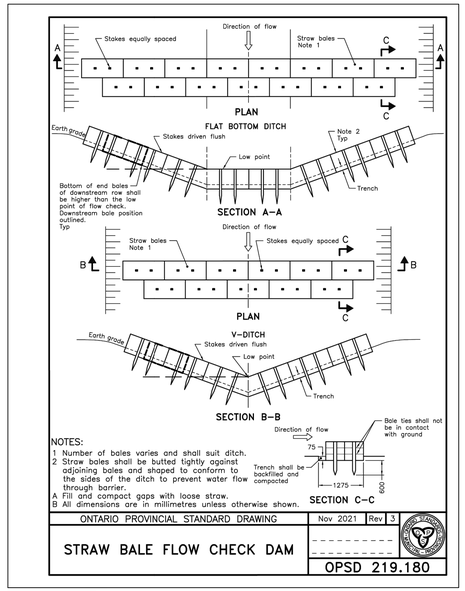
NORWOOD, ONTARIO

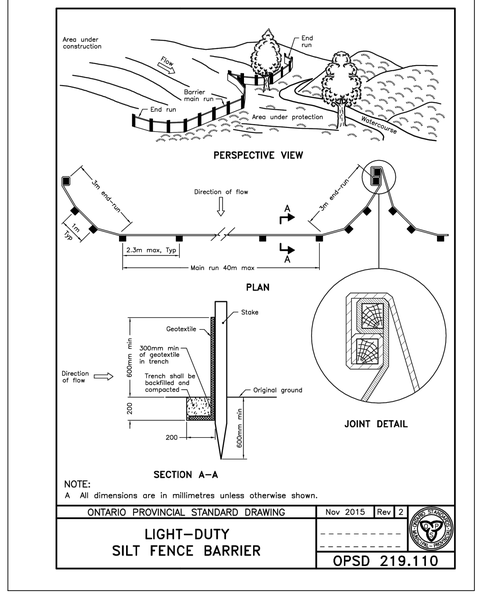
DRAWN BY: J.DUNN	STAMP: LICENSED PROFESSIONAL ENGINEER L.T.PARSONS 100516860 2023-04-28 PROVINCE OF ONTARIO
DESIGNED BY: J.DUNN	
APPROVED BY: L.PARSONS	
DATE: 2023-03-29	
SCALE:	

PROJECT NUMBER:	SHEET NAME:	SHEET:
22056	SNL	1 of 6

22056 - SNL - DT
Date: Apr 28, 2023 - 12:26 pm Plotted by: jdunn File name: S:\01 • Projects\22052\2209 - 33 Industrial Drive\02 Design\01 • Drawings\01 • Current Drawings\22056 - SNL - DT.dwg







EROSION AND SEDIMENT CONTROL SEQUENCING:

A. PLACE MUD MAT AT ENTRANCE TO SITE.

B. PLACE PERIMETER SILT FENCE.

C. CONSTRUCT CONVEYANCE SWALE AND STRAW BALE CHECK DAMS AS ILLUSTRATED ON ON THIS SHEET.

D. COMPLETE SUBSTANTIAL SITE CONSTRUCTION. TEMPORARY SEDIMENT PROTECTION DEVICES TO BE UTILIZED ONCE ON SITE CATCHBASIN IS INSTALLED IF SITE IS NOT STABILIZED.

E. ONCE SITE & BUILDING CONSTRUCTION IS COMPLETE AND SITE VEGETATION HAS BEEN ESTABLISHED, CLEAN OUT SEDIMENT FROM CONVEYANCE SWALE AND REMOVAL EROSION SEDIMENT CONTROL MEASURES.

EROSION & SEDIMENT CONTROL NOTES:

1. THE PROPOSED WORKS SHALL BE CARRIED OUT IN SUCH A MANNER THAT A MINIMUM AMOUNT OF EROSION OCCURS AND SUCH THAT SEDIMENTATION FACILITIES CONTROL ANY EROSION THAT DOES OCCUR.
2. ALL TEMPORARY SILTATION CONTROL DEVICES ARE TO BE CONSTRUCTED BEFORE CONSTRUCTION STARTS AND MAINTAINED FOR THE DURATION OF CONSTRUCTION UNTIL REMOVAL.
3. SEDIMENT ACCUMULATION OF MORE THAN 0.3 METRES IS TO BE REMOVED IMMEDIATELY.
4. INSPECT SILT FENCING AFTER EVERY SIGNIFICANT RAINFALL EVENT AND MAINTAIN AS REQUIRED, OR AT THE DIRECTION OF THE ENGINEER.
5. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (SILT FENCE, CLEAR STONE, ETC.) ARE TO BE KEPT ON SITE FOR EMERGENCIES AND REPAIRS.
6. EROSION AND SEDIMENT CONTROL METHODS ARE TO BE CONTINUOUSLY EVALUATED AND UPGRADES ARE TO BE IMPLEMENTED WHEN NECESSARY.
7. ALL DAMAGED ESC MEASURES WILL BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OR SOONER IF ENVIRONMENTAL RECEPTORS ARE AT IMMINENT AND FORESEEABLE RISK OF ADVERSE IMPACT.
8. DISTURBED AREAS LEFT FOR 30 DAYS OR LONGER MUST BE STABILIZED.
9. ENSURE THAT APPROPRIATE RESPONSE IS TAKEN FOR SPILLS AND ANY INCIDENTS ARE PROPERLY DOCUMENTED AND REPORTED.
10. AT THE COMPLETION OF CONSTRUCTION, ANY EXCESS MATERIAL SHALL BE REMOVED FROM THE SITE.
11. REMOVE SILT FENCE, MUD MAT AND ANY OTHER EROSION/SILTATION CONTROL MEASURES ONCE ALL CONSTRUCTION HAS BEEN COMPLETED AND ALL VEGETATION HAS BEEN ESTABLISHED AND AT THE DIRECTION OF THE ENGINEER.
12. THE CONVEYANCE SWALE SHALL BE CLEARED OF SEDIMENT AT COMPLETION OF CONSTRUCTION.

BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

NOTES:

EROSION & SEDIMENT CONTROL

- SILT FENCE
- STRAW BALE CHECK DAM
- RIP-RAP
- MUD MAT

No.	REVISION	BY	DATE
1.	ISSUED FOR 1ST SUBMISSION	JD	2023-04-28

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INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

EROSION & SEDIMENT CONTROL PLAN

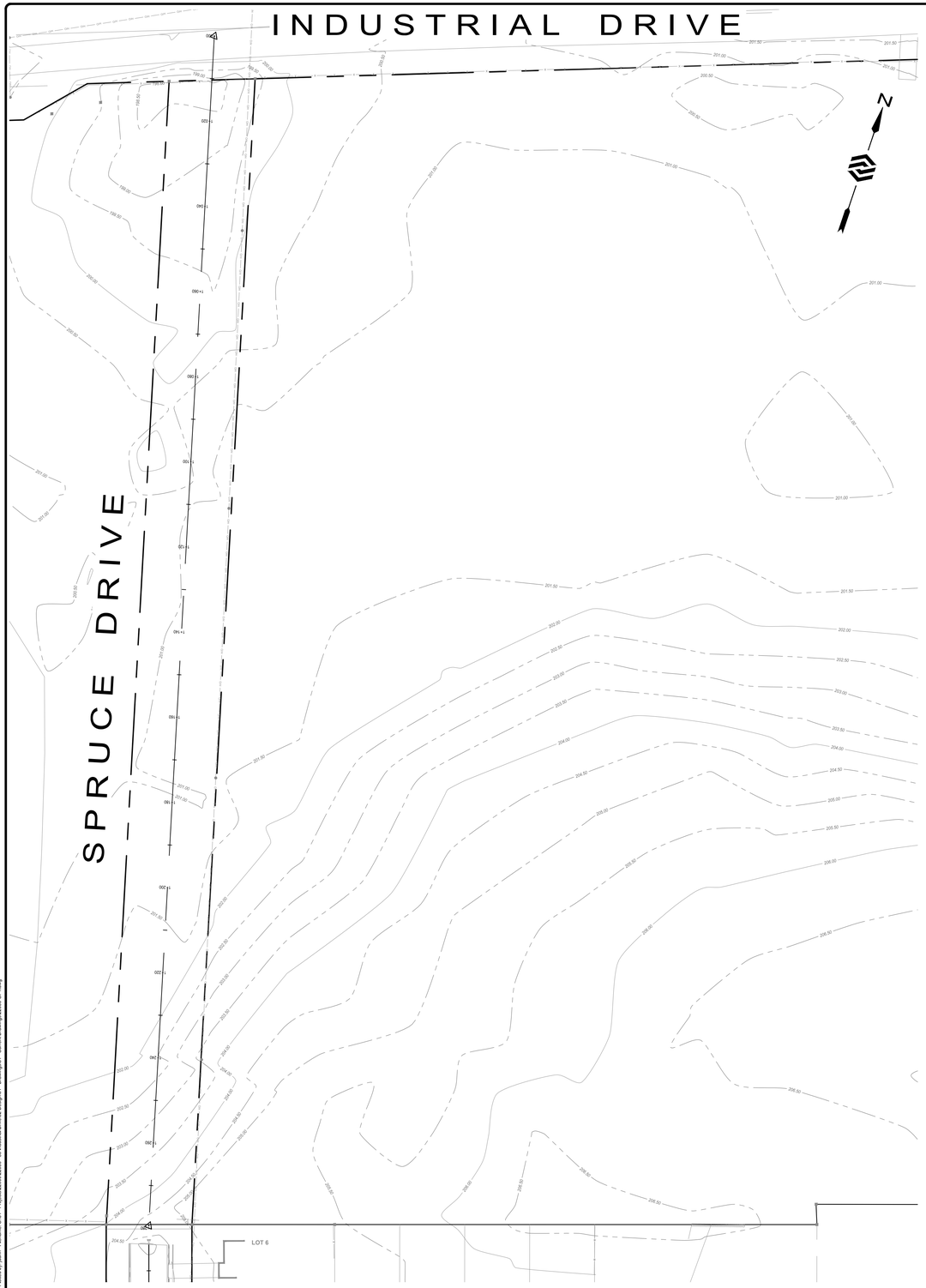
NORWOOD, ONTARIO

DRAWN BY:	J.DUNN
DESIGNED BY:	J.DUNN
APPROVED BY:	L.PARSONS
DATE:	2023-03-29
SCALE:	1:600

STAMP: LICENSED PROFESSIONAL ENGINEER — L.T.PARSONS — 100516860 — 2023-04-28 — PROVINCE OF ONTARIO

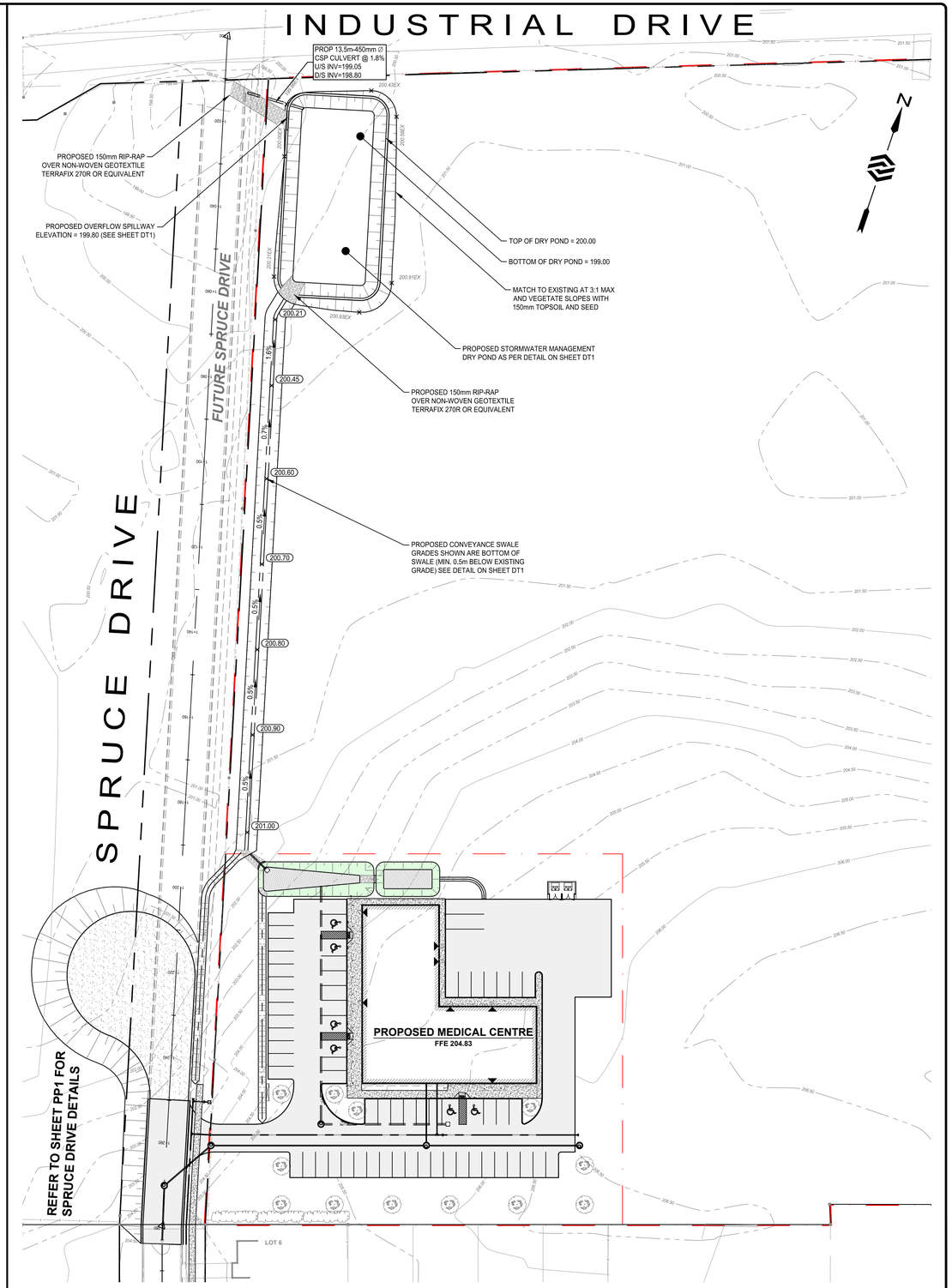
PROJECT NUMBER:	SHEET NAME:	SHEET:
22056	ESC1	2 of 6

22056-EC1
Date: Apr. 28, 2023 - 12:26 pm Plotted by: jdunn File name: S:\01 - Projects\20000\22056 -35 Industrial Drive\02 Design\01 - Drawings\01 - Current Drawings\22056-EC1.dwg



EXISTING CONDITIONS PLAN VIEW

SCALE: 1:600



OVERALL PLAN VIEW

SCALE: 1:600

BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

NOTES:

1. ALL CONSTRUCTION AND MATERIALS TO BE IN ACCORDANCE WITH:
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No.	REVISION	BY	DATE
1.	ISSUED FOR 1ST SUBMISSION	JD	2023-04-28

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INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

OVERALL PLAN

NORWOOD, ONTARIO

DRAWN BY:	J.DUNN
DESIGNED BY:	J.DUNN
APPROVED BY:	L.PARSONS
DATE:	2023-03-29
SCALE:	1:600

STAMP: LICENSED PROFESSIONAL ENGINEER — L.T.PARSONS — 100516860 — 2023-04-28 — PROVINCE OF ONTARIO

PROJECT NUMBER:	SHEET NAME:	SHEET:
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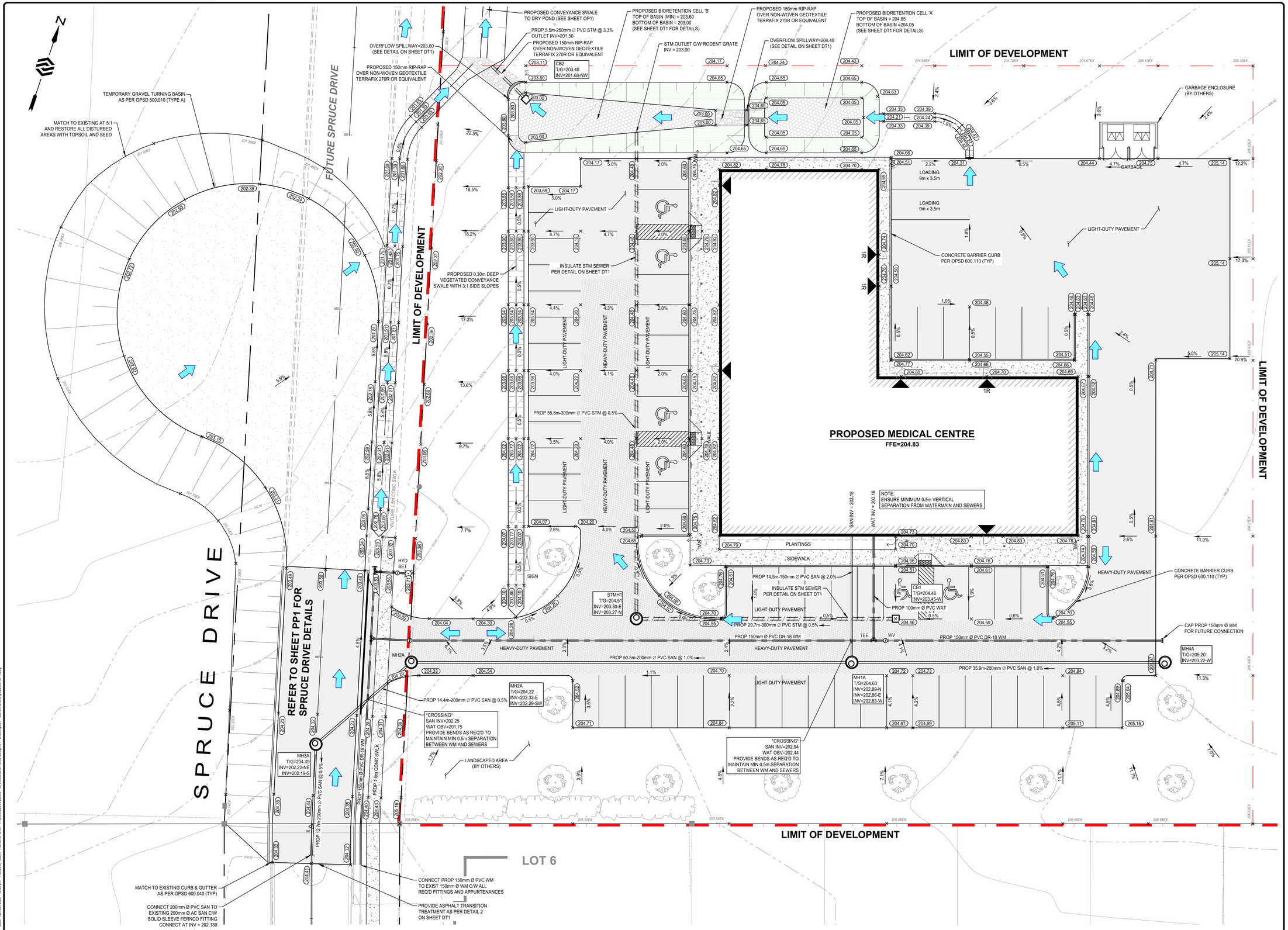
22056-OP1
Date: Apr. 28, 2023 - 12:29 pm Plotted by: jdunn File name: S:\01 - Projects\2020\02205\6 - 35 Industrial Drive\02 Design\01 - Drawings\01 - Current Drawings\22056-OP1.dwg



22056-GP1

Date: Apr. 28, 2023 - 12:26 pm Plotted by: jdunn File name: S:\01 - Projects\22000\22056 - 35 Industrial Drive\02 Design\31 - Drawings\01 - Current Drawing\22056-GP1.dwg

BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

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INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

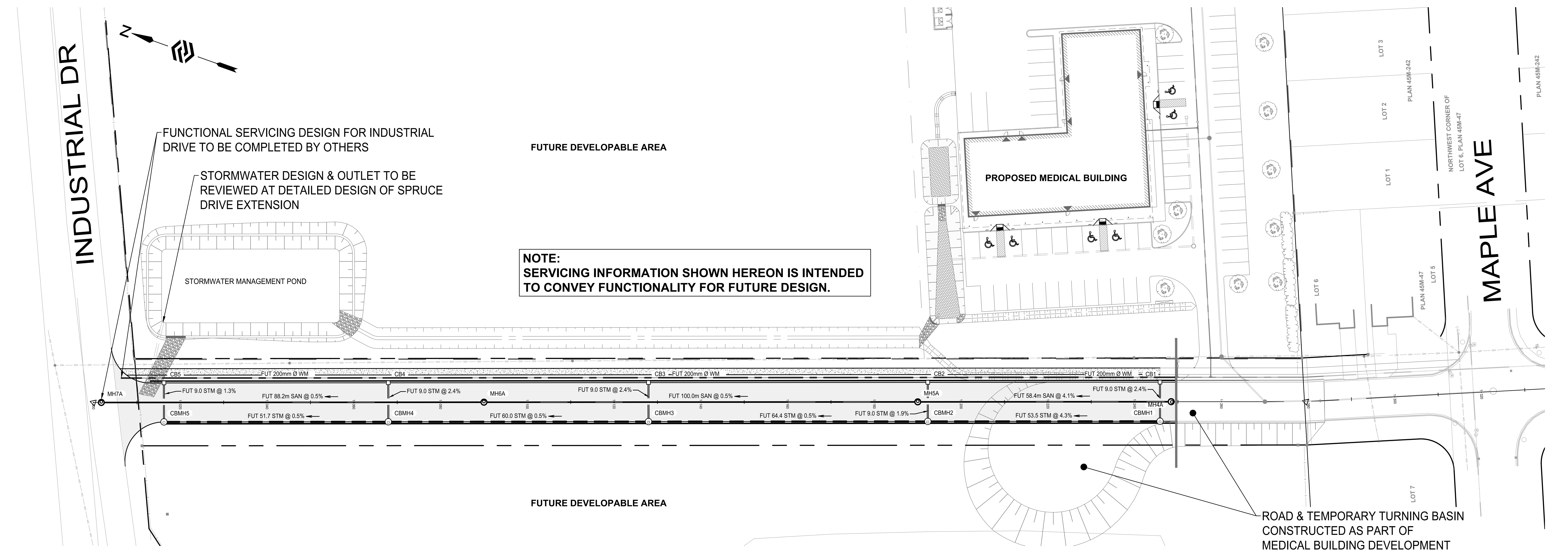
SITE SERVICING & GRADING PLAN

NORWOOD, ONTARIO

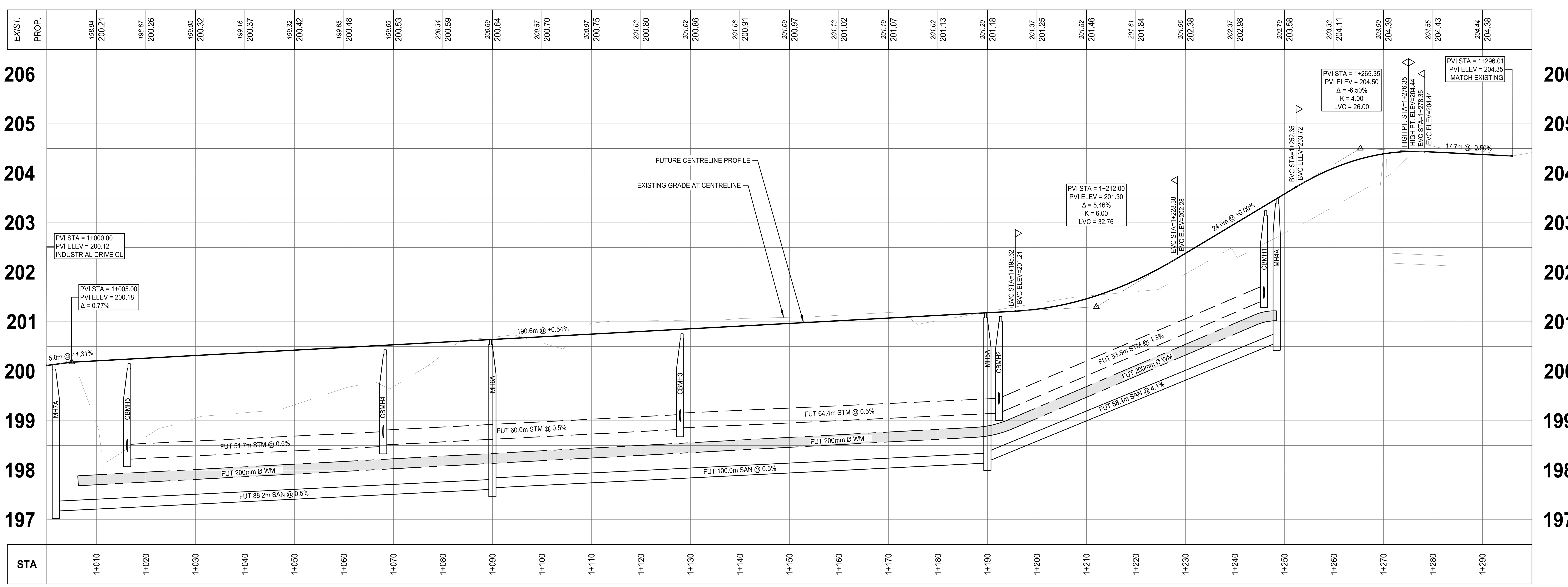
DRAWN BY:	J.DUNN
DESIGNED BY:	J.DUNN
APPROVED BY:	L.PARSONS
DATE:	2023-03-29
SCALE:	1:200

STAMP: LICENSED PROFESSIONAL ENGINEER — L.T.PARSONS — 100516860 — 2023-04-28 — PROVINCE OF ONTARIO

PROJECT NUMBER:	SHEET NAME:	SHEET:
22056	GP1	4 of 6



FUTURE SPRUCE DRIVE EXTENSION



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ENGAGE ENGINEERING

INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

FUNCTIONAL SPRUCE DRIVE EXTENSION

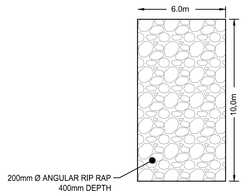
NORWOOD, ONTARIO

DRAWN BY:	J.DUNN
DESIGNED BY:	J.DUNN
APPROVED BY:	L.PARSONS
DATE:	2023-03-29
SCALE:	1:500H 1:50V

STAMP: LICENSED PROFESSIONAL ENGINEER L.T.PARSONS 100516860 2023-04-28 PROVINCE OF ONTARIO

PROJECT NUMBER:	SHEET NAME:	SHEET:
22056	PP1	5 of 6

22056-SR2



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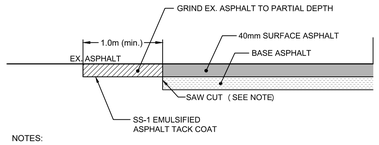
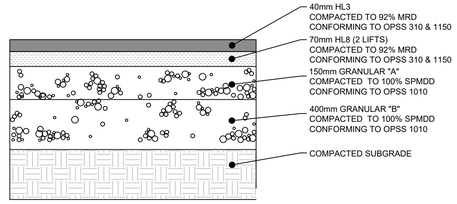


NOTES:

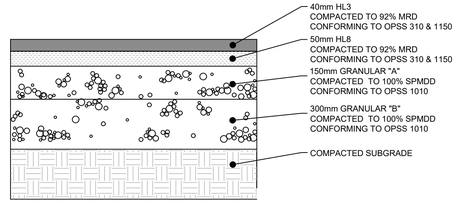
1. TRANSITION TREATMENT REQUIRED AT ALL BUTT JOINTS. THE EXISTING PAVEMENT EDGES SHALL BE "SAW CUT" TO FORM A STRAIGHT, CLEAN VERTICAL FACE.
2. APPLY UNIFORM COATING OF SS-1 EMULSIFIED TACK COAT TO EXISTING ASPHALT EXISTING ASPHALT AT THE TRANSITION TREATMENT AREA.

2 ASPHALT TRANSITION TREATMENT
SCALE: N.T.S.



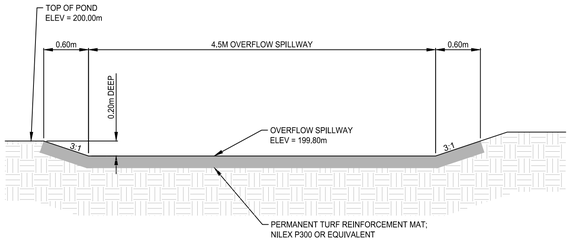
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

3 HEAVY DUTY PAVEMENT STRUCTURE
SCALE: N.T.S.

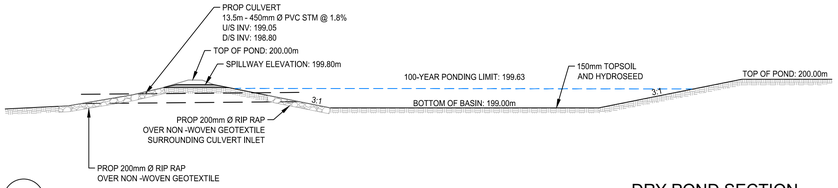


NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

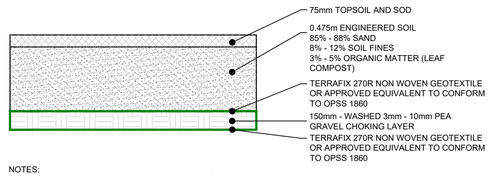
4 LIGHT DUTY PAVEMENT STRUCTURE
SCALE: N.T.S.



5 DRY POND OVERFLOW WEIR
SCALE: N.T.S.



6 DRY POND SECTION
SCALE: N.T.S.



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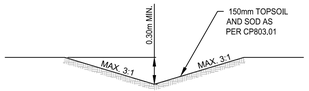
2. REFER TO CREDIT VALLEY CONSERVATION(CVC) LOW IMPACT DEVELOPMENT STORMWATER PLANNING AND DESIGN GUIDE 'TABLE 4.5.5 - BIORETENTION SPECIFICATIONS' FOR ADDITIONAL DETAILS.

7 BIORETENTION SOIL STRUCTURE SPECIFICATIONS
SCALE: N.T.S.



8 0.30m DEPTH CONVEYANCE SWALE
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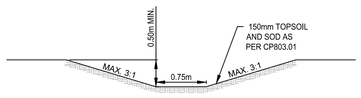
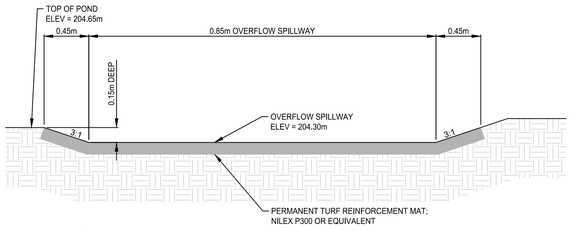


9 0.50m DEPTH FLAT-BOTTOM SWALE
SCALE: N.T.S.



10 EAST BIORETENTION OVERFLOW SPILLWAY
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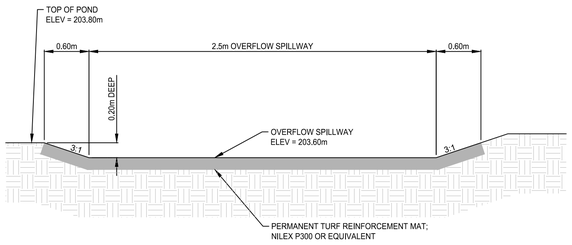

11 WEST BIORETENTION OVERFLOW SPILLWAY
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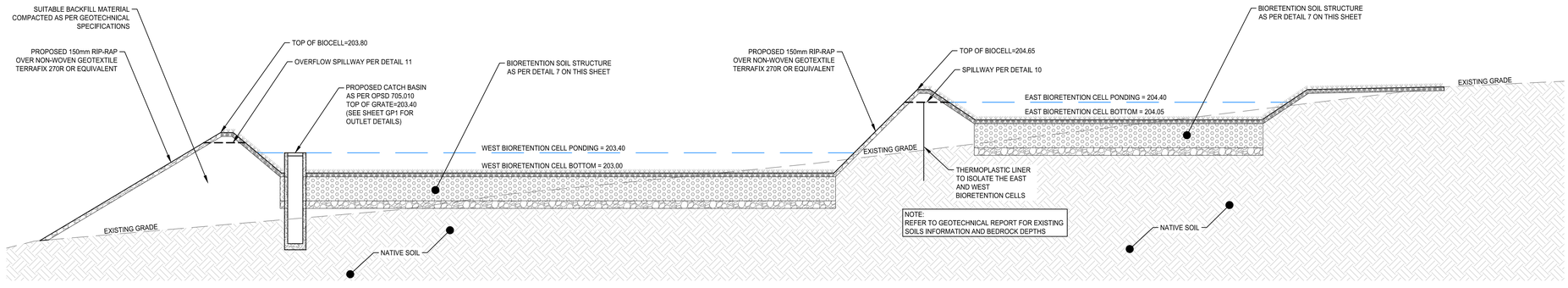

6 BIORETENTION FACILITY PROFILE
SCALE: 1:100H 1:50V

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INDUSTRIAL DRIVE MEDICAL BUILDING

TOWNSHIP OF ASPHODEL-NORWOOD

DETAILS

NORWOOD, ONTARIO

DRAWN BY:	J.DUNN
DESIGNED BY:	J.DUNN
APPROVED BY:	L.PARSONS
DATE:	2023-03-29
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22056 - SNL - DT
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