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STORMWATER MANAGEMENT REPORT
PROPOSED INDUSTRIAL WAREHOUSE DEVELOPMENT
2726 MOODIE DRIVE
CITY OF OTTAWA, ONTARIO

Prepared For:

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Ottawa, Ontario
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PROJECT #: 221099

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1. INTRODUCTION

1.1. Background

Mr. TJ Sohal of 1000198532 Ontario Inc. retained Kollaard Associates Inc. to complete a Site Grading and Drainage Plan along with a Stormwater Management Report in support of the Site Plan Control Application for the proposed industrial development at 2726 Moodie Drive in the City of Ottawa, Ontario. Additionally, Kollaard Associates Inc. was retained to complete a Servicing Report with the same objective which will be submitted concurrently, and which will be referenced throughout this document.

The proposed development will occupy a mostly vacant parcel of land along the west side of Moodie Drive at Fallowfield Road. The development will be accessed by a right turn only small vehicle access from Fallowfield Road and by means of a main entrance from Moodie Drive. For the purposes of this design, Moodie Drive is considered to be oriented along a north south axis.

The development site is approximately 6.607 hectares (16.3 acres) and resembles a rectangularly shaped parcel with the northwest corner missing. The development site extends about 390 metres west of Moodie Drive with approximately 240 metres of frontage along the south side Fallowfield Road. The remaining about 150 metres extends behind existing residential development along the south side of Fallowfield Road. The site has approximately 170 metres of frontage along Moodie Drive.

A proposed road widening along Fallowfield Road will shift the property line between the site and Fallowfield Road south 5.1 metres at the west end of the site, about 7.1 metres at the center of the north side of the site and about 4.3 metres at the east end of the site. This road widening will reduce the site area by about 0.1 hectare. The future property line has been indicated on the drawings. The only impervious area within the road widening is a result of the proposed entrance from Fallowfield Road. The stormwater management design has been completed using the current site area as the grading for the proposed development will affect the area within the future road widening. The reduction in site area by changing site area to offsite area will not change the stormwater management model.

The proposed development will consist of 5 Industrial Warehouse Buildings together with associated parking, roadway and truck turning areas. The proposed warehouses will be oriented parallel to Fallowfield Road with 3 buildings adjacent to Moodie Drive and 2 buildings behind the existing residential lots along Fallowfield Road. Buildings A and B and buildings D and E will be placed back to back to shield the adjacent properties from the loading bays and by extension the vast majority of the truck traffic.

This report is intended to present the results of a stormwater management design in support of the application for site plan control approval. The report will summarize the stormwater management (SWM) design requirements and proposed works that will address stormwater flows arising from the site under post-development conditions on a level sufficient to ensure that stormwater management facility is adequately designed to meet the criteria for the site.

The report is to be read in conjunction with the stormwater management system design presented in the Kollaard Civil Drawings.

Topographic information of the site was obtained using GPS survey equipment. All elevations used in this report are geodetic and were referenced to the vertical datum of CGVD28:78.

1.2. Subwatershed Study

The proposed development site is part of the Jock River Watershed. The east side of the site outlets to the Jock River via the roadside ditches along Fallowfield Road and Moodie Drive while the west portion of the site outlets to the Jock River by means of the Monahan Drain. The flow divide between the catchment areas is illustrated in the pre-development drawing with area Pre-W outletting to the Monahan Drain catchment.

The wide blue line in Figure 1-1 below (when printed in colour) indicates the watershed boundaries. It is noted that the Jock River is south of the site and that Leamy Creek outlets to the Jock River on the south side of the river. The Barrhaven catchment (label not shown) begins east of Moodie Drive. The greenhouses shown in the air photo on the site were removed from the site prior to 2021.

Figure 1-1: Image of Watershed Divide at Site

A subwatershed study report for the Jock River Watershed was issued by Rideau Valley Conservation Authority dated 2016. This report provides an assessment of the Jock River watershed as well as proposed actions which could be completed to preserve and improve the condition of the Jock River. In general, the forest cover across the Jock River Watershed ranges from about 42 percent in the upper rural reaches to 7 percent in the lower urban reaches. There is no significant wetland cover in the Monahan Drain or Leamy Creek Catchments. The quality of the water in the Jock River ranges from Good to Poor depending on specific location and adjacent land uses.

1.3. Summary

The proposed stormwater management design directs stormwater runoff to both the Monahan Drain catchment and the Leamy Creek catchment. The flows directed to the Monahan Drain catchment will either be uncontrolled or be controlled and treated using low impact design techniques only. The flows directed to the Leamy Creek catchment will be either uncontrolled or controlled and treated by means of a stormwater storage facility which incorporates both vegetative and sand filtration.

The proposed stormwater management plan for the development will make use of best management practices and low impact design techniques where possible in combination with a treatment train approach to meet the requirements for stormwater management on the site. Stormwater from the roof and paved areas of the site, with the exception of the entranceways, will be directed to the stormwater storage facility. The stormwater water storage facility will consist of a combination of underground storage provided in modular storm chambers and an enhanced swale / rain garden. The underground storage will be provided in NDS SC-34E and NDS SC-18 stormchambers as illustrated on the proposed grading and servicing plans. The enhanced swale / rain garden will consist of a flat bottomed low sloped swale complete with an enhanced topsoil layer on the bottom. The low impact design techniques employed in the remaining areas will consist of enhanced grassed swales and infiltration facilities.

The enhanced stormwater management swale and the low impact development techniques used will provide stormwater storage and promote sedimentation and infiltration in order to achieve the quantity and quality control parameters established by the City of Ottawa and the Ministry of Environment Conservation and Parks.

1.4. Governing Authorities

This Stormwater Management Report has been prepared to present the design information to satisfy conditions set by the following authorities:

City of Ottawa (City)
Rideau Valley Conservation Authority (RVCA)
Ministry of Environment, Conservation and Parks (MECP) formerly Ministry of Environment (MOE)

1.5. Guidelines and Manuals

The following guidelines and manuals were utilized in the creation of the stormwater management design and the preparation of this report. Reference names used within this report are listed after the name of the publication in square parentheses and italicized.

Ottawa Sewer Design Guildelines *[OSDG]*
City of Ottawa, October 2012 as amended.

Stormwater Management Planning and Design Manual *[MOE Manual]*
Ministry of the Environment, March 2003

Visual OTTHYMO V6.0: User's Manual
Civica Infrastructure Inc., November 201

CITY OF OTTAWA, Low Impact Development Technical Guidance Report *[City LID Guide]*
City of Ottawa, February 2021

Low Impact Development Stormwater Management Guidance Manual *[MECP LID Guide]*
Ministry of Environment Conservation and Parks, (Draft - January 2022)

Low Impact Development Stormwater Management Planning and Design Guide Version 1.0 ***[CVC LID Guide]***
Credit Valley Conservation & Toronto and Region Conservation 2010

MTO Drainage Management Manual
Ontario Ministry of Transportation

Part 650 Hydrology National Engineering Handbook – Chapter 15 Time of Concentration ***[USDA Chapter 15]***
United States Department of Agriculture

Urban Hydrology for Small Watersheds Technical Release 55 ***[USDA TR55]***
United States Department of Agriculture

Storm Water Management Model Reference Manual Volume I – Hydrology (Revised) ***[US EPA RM]***
United States Environmental Protection Agency

Jock River Subwatershed Report
Rideau Valley Conservation Authority, 2016

2. STORMWATER MANAGEMENT DESIGN

The subject lands are within the City of Ottawa and the Rideau Valley Conservation Authority jurisdiction. Stormwater management criteria were established based on the nature and location of the development and on the nature of the receiving watercourse for the stormwater discharge from the site.

2.1. Design Criteria

2.1.1. Quantity Control Criteria

- The post-development peak runoff rate occurring during a 100 year design storm event is to be controlled to the runoff rate of the 2 year pre-development design storm of the same duration;
- Onsite stormwater storage and flow shall be controlled as to not affect lands adjacent the development site.
- Runoff from impervious surfaces most not be directed onto neighbouring properties.
- Stormwater discharge must outlet to a legal and sufficient outlet.

2.1.2. Quality Control Criteria

- The design shall include enhanced quality treatment to 80% long-term suspended solids removal as recommended by the MOE Manual.

2.1.3. Jock River Subwatershed Report

- There are no directly specified criteria provided in the Jock River Subwatershed report.
- The report however does recommend:
  - the implementation of best practiced for stormwater management including low impact development measures;
  - Reduce property runoff by allowing surface water to infiltrate as much as possible;
  - Use advanced wastewater treatment systems.
    - Note: The wastewater system will be discussed within the Servicing Report.

2.2. Best Management Practices

As indicated in the MOE Manual, the recommended strategy for stormwater management is to provide an integrated treatment train approach to stormwater management. Each element of the treatment train within the development when combined forms the stormwater management facility for the development.

In general, best management practices for stormwater management are divided into three categories: source control, conveyance control and end-of-pipe control. As indicated in the Ministry of Transportation Drainage Management Manual, the priority in applying these BMPs should follow the sequence presented with end of pipe measures applied as the last resort.

The proposed BMPs utilized in the proposed development will include reduced lot grading in uncontrolled areas, reducing directly connected impervious areas where possible, vegetative buffer strips and protecting any surface areas disturbed during construction as soon as possible. The proposed BMPs will also include reduced swale slopes and increased swale cross sections were possible to reduce flow rates and promote filtration and the removal of sediments.

3. Subsurface Conditions

3.1. Soil Conditions

Detailed description with respect to the subsurface conditions can be found in the Geotechnical Report prepared for the proposed development. The subsurface conditions were found to consist of 0.1 to 0.7 m of topsoil overlying clayey silty sand glacial till. Comparison of the results of the particle size analysis with the grain size distribution charts provided in the Ontario Building Code Supplementary Standards SB-6 indicates that the Glacial Till could be classified as SM – silty sand / sand silt mixture in accordance with the Unified Soils Classification System.

3.2. Permeability of Native Soils

Permeability testing was completed on the native glacial till materials within the areas of the proposed rain garden and bioswales along the west sides of the development. The test results are included in Appendix I. The test results indicate that the permeability k for the native soils at the site range from 2.0 x 10^{-7} cm/s to 2.2 x 10^{-7} cm/s. The following table obtained from Appendix C of the CVC LID guide indicates the relationship between the Coefficient of Permeability, Percolation Time, and Infiltration Rate:

Table C1: Approximate relationships between hydraulic conductivity, percolation time and infiltration rate

Hydraulic Conductivity, K_{fs} (centimetres/second)	Percolation Time, T (minutes/centimetre)	Infiltration Rate, 1/T (millimetres/hour)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997. Supplementary Guidelines to the Ontario Building Code 1997. SG-6 Percolation Time and Soil Descriptions. Toronto, Ontario.

From the above, the native soils at the site would have an estimated infiltration rate of 12 mm/hr and a percolation time T of 50 minutes.

4. PROPOSED HYDROLOGIC MODEL

4.1. Design Storm Intensity

Intensity-Duration-Frequency curves derived from Meteorological Services of Canada rainfall data for the MacDonald-Cartier Airport in Ottawa were used to determine the expected rainfall intensity for a given duration and storm frequency.

The IDF formulae obtained from the OSDG are as follows:

100 year Intensity $= 1735.688 / (\text{Time in min} + 6.014)^{0.820}$
5 year Intensity $= 998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity $= 732.951 / (\text{Time in min} + 6.199)^{0.810}$

The data obtained from the IDF curves for the site was used to generate Chicago Storms with select durations and return periods up to and including the 100 year storm event. The 25 mm 4 hour Chicago storm is considered by the MECP to be the design storm for quality control purposes and was also included in the analysis. Table 4-1 summarizes the selected design storms included for analysis.

Table 4-1: Design Storms Considered

Quantity Control Storm Events	
Simulation 01.	Chicago 2 yr 3 hr
Simulation 02.	Chicago 2 yr 6 hr
Simulation 03.	Chicago 5 yr 3 hr
Simulation 04.	Chicago 5 yr 6 hr
Simulation 05.	Chicago 100 yr 3 hr
Simulation 06.	Chicago 100 yr 6 hr
Extreme Event – Historical Storms	
Simulation 08	August 4, 1988 Historical
Simulation 09	July 1, 1979 Historical
Quality Control Storm Event	
Simulation 07	25mm 4 hr Chicago

4.2. Methodology

The hydrologic modeling software, Visual OTTHYMO (V6.2) was used to assess pre- and post-development stormwater conditions at the site.

The pre-development were calculated using the NASHYD watershed command. The post-development conditions were also calculated using the NASHYD watershed command for the sub-catchment areas having an impervious ratio of less than 20 percent. The post-development conditions for the catchment areas having an impervious ratio of more than 20 percent were calculated using the STANDHYD watershed command.

The NASHYD hydrograph method uses the Nash instantaneous unit hydrograph which is made of a cascade of 'N' linear reservoirs and is used to model rural areas.

The STANDHYD hydrograph method is used to simulate runoff flows from urban watersheds having an impervious ratio of greater than 20%. The program uses two parallel standard instantaneous unit hydrographs modeled at the same time to combine the effective rainfall intensity over the pervious and impervious surfaces.

Both the pre and post-development conditions were modeled for quantity control purposes utilizing the Chicago storm distributions listed for Simulations 1 to 7 in Table 4-1above.

The post-development conditions were also modeled using the 25 mm 4 hour Chicago storm for quality control purposes.

4.3. OTTHYMO Storm Analysis Variables

As previously indicated, the stormwater runoff was calculated using both the NASHYD watershed command and the STANDHYD watershed command.

The NASHYD command uses the Nash instantaneous unit hydrograph which is made of a cascade of 'N' linear reservoirs and is used to model rural areas.

The NASHYD command uses the following inputs:
DT – Simulation time step increment (min) – must be shorter than TP
Area – Watershed or catchment area (hectares)
DWF – A constant Dry Weather Flow or Baseflow (m3/s) assumed to be 0 (doesn't change from pre to post development)
CN – SCS Modified Curve Number
IA – Initial Abstraction (mm)
N – Number of Linear reservoir used for derivation of the Nash Unit Hydrograph
TP – Unit hydrograph time to peak (hr)

The STANDHYD command uses the following inputs:

DT – Simulation time step increment (min) – must be shorter than TP
Area – Watershed or catchment area (hectares)
DWF – A constant Dry Weather Flow or Baseflow (m3/s) assumed to be 0 (doesn't change from pre to post development)
XIMP – Directly connected imperviousness (ratio of area which is impervious and directly connected to the storm sewer or discharge point
TIMP – Total impervious area (ratio of total impervious area to total catchment area)
LOSS – Loss method (Modified SCS Curve number)
SLPP – Pervious area ground slope
LGP – Length of flow over pervious area
MNP – manning's roughness coefficient for sheet flow over pervious area
SCP – Pervious area storage coefficient (set to allow program to calculate)
DPSI – Available impervious area depression storage
SLPI – Impervious area ground slope
LGI – Flow length of impervious area
MNI – Manning's Roughness coefficient for impervious area (channel flow)
SCI – Impervious area storage coefficient (set to allow program to calculate)

The Storm Analysis Model Variables for each catchment used in the storm water management model are summarized in Appendix A of this report.

4.3.1. Runoff Curve Numbers

The NasHyd hydrograph method which uses the SCS loss method for pervious areas was used to model both the pre- and post development conditions of the proposed warehouse development. Runoff Curve Numbers (CN) are utilized in the SCS hydrology method. The Curve Number is a function of soil type, ground cover, and antecedent moisture conditions. The Hydrologic soil type was chosen to be Group C for the predevelopment conditions at the site in keeping with the Geotechnical Report prepared for the proposed development. The subsurface conditions were found to consist of 0.1 to 0.7 m of topsoil overlying clayey silty sand glacial till. The proposed site grading will result in significant quantity of fill material being placed in the catchment areas controlled by low impact development techniques. The fill material in these areas is specified to be riprap over sandy loam material. These materials will have a significantly higher permeability. As such a soil classification of Group B was used for these areas in post development conditions. A calculation of the CN values for both the pre- and post-development conditions is presented in Appendix A.

The CN values used for each catchment area consist of a weighted average value based on the conditions and cover of the ground surface in the catchment area. For the purposes of analysis presented in this report, the surface cover was considered to be: Open Space and Pasture in good condition 74 (61 for post development); Woods/brush in fair condition (the woods/brush along the west side of the site is re-growth since 2008) 76 (N/A for post development); Unmaintained and overgrown Woods/brush in fair condition 70 (N/A for post development); Gravel 89 (85 for post development); and Impervious 98 (98 for post development). The CN values were taken from OSDG Table 5.9 and from USDA TR55.

4.3.2. Initial Abstraction and Potential Storage

The initial abstraction includes all losses before runoff begins, and includes water retained in surface depressions, water taken up by vegetation, evaporation, and infiltration. This value is related to characteristics of the soil and the soil cover. Initial abstraction is a function of the potential storage and is generally assumed to be equal to 0.2S where S is the potential storage.

It is considered that for lower CN values, the relationship IA = 0.2S tends to overestimate the initial abstraction resulting in underestimated peak runoff. As such suggested guidelines are as follows:

CN ≤ 70 IA = 0.075S
CN > 70 ≤ 80 IA = 0.10S
CN > 80 ≤ 90 IA = 0.15S
CN > 90 IA = 0.2S

The potential storage S is related to the runoff coefficient as follows:

$S = (25400/CN) - 254$

The initial abstraction IA and potential storage S values for both the pre- and post-development conditions are also presented in Appendix A.

4.3.3. Time of Concentration and Time to Peak

The time to peak is generally considered to be 2/3rds of the time of concentration of a catchment area. The calculation for the time of concentration of each catchment during pre-development conditions is summarized in Appendix B. The time of concentration of each catchment was determined using the Velocity method. The velocity method assumes that the time of concentration is the sum of travel times for segments along the hydraulically most distant flow path. The segments used in the velocity method may be of three types: sheet flow

T_s, shallow concentrated (overland) flow T_{sc}, and open channel flow T_c. The open channel flow has been modelled using the route Channel Command in OTTHYMO. The time to peak for the catchments analyzed during post-development conditions using the NASHYD command was take as 10 minutes in keeping with the OSDG for minimum time of concentration.

4.3.3.1. Travel time for sheet flow

Sheet flow is defined as flow over plane surfaces. Sheet flow usually occurs at the upper end of each individual catchment and typically occurs for no more than 30 metres before transitioning to shallow concentrated flow. The Manning's roughness coefficients used for sheet flow only apply for flow depth of less than 3 cm and vary from those used in shallow concentrated flow and open channel flow.

The travel time for sheet flow is calculated using the simplified Manning's Kinematic solution as follows:

$$T_s = \frac{0.091(nl)^{0.8}}{(P_2)^{0.5}S^{0.4}}$$

Where T_s = travel time, h
- n = Manning's roughness coefficient sheet flow
- l = sheet flow length,
- P_2 = 2-year 24-hour rainfall, = 48 mm
- S = Slope of land surface m/m

The Manning's roughness coefficient for sheet flow includes the effects of roughness as well as the effects of raindrop impact, drag over the surface, obstacles such as litter and rocks and transportation of sediment.

The Manning's n for sheet flow ranges from 0.8 for Woods (with dense underbrush and no clearing of deadfall and other detritus) to 0.018 for bare hard packed earth. The Manning's n for grass ranges from 0.15 (short grass prairie or lawn grass with bare patches), 0.24 (dense prairie grasses (long stems grasses)) to 0.41 (Bermuda grass or dense lush lawn grass).

The ground surface conditions at about the location where the flow divide between subwatersheds crosses the site consists of dense un-mown vegetation (dense prairie grasses). Since the sheet flow occurs at the upper end of the catchment area, the sheet flow during pre-development conditions on site will occur through this portion of the site. As such a Manning's roughness coefficient of 0.24 corresponding to dense prairie grass cover was used for pre-development conditions for the site.

4.3.3.2. Travel time for shallow concentrated flow

Shallow concentrated flow follows sheet flow and is expected to occur at depths of greater than 3 cm and less than 15 cm. The Manning's roughness coefficients for shallow concentrated or overland flow was obtained from Table 3-5 of the US EPA RM. The flow velocity used to calculate the time of travel for shallow concentrated flow was determined using Table 15-3 and Figure 15-4 of Chapter 15 of the USDA handbook (Included in Appendix B of this Report). Since the ground surface cover descriptions provided on Table 15-3 are agricultural in nature, they do not readily relate to the expected ground surface cover to be encountered in the proposed development. As such, the corresponding Manning's n value provided in Table 15-3 was used to relate the ground surface cover description used in Figure 15-4. From US EPA RM Table 3-5, when considering shallow concentrated flow or overland flow, a Manning's n of 0.075 is used for parks and lawns, 0.09 for dense grass and 0.12 for shrubs and bushes. A Manning's n of 0.202 is used for forest with heavy ground litter and hay meadows.

As previously discussed, it is expected that the majority of the shallow concentrated flow during pre-development conditions will occur through un-mown vegetation or pasture which corresponds to a Manning's n of 0.073. The flow velocity short grass pasture was obtained from Figure 15-4 using the slopes calculated for each catchment to obtain the flow velocity for shallow concentrated flow during pre-development conditions.

4.3.3.3. Travel time for open channel flow

Open Channel flow was not considered in either pre- or post- development conditions

4.4. Manning Coefficients – Post Development

The Manning Roughness (n) Coefficients for overland flow selected for impervious site areas (MNI) was assumed to be 0.013 based on the CofO Guidelines: Appendix 6-C Manning Coefficient values for street and gutter flow assuming weathered asphalt.

The Manning's roughness coefficient for pervious surfaces (MNP) was selected to be 0.25 based on sheet flow through good quality grass in the previous areas.

4.5. Catchment Areas

The catchment areas contributing runoff to the stormwater management works consist of onsite catchment areas. Due to the slope of the lands adjacent the site, there is no significant runoff contribution from adjacent properties onto or across the site. The catchment areas used in the design for the proposed development are presented in the attached drawings 221099-PRE and 221099-POST.

4.5.1. Delineation of Onsite Catchment Areas

The onsite catchment areas for pre-development conditions were delineated based on the topography obtained for the site area. In general the area of the site directing runoff to the Monahan Drain sub-catchment of the Jock River was considered as one catchment. The area of the site directing runoff to the Leamy Creek sub-catchment of the Jock River was divided between the area directing runoff to the ditch along Fallowfield Road and the area directing runoff to the ditch along Moodie Drive.

The catchment areas used in the analysis during post-development conditions for the design of the stormwater management facility are presented in the attached drawing 221099-POST – Post-Development Drainage Plan. These catchment areas have been delineated based on the proposed grading of the development and the proposed building layout.

5. RECEIVING WATER BODY – JOCK RIVER

As previously stated, the proposed development is within the Jock River watershed. A subwatershed report was generated for the Jock River in 2016. This report provides an assessment of the Jock River watershed as well as proposed actions which could be completed to preserve and improve the condition of the Jock River. The proposed development is within the lower urban reaches of the Jock River and has no significant forest cover and no wetland cover. The quality of the water in the Jock River ranges from good to Poor depending on specific location and adjacent land uses. In order to mitigate the effects of development and urbanization on the watershed, the Jock River report recommends that best practices for stormwater management including low impact development measures be incorporated within proposed development. In addition, tree planting to the greatest extent possible is encouraged.

Additional recommended actions such as maintaining setbacks to watercourses and wetlands as well as preservation of forests are not applicable to the site as these features are not present on the site.

6. PRE-DEVELOPMENT STORMWATER ANALYSIS

6.1. On Site Pre-Development Catchments

6.1.1. Onsite Conditions

As previously indicated, the property is generally rectangular in shape with an area missing from the northwest corner of the rectangle. Historical imagery available on the geoOttawa website indicates that the site was historically occupied by a tree nursery with greenhouses and a single family dwelling. These images show that the site was last used as nursery more than 15 years ago and that the greenhouses were demolished between 2019 and 2021. The existing dwelling was also removed from the site prior to 2025. The ground surface across the site has a general downward slope from about the center of the site to the west of about 2.5 percent and from the centre to the east of about 1.3 percent and to the north of about 2.1 percent. Current site drainage takes the form of sheet and shallow concentrated flow following the general slope of the site.

The vegetative communities on the east portion of the site and on the east half of the west portion of the site consist of over grown weeds and grasses. There is new growth forest along the western property line, with over grown brush between the forest and the over grown weeds and grasses.

6.1.2. Onsite Delineation Catchments and Curve Numbers

As previously indicated, the general flow direction during pre-development conditions is from the center to the west and east. The flow in the eastern catchment is further divided between the areas that direct runoff to Fallowfield Road and to Moodie Drive. As such, the onsite pre-development catchment areas were divided into 3 catchments. Based on the ground surface cover the Runoff Curve Numbers for the onsite pre-development conditions are as shown in Table 6-1 below:

Table 6-1: Pre-Development Runoff Curve Numbers

Catchment	Surface	Area (Ha)	CN	Weighted Avg. CN
Monahan Drain Subwatershed				
PRE-W (2.072 ha)	Woods Fair condition	0.779	76	72.3
	Brush, weeds and grass fair condition	1.273	70	
Leamy Creek Subwatershed				
PRE-E (3.703 ha)	Brush, weeds and grass	3.414	70	71.0
	Weeds and Grass/ open space in good condition	0.130	74	
	Gravel	0.011	89	
	Impervious	0.148	98	
PRE-N (0.832 ha)	Brush, weeds and grass	0.684	70	71.0
	Weeds and Grass/ open space in good condition	0.131	74	
	Impervious	0.0170	98	

6.2. Pre-Development Runoff

As previously indicated, the runoff criteria from a quantity control perspective were given as: post-development peak runoff rate for the 100 year design storm is to be equal to or less than pre-development peak runoff rate for the 2 year design storm of the same duration and stormwater discharge must be directed to a legal and sufficient outlet.

The pre-development peak runoff rate and runoff volume was calculated using the OTTHYMO model. The pre-development peak runoff rates for each design storm event were assessed for the entire site in order to assess the allowable post development runoff rates from the site. The pre-development runoff rate to the Monahan Drain subcatchment area was also assessed independent of the remainder of the site to determine the impact of the development to the adjacent property as runoff from the site directed to the Monahan Drain subcatchment flows across adjacent private property. Table 6-2 summarizes the pre-development peak runoff rate and runoff volumes calculated using the OTTHYMO model for the entire site. Appendix C contains pre-development OTTHYMO summary output data as well as the detailed output data for the last link in the model. The detailed output data for the last link provides a summary of the predevelopment outflow from the proposed.

Table 6-2: Pre-Development Peak Runoff from Entire Site

Design Storm Event		**Pre-Development Runoff Rate**	**Runoff Volume (1)**
		(m^3/s)	**(mm)**
Simulation 01.	Chicago 2 yr 3 hr	0.052	3.81
Simulation 02.	Chicago 2 yr 6 hr	0.063	5.55
Simulation 03.	Chicago 5 yr 3 hr	0.116	7.8
Simulation 04.	Chicago 5 yr 6 hr	0.136	10.74
Simulation 05.	Chicago 100 yr 3 hr	0.382	23.17
Simulation 06.	Chicago 100 yr 6 hr	0.434	29.93
Simulation 07	25mm 4 hour Chicago	0.016	1.89
Simulation 08	August 4, 1988 Historical	0.522	28.79
Simulation 09	July 1, 1979 Historical	0.573	31.04

Table 6-3 summarizes the pre-development peak runoff rate and runoff volumes calculated using the OTTHYMO model for the portion of the site directing runoff west towards the Monahan Drain subwatershed:

Table 6-3: Pre-Development Peak Runoff Contributing to Monahan Drain Subwatershed

Design Storm Event		**Pre-Development Runoff Rate**	**Runoff Volume (1)**	**Runoff Volume (2)**
		(m^3/s)	**(mm)**	**(m^3)**
Simulation 01.	Chicago 2 yr 3 hr	0.018	4.11	85
Simulation 02.	Chicago 2 yr 6 hr	0.022	5.92	123
Simulation 03.	Chicago 5 yr 3 hr	0.039	8.27	171
Simulation 04.	Chicago 5 yr 6 hr	0.046	11.32	235
Simulation 05.	Chicago 100 yr 3 hr	0.126	24.1	499
Simulation 06.	Chicago 100 yr 6 hr	0.142	31.02	643
Simulation 07	25mm 4 hour Chicago	0.006	2.08	43
Simulation 08	August 4, 1988 Historical	0.169	29.85	618
Simulation 09	July 1, 1979 Historical	0.186	32.15	666

(1) Runoff volume is calculated by OTTHYMO in terms of mm of depth.
(2) Runoff volume in cubic metres is calculated by multiplying the runoff volume depth by the area of the catchment area.

7. POST-DEVELOPMENT MODEL

7.1. Post-Development Catchment Areas

7.1.1. Onsite Post-Development Catchment Areas

7.1.1.1. Post-development Conditions

As previously indicated, the proposed development will consist of 5 Industrial Warehouse Buildings together with associated parking, roadway and truck turning areas. The proposed warehouses will be rectangular in shape and oriented in an east-west manner. Buildings A, B and C will be located on the East side of the development. Buildings D and E will be located on the west side of the development. Footprint areas of the buildings will range from approximately 3,676 square metres to 4,629 square metres. The majority of the units within the buildings will contain principal entrances with potential for office space as well as loading bays at-grade arranged in a saw-tooth manner. End units offer additional building frontage but do not provide loading bay access.

Truck access is provided by the private approach from Moodie Drive in the southwest corner of the site. Loading bays are arranged between Buildings A and B, along the South side of Building C, and between Buildings D and E. Passenger vehicle parking is provided along the North side of Buildings A and D, between Buildings B and C and along the South side of Building E. Additional parking is provided along the ends of each building.

Storm runoff is directed by means of an onsite sewer system consisting of a series of roof drains, catch basins, manhole structures, subterranean storm chambers, and storm sewer pipes. Site grading is proposed such that storm runoff is directed away from each building to be intercepted by catch basins and directed toward the on-site stormwater management facility for temporary detention, filtration and release. Release of the storm runoff on the roof of each building will be controlled by roof drains, allowing for a temporary storage of the accumulated runoff atop each building.

The post-development catchment areas were delineated based on the proposed site grading. There are five areas around the perimeter of the proposed development that do not direct runoff to the proposed stormwater management facility along the east side of the site. Runoff from these four areas is either uncontrolled or is controlled by low impact design techniques only. These five areas include minimal impervious surface area and as such have been modeled using the NASHYD watershed command.

The remaining portion of the site contains the proposed buildings with associated parking the roadways and the truck turning and access areas. These post-development catchments were modeled using the STANDHYD due to the high percentage of impervious surface area in each catchment.

7.1.1.2. Delineation of Catchments

As previously indicated, the five perimeter catchment areas consisting largely of pervious areas were accessed using the NASHYD watershed command. These catchments were delineated based on their discharge locations and method of stormwater control.

These catchments are further delineated into two subcategories; uncontrolled and controlled by Low Impact Development (LID) techniques.

These five catchments area as follows:

- C-L-A – The pervious area between Building A and the west property line. This area discharges to the roadside ditch along Fallowfield Road which will direct the runoff towards the Leamy Creek subwatershed. This area will be controlled by means of an enhanced grass swale.
- C-L-B – The pervious area between Building D and the north property line. This area discharges to an existing swale at the southwest corner of the site towards the Monahan Drain subwatershed along existing flow paths. This area will be controlled by means of an enhanced grass swale.
- C-L-C – The pervious area between the proposed development and the west property line as well as the south property line for about 140 m. This area discharges to an existing swale at the southwest corner of the site towards the Monahan Drain subwatershed along existing flow paths. This area will be controlled by means of an enhanced grass swale.
- C-L-D – The pervious area between the proposed development and the south property line. This area discharges to the roadside ditch along Moodie Drive. This area will be controlled by means of an enhanced grass swale. This swale is subdrained toward Moodie.
- C-U-A – The pervious area around the north, and east property lines. This area is graded toward the roadside ditches along Fallowfield and Moodie.
- C-U-B – The pervious area around the north, west and south property lines. This area is graded to the adjoining properties, discharging to an existing swale at the southwest corner of the site towards the Monahan Drain subwatershed along existing flow paths.

The remainder of the site consists of the impervious roof, roadway, access/turning areas and parking areas, the pervious landscaped areas adjacent the buildings not included in the previously listed catchments and the pervious area surrounding the proposed stormwater management facility. These catchment areas were modeled using the STANDHYD watershed command and are delineated into six catchments on drawing 221099-Post. These delineations were made based on flow control and consist of the five rooftop storage areas and two catchment areas consisting of the remainder of the impervious area. These two areas were determined based on flow controls allowing placement of storm chambers to attenuate post-development runoff.

The catchment areas used in the post-development analysis have the following properties. More details are provided in Appendix A.

Table 7-1: Post-Development Catchment Areas

Catchment	Total Area (ha)	Weighted Average CN	Approx. Equivalent Runoff Coef C	Initial Abstraction (mm)	Percent Impervious (%)	Average Slope Impervious (%)	Average Slope Pervious (%)
C-L-A	0.081	61.0	0.25	13.0	0	N/A	N/A
C-L-B	0.123	61.0	0.25	13.0	0	N/A	N/A
C-L-C	0.224	61.0	0.25	13.0	0	N/A	N/A
C-L-D	0.248	62.7	0.27	12.1	0	N/A	N/A
C-U-A	0.131	61.6	0.26	12.7	2	N/A	N/A
C-U-B	0.207	61.0	0.25	13.0	0	N/A	N/A
C-R-A	0.395	N/A	0.90	N/A	99	1.0	1.0
C-R-B	0.463	N/A	0.90	N/A	99	1.0	1.0
C-R-C	0.408	N/A	0.90	N/A	99	1.0	1.0
C-R-D	0.368	N/A	0.90	N/A	99	1.0	1.0
C-R-E	0.368	N/A	0.90	N/A	99	1.0	1.0
C-P-A	2.294	N/A	0.74	N/A	73	3.0	1.5
C-P-B	1.295	N/A	0.88	N/A	96	3.0	1.5

7.1.1.3. Comparison of Pre- to Post- Development Onsite Conditions

As previously indicated, the pre-development onsite catchments were divided based on the existing topography and receiving subwatershed. The above post-development catchments were combined into two post-development areas based on the receiving subwatersheds in order to directly compare the pre- and post- development catchments to illustrate the affect of the proposed development on the catchments. This comparison is provided in Table 7-2.

Table 7-2: Comparison of Pre- to Post-Development Catchments

Catchment	Total Area (ha)	Percent Impervious Area %	Weighted Average Curve Number CN	Approximate Equivalent Runoff Coefficient C
Discharge to Monahan Drain Subwatershed				
Pre	2.072	0	72.3	0.3
Post	0.347	0	61.0	0.25
Discharge to Leamy Creek Subwatershed				
Pre	4.535	3.4	71.0	0.3
Post	6.260	78.0	91.3	0.77

7.2. Stormwater Conveyance - Controlled Areas

7.2.1. Sheet Flow to Storm Swale

The runoff originating on the sidewalk, landscaped area, and parking / roadway east of Buildings A, B, and C will be conveyed by sheet flow to the curb along east edge of the roadway. The finished grade elevation along the curb will be varied with longitudinal slopes of plus or minus 1 percent to form local high and low spots along the curb. A 0.5 m wide curb cut will be inserted at each low spot to outlet the runoff into the storm swale.

7.2.2. Roof Drainage

The runoff originating on the roof of each building will be discharged by means of a series of WATTS Accutrol Roof Drains (Product information is included in Appendix D) to storm leads which in turn will outlet to the storm sewers conveying the runoff from the loading dock trench drains to the subsurface storage chambers.

The storm leads conveying the roof runoff will be designed by the mechanical engineer. The roof will be fitted with scuppers along both the front and back of the building to ensure that the maximum ponding depth of 0.15 metres is not exceeded.

7.2.3. Storm Chambers

NDS SC-34 and NDS SC-18 storm chambers or similar product (Product information is included in Appendix D) will be placed along the internal roadways within the development as shown on the servicing plan drawing 221099-SER to convey the runoff collected from the trench drains and roof discharge to the proposed stormwater storage swale along the east side of the site. The NDS SC-34 storm chambers have a bottom width of 1.52 m, and a height of 0.86 m. The NDS SC-18 storm chambers have a bottom width of 0.97 m, and a height of 0.46 m. The chambers will be placed level.

The storm chambers will outlet to the storm swale by means of 375 mm diameter storm sewers. The storm chambers are intended to provide additional stormwater storage at the same elevation as the storm swale. It is intended that the outlet restriction from the storm swale will result in backup of stormwater within the chambers. There will be no impervious liner below the chambers. This means that there will be sum infiltration into the underlying soils below the chambers. Since the subsurface soils are expected to consist of glacial till of low permeability, the infiltration rate from the chambers to the soils was not considered of significant magnitude to include in the stormwater management calculations.

7.2.4. Capacity of Storm Chambers

The capacity of the storm chambers to attenuate the flow demand determined for all design storm events was determined using OTTHYMO. It is noted that the roof drainage system and leaders will be designed by the mechanical engineer. Roof leaders of 150mm diameter and roof slope of 1% were used for the purposes of calculations. It is considered that each bay comprising each building will be fitted with its own roof leader.

The summary presented in Appendix F indicates that the proposed storm chambers will be able to attenuate the flow demands during all design storm events

7.3. Stormwater Conveyance – Low Impact Development Areas

7.3.1. Rain Garden along West Property Line Adjacent to Fallowfield (C-L-A)

Catchment area C-L-A consists of the area west of the private approach off of Fallowfield. Runoff originating on this catchment will be directed to the rain garden which will be constructed along the length of the catchment. The rain garden is intended to collect the runoff and allow it to infiltrate into the underlying soils.

Discharge will be provided by infiltration to a subdrain within the east slope of the rain garden which will outlet to the roadside ditch along Fallowfield. There is not anticipated to be any significant flow within the rain garden as all of the runoff entering the bio swale is intended to infiltrate.

7.3.2. Enhanced Swale along North Property Line (C-L-B)

Catchment area C-L-B consists of the area between the parking surface and C-U-A along the north property line adjacent to the neighbouring residential lots. Runoff origination on this catchment will be directed to an enhanced swale sloped from east to west at a grade of about 1%. To allow for extended detention of runoff, check dams with a height of 0.3 m will be provided at increments of 30 m. The base of the enhanced swale will be underlaid with an amended topsoil layer of about 0.15 m which is well suited for extended periods of wet soil conditions immediately following major storm events. Additionally, deeply rooted plantings adapted to both wet and dry conditions will be recommended.

The interior side wall of the enhanced swale will provided by the back slope of the parking surface adjacent to catchment area C-L-B. The exterior side wall of the enhanced swale will be formed by imported soils consisting of sandy loam and/or sand. These imported soils will provide ample permeability to allow for infiltration through the earthen berm.

The enhanced swale has been constructed in imported fill material with the bottom above the existing ground surface. Stormwater from the enhanced swale will infiltrate into the imported material which has sufficient storage capacity to accommodate the volume of the infiltration above the existing ground surface. As such, this LID is not relying on the ability of the native soils to receive the runoff during or immediately following a storm event. Any seasonally high ground water in the native soils will not impede the function of the LID.

7.3.3. Enhanced Swale along West and South Property Lines (C-L-C)

Catchment area C-L-C consists of the area between the parking surface and C-U-A along the west property line and about the westernmost 140 m of the site along the south property line adjacent to the neighbouring agricultural lots. Runoff origination on this catchment will be directed to an L-shaped enhanced swale which slopes from north to south and from east to west and combining at the southwest corner of the site. Each section of the combined enhanced swale slopes at a grade of about 1%. To allow for extended detention of runoff, check dams with a height of 0.3 m will be provided at increments of 30 m. The base of the enhanced swale will be underlaid with an amended topsoil layer of about 0.15 m which is well suited for extended periods of wet soil conditions immediately following major storm events. Additionally, deeply rooted plantings adapted to both wet and dry conditions will be recommended.

The interior side wall of the enhanced swale will provided by the back slope of the parking surface adjacent to catchment area C-L-B. The exterior side wall of the enhanced swale will be formed by imported soils consisting of sandy loam and/or sand. These imported soils will provide ample permeability to allow for infiltration through the earthen berm similarly to the enhanced swale previously discussed in section 7.3.2.

7.3.4. Linear Subdrained Rain Garden along South Property Line (C-L-D)

Catchment area C-L-D consists of the area between the parking surface and the south property line adjacent to the neighbouring agricultural and residential lots. Runoff origination on this catchment will be directed to a linear subdrained rain garden which slopes at a grade of about 0.3%. To allow for extended detention of runoff, spreaders with a height of 0.3 m will be provided at increments of 25 m. The base of the enhanced swale will be underlaid with an amended topsoil layer of about 0.3 m which is well suited for extended periods of wet soil conditions immediately following major storm events. Additionally, deeply rooted plantings adapted to both wet and dry conditions will be recommended.

Given that the proposed elevation for the linear subdrained rain garden provides little cover over the existing soils, infiltration is considered to be negligible into the underlying soils. As such, this area is subdrained to allow runoff to be conveyed to the roadside ditch along Moodie.

7.4. Stormwater Conveyance - Uncontrolled Areas

7.4.1. Uncontrolled Catchment along North and East of Site (C-U-A)

Runoff from catchment area C-U-A will be directed without restriction, channelization or control to the roadside ditch along the south side of Fallowfield Road and west side of Moodie Drive. The runoff from this catchment will originate on the landscaped surfaces along the perimeter of the development.

7.4.2. Uncontrolled Catchment along West and South of Site (C-U-B)

Catchment area C-U-B consists of a strip along the west and south sides of the proposed development which ranges in width from about 3 m at the east end of the site to 12 m in the southwest corner of the site. This catchment also wraps along the north property line in the northwest corner of the site. The majority of this catchment consists of the backslope of earthen berms created to ensure attenuation of stormwater within the LID controlled catchments C-L-B, C-L-C, and C-L-D.

The backslope ranges from about a 2:1 slope near the northwest corner to a 6:1 slope near the southwest corner of the site. To stabilize the backslope riprap protection will be provided along the length of the entire catchment area.

8. Post-Development Quantity Control – Flow Rate

As previously indicated, the post-development peak runoff rate occurring during a 100 year design storm event is to be controlled to the runoff rate of the 2 year pre-development design storm of the same duration.

Due to the increased impervious area and decreased time of concentration resulting from the proposed development, the post-development unrestricted runoff rates from the site will be much greater than the pre-development runoff rates.

In order to meet the stormwater management criteria for the site with respect to runoff rate, temporary flow detention will be provided by means of directing the runoff from the controlled areas of the development (by the conveyance means indicated above) to the stormwater storage chambers and storage swale. The discharge rate from the stormwater storage areas will be restricted by means of an outlet control structures

In addition, low impact design techniques were incorporated into four of the six uncontrolled catchments to reduce the runoff from these uncontrolled areas.

8.1. Low Impact Development Areas

8.1.1. Catchment Area C-L-A

It is noted that area of the rain garden comprises the vast majority of the catchment area, and therefore the resultant storage requirement is far surpassed by the available storage. The rain garden will function as a large level area of green space within the development, suitable for various plantings. These plantings also provide a buffer between the development and the residential lots to the west.

As described in section 7.3.1, catchment area C-L-A consists of the vegetated area within the area between the private approach on Fallowfield and the west property line. A rain garden is provided to allow for attenuation of all runoff originating in this catchment area. The rain garden is rectangular in shape with rounded ends and having a width of about 4.5m and length of about 118m along the depth. The rain garden will have a 0.3 m thickness of amended topsoil followed by native soils. An infiltration rate of 0.075 m/hr was used for the amended topsoil and an infiltration rate of 0.0051 m/hr was used for the native underlying soils.

A subdrain will be installed within the side slope of the rain garden to provide an outlet to Fallowfield given the relatively low infiltration rate of the underlying soils. The base of the rain garden and the subdrain will be at a grade of 0.3%. For the OTTHYMO simulations of the selected storm events, the subdrain was omitted as the rain garden is designed to have enough volume for all major storm events. The subdrain is only provided as a redundancy measure to allow a flow path to the municipal drain watershed directly without effecting the neighbouring properties.

The demand on the rain garden along the west side of building A for the various storm events is summarized in Table 8-1.

Table 8-1: Rain Garden - Catchment Area C-L-A

Design Storm Event	**Peak Runoff Rate (m^3/s)**		**Surface Storage Volume (m^3)**	
	In	**Out**	**Required**	**Available**
Chicago 2 yr 3 hr	<0.001	0.000	15.40	200.8
Chicago 2 yr 6 hr	<0.001	0.000	7.56	200.8
Chicago 5 yr 3 hr	0.001	0.000	17.23	200.8
Chicago 5 yr 6 hr	0.001	0.000	10.13	200.8
Chicago 100 yr 3 hr	0.004	0.000	27.73	200.8
Chicago 100 yr 6 hr	0.005	0.000	26.19	200.8
25mm 4 hour Chicago	<0.001	0.000	11.57	200.8
August 4, 1988 H	0.007	0.000	28.49	200.8
July 1, 1979 H	0.007	0.000	32.92	200.8

8.1.2. Catchment Area C-L-B

A physical description of catchment area C-L-B is provided in section 7.3.2. Runoff originating on this catchment will be directed by means of an enhanced grassed swale which will be constructed along the length of the catchment. The swale is intended to collect the runoff and allow it to infiltrate into the underlying soils. Overflow of the enchanced swale will consist of sheet flow to the neighbouring properties. The design of the enchanced swale restricts any peak overflow to significantly less than the pre-development flow to the adjacent properties. The enhanced swale has been designed with a maximum storage depth of about 0.5m with a check dam or overflow height of 0.30 m. The swale will have a bottom width of 0.3 metres and 3 horizontal to 1 vertical side slopes. The swale has a longitudinal slope of about 1 percent. The enhanced swale will be constructed with 0.3 m of amended topsoil below the bottom of the swale. The enhanced swale should be planted with vegetation that can withstand periods of flooding. The OTTHYMO Model Information and detailed output for the enhanced swale is included in Appendix G.

The demand on the enhanced swale within catchment area C-L-B for the various storm events is summarized in Table 8-2.

Table 8-2: Enhanced Swale – C-L-B

Design Storm Event	Peak Runoff Rate (m^3/s)	
	In	Overflow
Chicago 2 yr 3 hr	<0.001	0.000
Chicago 2 yr 6 hr	<0.001	0.000
Chicago 5 yr 3 hr	0.002	0.000
Chicago 5 yr 6 hr	0.002	0.000
Chicago 100 yr 3 hr	0.007	0.005
Chicago 100 yr 6 hr	0.008	0.006
25mm 4 hour Chicago	<0.001	0.000
August 4, 1988 H	0.010	0.009
July 1, 1979 H	0.010	0.009

8.1.3. Catchment Area C-L-C

A physical description of catchment area C-L-C is provided in section 7.3.3. Runoff originating on this catchment will be directed by means of an enhanced grassed swale which will be constructed along the length of the catchment with a low point in the southwest corner of the site. The swale is intended to collect the runoff and allow it to infiltrate into the underlying soils. Overflow of the enchanced swale will consist of sheet flow to the neighbouring properties. The design of the enchanced swale restricts any peak overflow to significantly less than the pre-development flow to the adjacent properties. The enhanced swale has been designed with a maximum storage depth of about 0.5m with a check dam or overflow height of 0.30 m. The swale will have a bottom width of 0.3 metres and 3 horizontal to 1 vertical side slopes. The swale has a longitudinal slope of about 1 percent. The enhanced swale will be constructed with 0.3 m of amended topsoil below the bottom of the swale. The enhanced swale should be planted with vegetation that can withstand periods of flooding. The OTTHYMO Model Information and detailed output for the enhanced swale is included in Appendix G.

The demand on the enhanced swale within catchment area C-L-C for the various storm events is summarized in Table 8-3.

Table 8-3: Enhanced Swale – C-L-C

Design Storm Event	**Peak Runoff Rate (m^3/s)**	
	In	**Overflow**
Chicago 2 yr 3 hr	0.001	0.000
Chicago 2 yr 6 hr	0.001	0.000
Chicago 5 yr 3 hr	0.003	0.000
Chicago 5 yr 6 hr	0.004	<0.001
Chicago 100 yr 3 hr	0.012	0.011
Chicago 100 yr 6 hr	0.014	0.013
25mm 4 hour Chicago	<0.001	0.000
August 4, 1988 H	0.018	0.017
July 1, 1979 H	0.018	0.017

8.1.4. Catchment Area C-L-D

A physical description of catchment area C-L-D is provided in section 7.3.4. Runoff originating on this catchment will be directed by means of a linear subdrained rain garden which will be constructed along the length of the catchment with a low point in the southeast corner of the site. The swale is intended to collect the runoff and allow it to infiltrate into the underlying soils. Given the low permeability of the underlying soils, this catchment will drain by way of a 100 mm diameter perforated subdrain. Overflow of the enchanced swale will consist of sheet flow to the neighbouring properties. The design of the enchanced swale restricts any peak overflow to significantly less than the pre-development flow to the adjacent properties. The rain garden has been designed with a surface water storage depth of about 0.25m with a check dam or overflow height of 0.25 m. The series of rain gardens will have a bottom width of between 1 and 10 metres. The subdrain and the base of the rain gardens have a longitudinal slope of about 0.3 percent. The rain gardens will be constructed with 0.3 m of amended topsoil below the bottom of the swale. The enhanced swale should be planted with vegetation that can withstand periods of flooding. The OTTHYMO Model Information and detailed output for the enhanced swale is included in Appendix G.

The demand on the enhanced swale within catchment area C-L-D for the various storm events is summarized in Table 8-4.

Table 8-4: Linear Subdrained Rain Gardens - Catchment Area C-L-D

Design Storm Event	Peak Runoff Rate (m^3/s)		Surface Storage Volume (m^3)	
	In	Out	Required	Available
Chicago 2 yr 3 hr	0.001	<0.001	4	132
Chicago 2 yr 6 hr	0.002	<0.001	5	132
Chicago 5 yr 3 hr	0.003	<0.001	10	132
Chicago 5 yr 6 hr	0.004	<0.001	14	132
Chicago 100 yr 3 hr	0.013	<0.001	37	132
Chicago 100 yr 6 hr	0.015	<0.001	48	132
25mm 4 hour Chicago	<0.001	<0.001	1	132
August 4, 1988 H	0.020	<0.001	46	132
July 1, 1979 H	0.020	<0.001	52	132

8.2. Roof Drainage

As previously indicated, the roofs of each building will be designed to provide stormwater storage. At the time of this report, detailed architectural drawings are not available. Each roof area was separated into ponding areas with each individual ponding area having a length of 30 metres and width of 15 metres. The slope of the ponding area along the length is shown as 1% and along the width is shown as 2%. This results in a difference of 0.15 metres between the outlet and the edge of the ponding area. These ponding areas were limited by the irregular geometry resulting from the "zipper-style" loading docks along the back wall of each building.

Each ponding area on each roof will be fitted with a WATT Accutrol Roof Drain with a single slot. The resulting stage storage design curve for each roof has been included in Appendix E. A Route Reservoir block was added to the OTTHYMO hydrologic model following each roof catchment. Each of the reservoir blocks was based on the respected stage storage curve for the building. The discharge from each reservoir block was added to the ground surface based catchments in the OTTHYMO hydrologic model. The OTTHYMO Model Information and detailed output for each roof is included in Appendix E.

To allow for proper attenuation of stormwater runoff, the impermeable surfaces within the parking/trafficked road area of the site (along with limited vegetated areas within the controlled boundary) have been divided into two catchment areas. The storage demand and release rate from each roof which drains directly to catchment area C-P-A for the various storm events is summarized in Table 8-4.

Table 8-5: Roof Storage and Release Rates – Release to C-P-A

Building:	Building A			Building B			Building C		
Total Drains:	8			10			8		
Available Storage:	171 m^3			213 m^3			171 m^3		
Design Storm Event	Peak Runoff Rate (m^3/s)								
	In	Out	Overflow	In	Out	Overflow	In	Out	Overflow
Chi. 2 yr 3 hr	0.083	0.008	0.000	0.098	0.013	0.000	0.086	0.011	0.000
Chi. 2 yr 6 hr	0.083	0.008	0.000	0.098	0.013	0.000	0.086	0.011	0.000
Chi. 5 yr 3 hr	0.114	0.009	0.000	0.133	0.015	0.000	0.117	0.012	0.000
Chi. 5 yr 6 hr	0.114	0.009	0.000	0.133	0.015	0.000	0.117	0.012	0.000
Chi. 100 yr 3 hr	0.195	0.010	0.001	0.229	0.019	0.005	0.202	0.015	0.067
Chi. 100 yr 6 hr	0.195	0.010	0.053	0.229	0.019	0.005	0.202	0.015	0.050
25mm 4 hr Chi.	0.054	0.007	0.000	0.064	0.011	0.000	0.056	0.010	0.000
Aug 4, 1988 H	0.168	0.010	0.158	0.196	0.019	0.266	0.174	0.015	0.159
Jul 1, 1979 H	0.117	0.010	0.142	0.137	0.019	0.077	0.121	0.015	0.128

The storage demand and release rate from each roof which drains directly to catchment area C-P-B for the various storm events is summarized in Table 8-4.

Table 8-6: Roof Storage and Release Rates – Release to C-P-B

Building:	Building D			Building E		
Total Drains:	8			8		
Available Storage:	171 m^3			171 m^3		
Design Storm Event	Peak Runoff Rate (m^3/s)					
	In	Out	Overflow	In	Out	Overflow
Chi. 2 yr 3 hr	0.078	0.011	0.000	0.078	0.011	0.000
Chi. 2 yr 6 hr	0.078	0.011	0.000	0.078	0.011	0.000
Chi. 5 yr 3 hr	0.106	0.012	0.000	0.106	0.012	0.000
Chi. 5 yr 6 hr	0.106	0.012	0.000	0.106	0.012	0.000
Chi. 100 yr 3 hr	0.182	0.015	0.000	0.182	0.015	0.000
Chi. 100 yr 6 hr	0.182	0.015	0.004	0.182	0.015	0.004
25mm 4 hr Chi.	0.051	0.009	0.000	0.051	0.009	0.000
Aug 4, 1988 H	0.157	0.015	0.086	0.157	0.015	0.086
Jul 1, 1979 H	0.109	0.015	0.061	0.109	0.015	0.061

8.3. Stormwater Storage Swale and Storm Chambers.

8.3.1. Storm Chambers

As previously indicated, NDS SC34 storm chambers will be installed below the internal circulation roadways within the proposed development as shown on drawing 221099-SER. The storm chambers will discharge into the storage swale by means of a 375 mm diameter sewer. There will be no outlet restriction on the storm chambers. Additionally, NDS SC18 storm chambers will be installed within the roadway south of building E.

From the CVC LID Guide, the depth of the stone layer below the storage chambers is dependent on the native soil infiltration rate, porosity (void space ratio) of the gravel storage layer media (i.e, aggregate material used in the stone reservoir) and the targeted time period to achieve complete drainage between storm events. The maximum allowable depth of stone below the chambers is given as:

$d_{r\ max} = i * t_s/V_r$

where: $d_{r\ max}$ = Maximum stone depth (mm)

i = Infiltration rate for native soils (mm/hr) = 3.6 mm/hr

V_r = Void space ratio for aggregate used = 0.4

t_s = Time to drain (design for 48 hour time to drain is recommended)

$d_{r\ max}$ = 432 mm

The initial design was completed using an estimated infiltration rate corresponding to 3.6 mm/hr. As discussed in Section 3.2 above, permeability test results indicate that the actual infiltration rate is 12 mm/hr. The design calculation for infiltration was not revised in order to provide a conservative calculation and add a factor of safety to the design.

The storm chambers have been designed as follows:

- The chambers will be installed flat.
- The NDS SC-18 tanks are to be constructed on a minimum 150mm of clear crushed stone below the modules.
- The NDS SC-34 tanks are to be constructed on a minimum 228mm of clear crushed stone below the modules.
- The clear stone will be installed with a constant bottom elevation below each set of chambers. Clear stone is also to be used to backfill the tanks to a minimum of 150mm of cover over the tanks.

- The clear crushed stone shall be comprised of ¾”-2” washed angular crushed stone conforming to AASHTO #3 or #4.
- The clear stone has an assumed void ratio of 0.4, which is the industry standard
- The storm chambers shall be installed per NDS Design Worx installation guidelines and specifications.
- Discharge from the storm chambers will be controlled by the outlet controls from the storm water storage swale and within CB-64 during design storm events.

8.3.2. Stormwater Storage Swale

The stormwater storage swale has been designed as follows:

- The bottom of the storage swale has an average length of about 133 m and a width of about 11.6 m. The bottom slopes downward from an elevation of 115.80 m at the south end of the swale to 115.70 m at the north end of the swale.
- The storm sewers will discharge into the storage swale at the southwest and northwest corners.
- The outlet from the swale will be at the northeast corner of the swale.
- A 0.6 m high wall consisting of a row of precast concrete blocks having nominal dimensions of 0.6 m x 0.6 m x 1.2 m will be extended out from the north end of the swale midway between the stormwater inlet at the northwest corner and the stormwater outlet. The wall will have length of 9.6 m and will prevent direct flow from the northwest inlet to the outlet of the swale during storm events of less than or equal to a 2 year storm event.
- The storage swale has been constructed with a maximum depth before overflow of 1.0 metres and side slopes of about 3 horizontal to 1 vertical.
- Discharge from the swale will be controlled by an outlet structure at the north east corner of the site. Details of the outlet structure are provided in section 8.3.3.1 of this report.
- Overflow from the storage swale will be over the east side of the swale and will be directed to the roadside ditch along the west side of Moodie Drive.
- The topsoil should be removed from below the footprint of the proposed storage swale and stockpiled.
- The bottom of the storage swale should be further excavated as required to a subgrade level 0.45 m below the bottom of the swale.
- The subgrade surface should be scarified or ripped using the teeth of an excavator following removal of the topsoil.
- The storage swale bottom soil structure should consist of a layer of 150 mm thickness of 20mm clear stone placed on the subgrade materials topped with a 300 mm thickness of amended existing site topsoil.

- The existing site topsoil can be stripped and stock piled prior to amending. The site topsoil should be amended by mixing 1 part amendment material with 3 parts by volume of site topsoil. The amendment material shall consist of organic matter primarily leaf, yard and bark waste compost of 20 – 30% by dry weight as determined by loss-on-ignition. No uncomposted manure should be used.
- The swale shall be seeded with deep rooted grasses and planted with vegetation that can tolerate both wet and dry soil conditions.
- Discharge from the swale below an elevation of 115.80 metres is by infiltration only.

The physical characteristics of the stormwater storage swale and outlet control will result in the storage - discharge relationship as indicated in the calculation sheets provided in Appendix F.

8.3.3. Outlet Control and Allowable Release Rate

8.3.3.1. Release from C-P-A

The flow rate from the storage swale will be restricted such that the maximum runoff rate from the proposed development during post-development conditions for a 100 year design storm will be less than or equal to the pre-development flow rate from the proposed development area during a 2 year design storm of the same duration. The release rate from the stormwater storage swale will be controlled by means of an outlet control structure. The maximum release rate from the storage swale that will allow conformance to this criterion corresponds to the allowable release rate from the controlled catchment areas of the development.

The outlet control structure will consist of a 375 mm diameter double wall HDPE (R320) outlet culvert complete with a concrete headwall placed at the northeast corner of the storage swale. The culvert will have an inlet invert of 115.70 m. The culvert will be fitted with a cap across the inlet of the culvert through which one orifice will be cut. The orifice will have an invert of 115.80 m and a diameter of 135mm. A grate will be fitted over the inlet of the outlet pipe to protect the orifice from debris.

The discharge rates through the orifices were calculated using the equation (Vatankhah, A. R., (February 2018) Discussion of “Flow through Partially Submerged Orifice” by James C.Y. GUo and Ryan P. Stitt Journal of Irrigation and Drainage Engineering):

$$Q = \frac{0.72\sqrt{2gD^5}}{[(C_w\eta^{1.98})^{-2.14} + (C_d\eta^{0.52})^{-2.14}]^{0.4673}}$$

This is a calculation that unifies flow through a partially full orifice as weir flow with flow through a fully submerged orifice as orifice flow.

Where Q = flow (cubic meters per second)
C_d = Coefficient of Discharge for a sharp orifice = 0.60
Cw = Coefficient of Discharge for a sharp crested weir = 0.62
D = Orifice diameter (m)
η = y/D
Y = water-head relative to orifice invert (m)
g = acceleration from gravity (9.81 m/s^2)

The size and elevation of the orifice was determined by iteration. In a relatively large storm water storage facility, it is generally assumed that the hydraulic gradient is a function of the water surface elevation only. Since the discharge rate Q is a function of the depth of water or head relative to the orifice invert, the discharge rate will be directly related to the water surface elevation relative to the orifice invert. The volume of the storage swale is also directly related to the depth of water or water surface elevation. Since the discharge rate and storage swale volume are both related, a Discharge vs Storage curve can be developed. A discharge storage curve was developed in excel and was then programmed into the Route Reservoir block within the OTTHYMO hydrologic model. This process was repeated by varying the orifice size and/or invert elevation until the model produced post-development peak flow rates that met the stormwater management criteria.

The stormwater storage swale and outlet structure are modeled in the OTTHYMO program using a Route Reservoir Hydrograph command. The detailed worksheet has been included in Appendix F. Discharge from the Outlet control structure is directed to the roadside ditch along the west side of Moodie Drive.

8.3.3.2. Release from C-P-B

As previously discussed, the controlled areas of the site were split into two distinct areas, each with a control structure to mitigate post-development runoff. This delineation of catchments allows for chamber groups D, E and F to be placed with base elevations higher than those of chamber groups A, B and C without sacrificing significant storage volumes. The release from C-P-B will be controlled by an orifice plate within CB-64 and set at an invert of 116.09m and having a diameter of 150mm. These values and the associated release was determined by iteration using the methods described in section 8.3.3.1 above.

8.4. Mitigated or Controlled Post Development Runoff

The mitigated post-development runoff rate from the proposed development is calculated using the OTTHYMO model after the insertion of the Route Reservoir Hydrograph command to control the runoff rate from the controlled areas of the site. The runoff rates for each design storm event simulation are summarized in Table 8-7. This table also provides a comparison to the pre-development runoff rates.

Table 8-7: Mitigated Post-Development Runoff Rates and Runoff Volumes

Design Storm Event		Post-Development Runoff Rate	Pre-Development Runoff Rate	Post < Pre
		(m^3/s)	(m^3/s)	
Quantity Storm Events				
Sim 1	Chicago 2 yr 3 hr	0.020	0.052	Yes
Sim 2	Chicago 2 yr 6 hr	0.022	0.063	Yes
Sim 3	Chicago 5 yr 3 hr	0.024	0.116	Yes
Sim 4	Chicago 5 yr 6 hr	0.026	0.136	Yes
Sim 5	Chicago 100 yr 3 hr	0.052	0.382	Yes
Sim 6	Chicago 100 yr 6 hr	0.059	0.434	Yes
Extreme Event – Historical Storms				
Sim 8	August 4, 1988 H	0.080	0.522	Yes
Sim 9	July 1, 1979 H	0.079	0.573	Yes
Quality Storm Event				
Sim 7	25mm 4 hour Chicago	0.017	0.016	No

A review of the above table indicates that the proposed stormwater storage swale and outlet control configuration effectively mitigates the post-development runoff rate to less than that occurring during pre-development conditions for all of the quantity storm events as well as the historical storm events. In addition, the runoff rate from the post-development 100 year 3 hour Chicago design storm is less than the runoff rate from the pre-development 2 year 3 hour Chicago design storm. The runoff rate from post-development 100 year 6 hour Chicago design storm is less than the runoff rate from the pre-development 2 year 6 hour Chicago design storm.

The stormwater discharge from the stormwater management facility is directed to the roadside ditch along Moodie Drive. This ditch is part of the City of Ottawa stormwater management infrastructure and is the legal outlet for the runoff from the site. Since the discharge rate has been limited such that the post-development 100 year release rates are less than the 2 year pre-development release rates, the proposed development will result in significant decrease in the demand on the capacity of the roadside ditch. As such, the reduced demand ensures sufficient capacity for the post-development conditions.

Appendix H contains post-development OTTHYMO summary output data. Also included in Appendix H is the detailed output data for the last link in the model. The detailed output data for the last link provides a summary of the post-development outflow from the proposed development.

8.5. Storage Requirements

The OTTHYMO model Route Reservoir Report is provided in Appendix F. The storage requirements for the various storm events, obtained from the from the route reservoir block which models the stormwater storage swale, are shown in the following table 8-8.

Table 8-8: Storage Requirements

Design Storm Event		Max. Storage	Max. Ponding Elev.	Storage Drawdown Time	Peak Discharge Rate
		m^3	m	hrs	m^3/s
Sim. 1	Chicago 2 yr 3 hr	1240	116.14	25	0.020
Sim. 2	Chicago 2 yr 6 hr	1438	116.20	27	0.022
Sim. 3	Chicago 5 yr 3 hr	1652	116.25	30	0.024
Sim. 4	Chicago 5 yr 6 hr	1910	116.32	33	0.026
Sim. 5	Chicago 100 yr 3 hr	2788	116.57	41	0.032
Sim. 6	Chicago 100 yr 6 hr	3205	116.69	44	0.034

The invert of the orifice in the outlet pipe from the storage swale has been set at an elevation of 115.80 meters resulting in a storage volume of 254 cubic metres below the outlet. There is a total available quantity storage volume of 3399 cubic metres within the storage swale and storm chambers below an elevation of 116.75 metres.

The maximum storage requirement of 3205 cubic metres occurs during the 100 yr 6 hr Chicago storm event. The minimum modeled storage requirement is 979 cubic meters during a 25 mm 4 hr Chicago storm. Since the maximum storage requirement is less than the maximum available storage volume there is sufficient storage volume available within the proposed storage swale and storm chambers.

8.6. Quantity Control – Additional Criteria

The stormwater management criteria from a quantity control perspective also included the following criteria: Onsite stormwater storage and flow shall be controlled as to not affect lands adjacent the development site; Runoff from impervious surfaces must not be directed onto neighbouring properties; and Stormwater Discharge must outlet to a legal and sufficient outlet.

As previously indicated, the pre-development onsite catchments were divided based on the existing topography and receiving subwatershed. As discussed in section 6.2, the pre-development flow was divided between catchment areas directing runoff to the Monahan Drain Subwatershed and the Leamy Creek Subwatershed. Runoff directed to the Monahan Drain Subwatershed flows from the site to adjacent private property.

The runoff rates, for all the post-development catchments contributing runoff towards the Monahan Drain Catchment were also calculated independent from the post-development rates for the entire site. The flow from these catchments consisting of C-L-B, C-U-B and C-L-C is the stormwater runoff which potentially flows to neighbouring properties. In order to meet the additional criteria, the catchments cannot contain any impervious area and cannot discharge any concentrated flow. In addition, the post-development flow from these catchments must be less than the pre-development flow in terms of both rate and volume.

As discussed in section 8.1 above, catchments C-L-B, C-U-B and C-L-C do not contain any impervious area and there is no discharge point from any of these three catchments. Table 7-2 above compared the pre- and post- development catchments contributing runoff to the respective subwatersheds based on catchment area and runoff coefficient. From this table, it can be seen that the runoff coefficient during post-development conditions will be the same or less than the pre-development conditions and that the total contributing area to the Monahan Drain Catchment is much less during post-development conditions. The post-development flows from these contributing catchment areas are summarized in Table 8-8 and are compared to the predevelopment flows.

Table 8-9: Comparison of Post-Development flows to Pre-Development flows to the Monahan Drain Subwatershed

Design Storm Event	**Pre-Development Runoff**		**Post-Development Runoff**	
	Rate	**Volume**	**Rate**	**Volume**
	(m^3/s)	**(m^3)**	**(m^3/s)**	**(m^3)**
Chicago 2 yr 3 hr	0.018	85	0.001	5
Chicago 2 yr 6 hr	0.022	123	0.002	7
Chicago 5 yr 3 hr	0.039	171	0.003	11
Chicago 5 yr 6 hr	0.046	235	0.004	15
Chicago 100 yr 3 hr	0.126	499	0.026	64
Chicago 100 yr 6 hr	0.142	643	0.030	83
25mm 4 hour Chicago	0.006	43	<0.001	2
August 4, 1988 Historical	0.169	618	0.044	81
July 1, 1979 Historical	0.186	666	0.044	99

A review of the above table indicates that the post-development runoff will be less than the pre-development runoff in term of both rate and volume for all storm events. As such, the proposed development will have no negative impact on the neighbouring properties from a stormwater management perspective and the proposed development will satisfy the stormwater management criteria.

9. Quality Control

As previously stated, an enhanced level of treatment is required for the runoff from the site. An enhanced level of treatment corresponds to 80 percent total suspended solids removal. The recommended strategy in the MOE Manual for stormwater management quality control is to provide an integrated treatment train approach. In general, best management practices for stormwater management quality control are divided into three categories: source control or lot level control, conveyance control and end-of-pipe control. A treatment train approach consists of a combination of these practices..

9.1. Source Control

The primary source of total suspended solids and associated runoff pollution under post-development conditions is considered to be the areas of a site subject to vehicle traffic. At the proposed development, this consists of the parking areas, roadways and truck access areas. The vegetated landscaped surfaces and building roofs are typically not considered to be significant sources of suspended solids following the completion of the development and establishment of the vegetation in landscaped areas.

The application of de-icing chemicals including salts and sand can be reduced with a best management plan for the application of these products. BMPs with respect to de-icing chemicals include such measures as timing of application, targeted application, and clearing of snow cover before application. The use of coarser particles and clean sand for de-icing facilitates rapid sedimentation of the suspended solids originating from the de-icing.

9.2. Conveyance Control

9.2.1. Conveyance to the Stormwater Storage Swale

9.2.1.1. Storm Sewer

The proposed parking areas, roadways, and truck access areas are within the controlled area of the site. In general, runoff generated from these areas will be collected by either catch basins.

There will be settlement of coarse suspended solids within the catch basin sumps. There will be little additional benefit in terms of conveyance control from the storm sewers.

9.2.1.2. Storage Chambers

The underground storage chambers are open bottomed and set on clear stone. The full flow velocity in the storm chambers is 0.4 m/s. This low velocity will result in some settlement of suspended solids within the clear stone. Guidance with respect to the design of the Chambers is provided in the CVC LID Guide section 4.4. It is recommended that these chambers should be used for runoff from low traffic roads or parking areas and not for pollution hot spots (areas such as vehicle fuelling, servicing or demolitions areas or storage or handling of hazardous materials). This site consists of a parking and truck access area and is not a pollution hot spot, it is appropriate to use the chambers at this location. Pretreatment for the chambers will take the form of sedimentation in the sumps of the catch basins and within sediment traps at each inlet into the chambers.

9.2.2. Conveyance in the Stormwater Storage Swale

A Research paper completed by University of Quelph School of Engineering (Authors Dr. Ramesh P Rudra Ph.D., Dr. Hugh R Whiteley Ph.D., Dr. William T Dickinson Ph.D.) *Sediment Removal Efficiency of Vegetative Filter Strips* indicates that vegetative filters can partially remove sediments and pollutants attached to sediment particles in runoff. Field experiments on vegetative filter strips showed average sediment removal varying from 50 to 98% as flow path length increases from 2.5 to 10 metres. The research indicates that almost all particles larger than 40 microns in diameter are captured within the first five meters of a filter strip provided the flow velocity is limited to less than 0.5 m/s during the quality control storm event. About 50% of the sediments are removed within the first 2.5 metres of travel over the vegetative filter flow path. An additional 25% to 45% of sediments are removed within the next 2.5 m of the flow path depending on the flow rate and velocity. The removal efficiency of the vegetative filtration does not significantly increase with a flow path length beyond 10 m. This research is in keeping with the discussion in section 4.6 of the CVC LID Guide.

Stormwater Runoff will enter the stormwater storage swale from a storm sewer at the south west corner of the storage swale and from a storm sewer at the northwest corner of the storage swale. Runoff will also enter the swale from the small vehicle parking area all along the west side of the storage swale.

The length of flow path from the southwest corner of the swale to the outlet of the swale at the northeast corner is approximately 130 metres. The 0.6 m high concrete block wall will force a minimum length of flow path of 20 metres. The stormwater storage swale has been designed to promote a dense growth of semi-emergent vegetation. This vegetation will provide effective vegetative filtration and removal of sediments.

9.3. End-of-Pipe Control – Hydrodynamic Oil Grit Separator.

The immediate receiving water body for the discharge from the stormwater storage swale is the roadside ditch along the south side of Fallowfield Road. Final treatment and effulent polishing for the runoff from the storage swale will be provided by the following:

- An Imbrium Stormceptor OSR hydrodynamic separator in MH-STM – (63), with a minimum of 80% TSS removal.

The Stormceptor unit will be installed in a storm maintenance hole between the storage swale outlet and the roadside ditch. This Stormceptor unit will result in a treatment level of greater than 80% predicted net annual total suspended solids removal efficiency. The Stormceptor unit is to be installed in accordance with the manufactures specifications and guidelines. The Stormceptor product information is included in Appendix D.

10. Operation and Maintenance

The owner or designated Property Management Company is responsible for inspections and maintenance of the stormwater management facility. Records of inspections and maintenance should be kept for each visit.

10.1. Enhanced Grassed Swales

The grassed swales for the development will require occasional maintenance. Periodic grass trimming along the drainage swales and ditches represents the bulk of the maintenance required.

Should excavation be required during maintenance, re-vegetation of disturbed areas should be completed after maintenance operations have been completed.

10.2. Rain Gardens and Stormwater Storage Swale

The stormwater management swale should be inspected on a bi-weekly basis and after any rain fall event after construction until vegetation is well established. Once the vegetation is well established and during the first year of operation, the stormwater management swale should be visually inspected on a bi-monthly basis and following significant storm event. For inspection purposes, a rain fall event of more than 25 mm in 4 hours would be considered to be a significant event.

Cut the vegetation within the stormwater storage swale to a height of 20 cm twice during the first growing season and once early in the second growing season. Hand remove pockets of aggressive weeds during the establishment period. The specified native seed mixes are intended to grow without maintenance following their establishment in order to provide wildlife habitat.

If patches of weeds occur following the establishment of the seed mixture, the patch could be mechanically removed by excavator. The topsoil removed should be replaced with an amended topsoil mix and the area should be reseeded.

Removal of accumulated sediment from the stormwater management swale should be conducted when the accumulation of the sediment begins to significantly affect the quality of the vegetation growth within the storage swale and/or the drainage patterns along the bottom. If the drawdown time becomes significantly extended, the topsoil layer should be tilled or cultivated to reduce the compaction. Additional amending material can also be added at that time. Following tilling or cultivation, the bottom should be reseeded with the specified seed mixtures.

10.3. Storm sewers and Outlet Pipe

The control device for the site is a 375mm diameter outlet pipe. The outlet pipe should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. If the stored water does not recede in a normal manner the outlet pipe and MH-STM – (63) should be inspected and cleaned.

10.4. Catch basins and Maintenance Holes

The catch basins and maintenance holes should be cleaned with a hydrovac excavation truck following completion of construction, paving of the asphaltic concrete surface and establishment of adequate grass cover on the landscaped areas.

Following the initial cleaning the catch basins and maintenance holes should be inspected on a semi-annual basis and following major storm events. Any blockages, trash or debris should be removed. Once the sediment accumulation in the catch basins and manhole has reached a level equal to 0.15 metres below the outlet invert of the structure, the sediment should be removed by hydro excavation.

10.5. Storm Chambers

The Storm Chambers can be inspected and maintained through the observation ports. A camera with a light and/or a long measuring stick can be used to measure the accumulation of sediment within the chambers. The Storm Chambers should be serviced once sediment build-up exceeds 3 inches from the bottom.

The Storm Chambers should be cleaned with a Hydrovac excavation truck following completion of construction, paving of the asphaltic concrete surface and establishment of adequate grass cover on the landscaped areas. When the sediment level accumulates to a level at which maintenance is required, the sediment can be removed using a Hydrovac excavation truck.

New installations should be inspected quarterly and after each large storm event to see how it performs. It is recommended that a logbook be maintained showing the depth of water in the Storm Chambers at each observation point. This will help determine the rate at which the Storm Chamber system dewaters after runoff producing storm events.

Once the performance characteristics of the Storm Chamber have been verified, the monitoring schedule can be reduced, unless the performance data suggests that a more frequent schedule is required.

10.6. Hydrodynamic Oil Grit Separator

The Imbrium Stormceptor OSR hydrodynamic separator is to be maintained in accordance with manufactures recommendations and guidelines as provided in the owner’s manual. In addition the followings maintenance practice should be followed:

- Inspect every 6 months for the first year to determine the oil and sediment accumulation rate. In subsequent years, inspections are based on first-year observations or local requirements
- Inspect immediately after an oil, fuel or chemical spill. A licensed waste management company should remove oil and sediment and dispose responsibly.
- Sediment removal to be completed with a vacuum truck.

11. EROSION AND SEDIMENT CONTROL

The owner (and/or contractor) agrees to prepare and implement an erosion and sediment control plan at least equal to the stated minimum requirements and to the satisfaction of the City of Ottawa, appropriate to the site conditions, prior to undertaking any site alterations (filling, grading, removal of vegetation, etc.) and during all phases of site preparation and construction in accordance with the current best management practices for erosion and sediment control. It is considered to be the owners and/or contractors responsibility to ensure that the erosion control measures are implemented and maintained.

In order to limit the amount of sediment carried in stormwater runoff from the site during construction, it is recommended to install a silt fence along the inside of the front property line of the site, as shown in Kollaard Associates Inc. Drawing #221099-ESC Erosion & Sediment Control Plan. The silt fence may be polypropylene, nylon, and polyester or ethylene yarn.

If a standard filter fabric is used, it must be backed by a wire fence supported on posts not over 2.0 m apart. Extra strength filter fabric may be used without a wire fence backing if posts are not over 1.0 m apart. Fabric joints should be lapped at least 150 mm (6") and stapled. The bottom edge of the filter fabric should be anchored in a 300 mm (1 ft) deep trench, to prevent flow under the fence. Sections of fence should be cleaned, if blocked with sediment and replaced if torn.

Filter socks should be installed across the proposed catch basin, maintenance hole and inspection port lids immediately after installation. The filter socks should only be removed once the asphaltic concrete is installed and the site is cleaned.

The exposed landscaped areas of the site should be finished as soon as possible. The proposed asphaltic concrete surfaced areas should be surfaced as soon as possible.

The silt fences should only be removed once the site is stabilized and vegetation is established. These measures will reduce the amount of sediment carried from the site during storm events that may occur during construction.

12. STORMWATER MANAGEMENT CONCLUSIONS

Stormwater Management for the proposed development will be achieved by restricting the post-development runoff rate for each design storm (up to and including a 100 year design storm event) to a runoff rate of less than a 2 year pre-development design storm of the same duration.

The proposed stormwater storage area (consisting of underground storm chambers and a stormwater storage swale) contains an outlet control structure that has been designed to ensure that the stormwater leaving the storage area is controlled, as to not affect the land adjacent to the site.

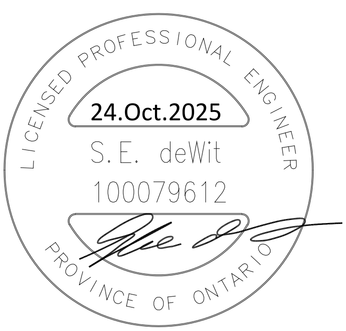
The stormwater runoff in the controlled areas will be treated using a treatment train approach consisting of sedimentation, vegetative filtration and effluent polishing with a hydrodynamic oil grit separator.

Low impact development techniques such as enchanced swales, and bioswales/ rain gardens were used in three of the five uncontrolled areas to reduce the amount of runoff.

Erosion measures will be placed prior to construction and during development and will remain in place until construction is complete. Disturbed areas will be topsoiled and seeded as soon as reasonably possible.

We trust that this report provides sufficient information for your present purposes. If you have any questions concerning this report or if we can be of any further assistance to you on this project, please do not hesitate to contact our office.

Sincerely,
Kollaard Associates Inc.



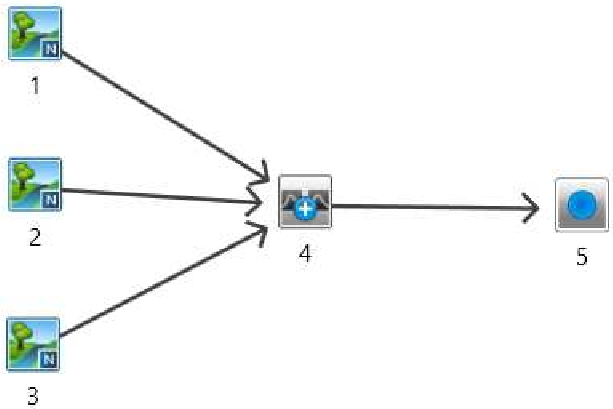
Steven deWit, P.Eng.

Appendix A: Storm Analysis Model Schematic and Parameters

Pre-development OTTHYMO model Schematic and Summary Table

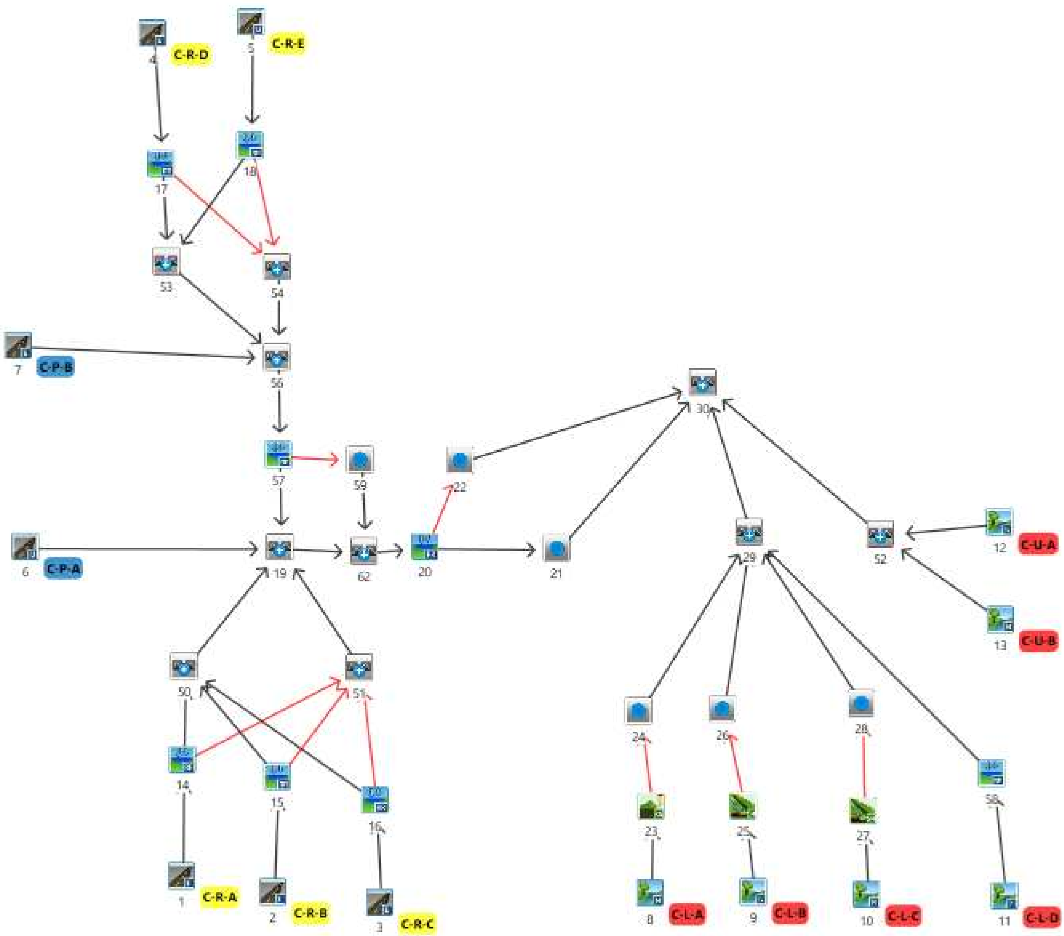
Post-development OTTHYMO model Schematic and Summary Table

Model Variables for Each Catchment



Pre-Development OTTHYMO model Schematic Summary Table

Hydrograph No.	Model Type	Item Represented	Comment
1	NASHYD	Sub-Catchment PRE-W	Catchment represents portion of site direction runoff to the adjacent property west of the site.
2	NASHYD	Sub-Catchment PRE-E	Catchment represents portion of the site directing runoff to Moodie Drive
3	NASHYD	Sub-Catchment PRE-N	Catchment represents portion of the site directing runoff to Fallowfield Road
4	ADDHYD	Add Hydrograph	Used to add hydrographs in the routing
5	Node	Ends the Model	Ends the Model



Post-Development OTTHYMO model Schematic Summary Table

Hydrograph No.	Model Type	Item Represented	Comment
8	NASHYD	Sub-Catchment C-L-A	Catchment represents area controlled by LID techniques (rain garden) west of Building A.
9	NASHYD	Sub-Catchment C-L-B	Catchment represents area controlled by LID techniques (enchanced swale) in the northwest corner of the site.
10	NASHYD	Sub-Catchment C-L-C	Catchment represents area controlled by LID techniques (enchanced swale) in the southwest corner of the site.
11	NASHYD	Sub-Catchment C-L-D	Catchment represents area controlled by LID techniques (linear rain garden) in the southeast corner of the site.
12	NASHYD	Sub-Catchment C-U-A	Catchment represents uncontrolled area in the northeast corner of the site.

13	NASHYD	Sub-Catchment C-U-A	Catchment represents uncontrolled area on the west side of the site.
23	LID – RG	Rain Garden	Modeling tool in OTTHYMO to model a Rain Garden.
25, 27	LID – SW	Enhanced Swale	Modeling tool in OTTHYMO to model an enhanced swale
58	Route Reservoir	Linear Rain Garden Storage-Release	Provides a model of the stormwater storage and release from the linear rain garden.
24, 26, 28	JUNCTION	Junction	A modeling tool in OTTHYMO used to connect a LID object to the next item in the model.
29	ADDHYD	Add Hydrograph	Used to add the hydrographs representing the uncontrolled areas in the routing
1	STANDHYD	Sub-Catchment C-R-A	Roof of Building A - Controlled
2	STANDHYD	Sub-Catchment C-R-B	Roof of Building B - Controlled
3	STANDHYD	Sub-Catchment C-R-C	Roof of Building C - Controlled
4	STANDHYD	Sub-Catchment C-R-D	Roof of Building D - Controlled
5	STANDHYD	Sub-Catchment C-R-E	Roof of Building E - Controlled
14	Route Reservoir	Roof Storage Building A	Provides a model of the stormwater storage and release from the roof.
15	Route Reservoir	Roof Storage Building B	Provides a model of the stormwater storage and release from the roof.
16	Route Reservoir	Roof Storage Building C	Provides a model of the stormwater storage and release from the roof.
17	Route Reservoir	Roof Storage Building D	Provides a model of the stormwater storage and release from the roof.
18	Route Reservoir	Roof Storage Building E	Provides a model of the stormwater storage and release from the roof.
50, 53	ADDHYD	Add Hydrograph	Used to add the hydrographs representing the discharge from the roofs.
51, 54	ADDHYD	Add Hydrograph	Used to add the over flow from the roofs if present.
6, 7	STANDHYD	Represent the controlled area Sub-Catchments indicated by the name of the component	The location of the catchments areas are shown on drawing 221099-POST.
19, 56, 62	ADDHYD	Add Hydrograph	Used to add the hydrographs together.
20, 57	Route Reservoir	Storage Swale and Chambers	Provides a model of the stormwater storage and release from the storage swale and underground storage chambers.
22, 59	JUNCTION	Junction	An outlet for overflow from the swales and chambers if it occurred.

21	JUNCTION	Junction	A modeling tool in OTTHYMO used to connect the route reservoir to the next component in the model.
30	ADDHYD	Add Hydrograph	Used to add the hydrograph representing the discharge from the storage swale to the hydrograph representing the combined runoff from the uncontrolled areas.

Catchment Areas and Model Parameters

Refer to Drawing # 221099-PRE and Drawing # 221099-POST for an illustration of the specified catchment areas.

		NASHYD CATCHMENT AREAS							
		TOTAL AREA m^2	2-2c [WOODS & GRASS](FAIR)	2-2c [BRUSH WEED GRASS](FAIR)	2-2a [OPEN SPACE](GOOD)	2-2a [IMP](ROOFS ETC)	2-2a [STREET](GRAVEL)	WEIGHTED AVERAGE CN	POTENTIAL STORAGE [mm]
PRE-DEVELOPMENT HYDROLOGIC SOIL GROUP C			CN= 76	CN= 70	CN= 74	CN= 98	CN= 89		
	PRE-W	20720	7990	12730	0	0	0	72.3	97.3
	PRE-E	37030	0	34140	1300	110	1480	71.0	103.7
	PRE-N	8320	0	6840	1310	0	170	71.0	103.7
POST-DEVELOPMENT HYDROLOGIC SOIL GROUP B			CN= 65	CN= 56	CN= 61	CN= 98	CN= 85		
	C-L-A	812	0	0	812	0	0	61.0	162.4
	C-L-B	1226	0	0	1226	0	0	61.0	162.4
	C-L-C	2236	0	0	2236	0	0	61.0	162.4
	C-L-D	2480	0	0	2308	0	172	62.7	151.1
	C-U-A	1310	0	0	1287	23	0	61.6	158.3
	C-U-B	2070	0	0	2070	0	0	61	162.4

OTTHYMO NASHYD PARAMETERS														
NHYD	NAME	COMMENTS 1	COMMENTS 2	COMMENTS 3	OUTLET	DT [min]	AREA [ha]	DWF [m³/s]	CN	IA [mm]	N	TP [hr]	STORM INDEX	RAIN [mm/hr]
1	PRE-W	PRE	A		4	5	2.072	0	72.3	9.7	3	0.32	1	0
2	PRE-E	PRE	B		4	5	3.703	0	71.0	10.4	3	0.33	1	0
3	PRE-N	PRE	C		4	5	0.832	0	71.0	10.4	3	0.28	1	0
8	C-L-A	POST - LOW IMPACT DEVELOPMENT	A		23	5	0.081	0	61	12.991	3	0.16667	1	0
9	C-L-B	POST - LOW IMPACT DEVELOPMENT	B		25	5	0.123	0	61.0	13.0	3	0.17	1	0
10	C-L-C	POST - LOW IMPACT DEVELOPMENT	C		27	5	0.224	0	61.0	13.0	3	0.17	1	0
11	C-L-D	POST - LOW IMPACT DEVELOPMENT	D		58	5	0.248	0	62.7	12.1	3	0.17	1	0
12	C-U-A	POST - UNCONTROLLED	A		52	5	0.131	0	61.6	12.7	3	0.17	1	0
13	C-U-B	POST - UNCONTROLLED	B		52	5	0.207	0	61.0	13.0	3	0.17	1	0

STANDHYD CATCHMENT AREAS

NHYD	NAME	TOTAL AREA	DIRECT IMPERVIOUS m^2	INDIRECT IMPERVIOUS m^2	PERVIOUS m^2	COMMENT
1	C-R-A	3953	3953	0	0	BLDG - A ROOF
2	C-R-B	4629	4629	0	0	BLDG - B ROOF
3	C-R-C	4076	4076	0	0	BLDG - C ROOF
4	C-R-D	3676	3676	0	0	BLDG - D ROOF
5	C-R-E	3676	3676	0	0	BLDG - E ROOF
6	C-P-A	22943	16700	0	6243	EAST HALF OF PARKING AREA
7	C-P-B	12953	12490	0	463	WEST HALF OF PARKING AREA

OTTHYMO STANDHYD PARAMETERS

NHYD	NAME	OUTLET	DT [min]	AREA [ha]	TIMP	XIMP	DWF [m^3/s]	LOSS	SLPP [%]	LGP [m]	MNP	SCP [hr]	DPSI [mm]	SLPI [%]	LGI Type	LGI [m]	MNI	SCI [hr]	STORM INDEX	RAIN [mm/hr]
1	C-R-A	14	5	0.395	0.99	0.99	0	Horton's Equation	1.00	15.0	0.25	0	0	1.00	Auto	Auto	0.013	0	1	0
2	C-R-B	15	5	0.463	0.99	0.99	0	Horton's Equation	1.00	15.0	0.25	0	0	1.00	Auto	Auto	0.013	0	1	0
3	C-R-C	16	5	0.408	0.99	0.99	0	Horton's Equation	1.00	15.0	0.25	0	0	1.00	Auto	Auto	0.013	0	1	0
4	C-R-D	17	5	0.368	0.99	0.99	0	Horton's Equation	1.00	15.0	0.25	0	0	1.00	Auto	Auto	0.013	0	1	0
5	C-R-E	18	5	0.368	0.99	0.99	0	Horton's Equation	1.00	15.0	0.25	0	0	1.00	Auto	Auto	0.013	0	1	0
6	C-P-A	19	5	2.294	0.73	0.73	0	Horton's Equation	2.00	25.0	0.25	0	1.57	1.50	Auto	Auto	0.013	0	1	0
7	C-P-B	56	5	1.295	0.96	0.96	0	Horton's Equation	2.00	25.0	0.25	0	1.57	1.50	Auto	Auto	0.013	0	1	0

Appendix B: Time of Concentration and Time to Peak Calculation

Calculation Table

USDA Chapter 15 – Figure 15-4 and Table 15-3

SHEET FLOW

	Sheet Flow Surface Part 630 Table-15-1	Mannings n	length Sheet Flow (m)	2 yr 24 Hr Rainfall (mm)	Slope (m/m)	Time of Sheet Flow (hrs)
	Drop down	lookup				
PRE-W	DENSE GRASSES	0.24	30	51.8	0.01	**0.39**
PRE-E	DENSE GRASSES	0.24	30	51.8	0.014	**0.34**
PRE-N	DENSE GRASSES	0.24	30	51.8	0.01	**0.39**

SHALLOW CONCENTRATED FLOW

	Flow Length to Major Channel	Slope (m/m)	sqrt(slope)	Flow type Table 15-4	Depth (ft)	Mannings n	Velocity (m/s)	Time of Shallow Concentrated Flow (hr)
				Drop down	lookup	lookup	lookup	
PRE-W	107.95	0.025	0.158	Short-grass pasture	0.2	0.073	0.34	**0.09**
PRE-E	130.75	0.013	0.114	Short-grass pasture	0.2	0.073	0.24	**0.15**
PRE-N	38.77	0.021	0.145	Short-grass pasture	0.2	0.073	0.31	**0.04**

TOC SUMMARY

	TOC [hrs]	TOC [mins]
PRE-W	**0.48**	**28.65**
PRE-E	**0.49**	**29.36**
PRE-N	**0.42**	**25.39**

Figure 15–4 Velocity versus slope for shallow concentrated flow

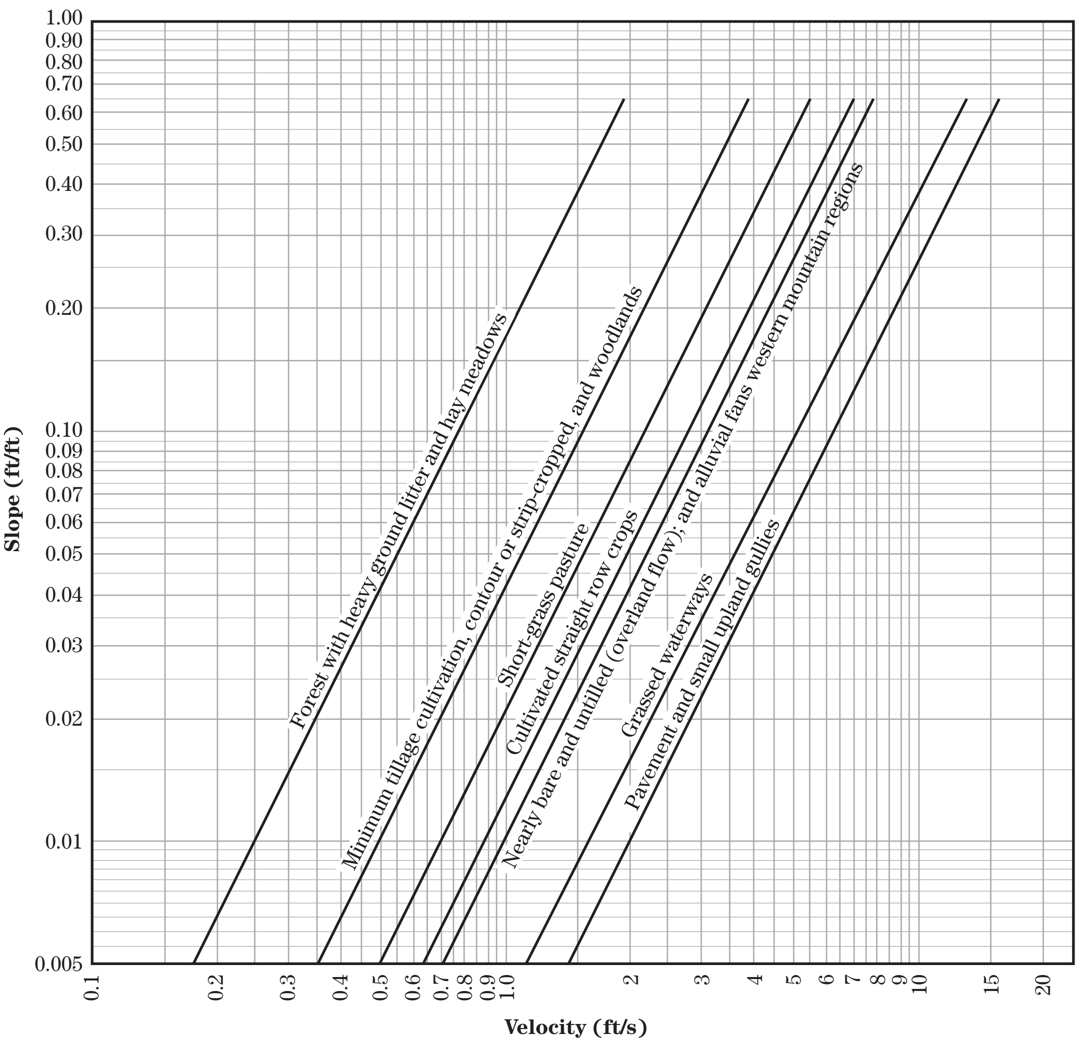


Table 15–3 Equations and assumptions developed from figure 15–4

Flow type	Depth (ft)	Manning's *n*	Velocity equation (ft/s)
Pavement and small upland gullies	0.2	0.025	$V = 20.328(s)^{0.5}$
Grassed waterways	0.4	0.050	$V = 16.135(s)^{0.5}$
Nearly bare and untilled (overland flow); and alluvial fans in western mountain regions	0.2	0.051	$V = 9.965(s)^{0.5}$
Cultivated straight row crops	0.2	0.058	$V = 8.762(s)^{0.5}$
Short-grass pasture	0.2	0.073	$V = 6.962(s)^{0.5}$
Minimum tillage cultivation, contour or strip-cropped, and woodlands	0.2	0.101	$V = 5.032(s)^{0.5}$
Forest with heavy ground litter and hay meadows	0.2	0.202	$V = 2.516(s)^{0.5}$

Appendix C: Pre-Development Otthymo Model Results

Summary output from Pre-development Model

Detailed output from last link in Pre-development Model

```
     V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
     V    V   I    SS     U   U   A A   L
      V  V    I     SS    U   U  AAAAA  L
      V  V    I      SS   U   U  A   A  L
       VV     I    SSSSS  UUUUU  A   A  LLLLL

      OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
     O   O    T      T    H   H   Y Y   MM MM  O   O
     O   O    T      T    H   H    Y    M   M  O   O
      OOO     T      T    H   H    Y    M   M   OOO


                   *****  S U M M A R Y   O U T P U T  *****


************************************************
  ** SIMULATION : 1. CHICAGO [2 YR] [3 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0001  1  5.0    2.07    0.02  1.50   4.11 0.13   0.000
    [CN=72.3          ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0002  1  5.0    3.70    0.03  1.50   3.68 0.12   0.000
    [CN=71.0          ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0003  1  5.0    0.83    0.01  1.42   3.68 0.12   0.000
    [CN=71.0          ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.05  1.50   3.83  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.05  1.50   3.81  n/a   0.000
*
```

```
  ************************************************
  ** SIMULATION : 2. CHICAGO [2 YR] [6 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.02  2.42   5.92 0.16   0.000
    [CN=72.3          ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                 10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.03  2.42   5.38 0.15   0.000
    [CN=71.0          ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.01  2.42   5.37 0.15   0.000
    [CN=71.0          ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.05  2.42   5.57  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.06  2.42   5.55  n/a   0.000
*
===============================================================================
```

```
  ************************************************
  ** SIMULATION : 3. CHICAGO [5 YR] [3 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.04  1.42    8.27 0.19   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.06  1.42    7.59 0.18   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.02  1.33    7.59 0.18   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.10  1.42    7.83  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.12  1.42    7.80  n/a   0.000
*
===============================================================================
```

```
  **********************************************
  ** SIMULATION : 4. CHICAGO [5 YR] [6 HR]      **
  **********************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                    min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                   10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.05  2.42  11.32 0.23   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                   10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.07  2.42  10.48 0.21   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                   10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.02  2.33  10.48 0.21   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.12  2.42  10.78  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.14  2.42  10.74  n/a   0.000
*==============================================================================
```

```
  **********************************************
  ** SIMULATION : 5. CHICAGO [100 YR] [3 HR]    **
  **********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.13  1.33  24.10 0.34   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.21  1.33  22.74 0.32   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.05  1.33  22.73 0.32   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.33  1.33  23.23  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.38  1.33  23.17  n/a   0.000
*
===============================================================================
```

```
  ************************************************
  ** SIMULATION : 6. CHICAGO [100 YR] [6 HR]    **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.14  2.33  31.02 0.38   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.23  2.33  29.44 0.36   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.06  2.25  29.43 0.36   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.38  2.33  30.01  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.43  2.33  29.93  n/a   0.000
*
===============================================================================
```

```
 ************************************************
 ** SIMULATION : 7. Historical Aug 4 1988      **
 ************************************************

 W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                   min     ha   '  cms   hrs     mm          cms

     START @  0.00 hrs
     --------------------
   READ STORM                  5.0
   [ Ptot= 80.57 mm ]
   fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
   remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.17  2.17  29.85 0.37   0.000
   [CN=72.3         ]
   [ N = 3.0:Tp 0.32]
*
   READ STORM                  5.0
   [ Ptot= 80.57 mm ]
   fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
   remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.28  2.17  28.30 0.35   0.000
   [CN=71.0         ]
   [ N = 3.0:Tp 0.33]
*
   READ STORM                  5.0
   [ Ptot= 80.57 mm ]
   fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
   remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.07  2.17  28.29 0.35   0.000
   [CN=71.0         ]
   [ N = 3.0:Tp 0.28]
*
   ADD [  0001+  0002]  0004  3  5.0    5.78    0.45  2.17  28.86  n/a   0.000
*
   ADD [  0004+  0003]  0004  1  5.0    6.61    0.52  2.17  28.79  n/a   0.000
*
===============================================================================
```

```
  **********************************************
  ** SIMULATION : 7. Historical Aug 4 1988      **
  **********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.17  2.17  29.85 0.37   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.28  2.17  28.30 0.35   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.07  2.17  28.29 0.35   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.45  2.17  28.86  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.52  2.17  28.79  n/a   0.000
*===============================================================================
=
```

```
  ************************************************
  ** SIMULATION : 9. 25mm4hrChicago             **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0001  1  5.0    2.07    0.01  2.17   2.08 0.08   0.000
    [CN=72.3         ]
    [ N = 3.0:Tp 0.32]
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0002  1  5.0    3.70    0.01  2.25   1.80 0.07   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.33]
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\139b0b06-77be-4897-ae11-
9440be1396d7\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0003  1  5.0    0.83    0.00  2.08   1.80 0.07   0.000
    [CN=71.0         ]
    [ N = 3.0:Tp 0.28]
*
    ADD [  0001+  0002]  0004  3  5.0    5.78    0.01  2.17   1.90  n/a   0.000
*
    ADD [  0004+  0003]  0004  1  5.0    6.61    0.02  2.17   1.89  n/a   0.000
*===============================================================================
=
```

```
*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.018     1.50     4.11
      + ID2= 2 (  0002):      3.70   0.028     1.50     3.68
        ===================================================
        ID = 3 (  0004):      5.78   0.046     1.50     3.83

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.046     1.50     3.83
      + ID2= 2 (  0003):      0.83   0.007     1.42     3.68
        ===================================================
        ID = 1 (  0004):      6.61   0.052     1.50     3.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.022     2.42     5.92
      + ID2= 2 (  0002):      3.70   0.033     2.42     5.38
        ===================================================
        ID = 3 (  0004):      5.78   0.055     2.42     5.57

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.055     2.42     5.57
      + ID2= 2 (  0003):      0.83   0.008     2.42     5.37
        ===================================================
        ID = 1 (  0004):      6.61   0.063     2.42     5.55

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

```
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.039     1.42     8.27
      + ID2= 2 (  0002):      3.70   0.062     1.42     7.59
        ===================================================
        ID = 3 (  0004):      5.78   0.101     1.42     7.83

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.101     1.42     7.83
      + ID2= 2 (  0003):      0.83   0.015     1.33     7.59
        ===================================================
        ID = 1 (  0004):      6.61   0.116     1.42     7.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.046     2.42    11.32
      + ID2= 2 (  0002):      3.70   0.073     2.42    10.48
        ===================================================
        ID = 3 (  0004):      5.78   0.118     2.42    10.78

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.118     2.42    10.78
      + ID2= 2 (  0003):      0.83   0.018     2.33    10.48
        ===================================================
        ID = 1 (  0004):      6.61   0.136     2.42    10.74

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

```
******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
******************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     2.07   0.126     1.33    24.10
      + ID2= 2 (  0002):     3.70   0.205     1.33    22.74
        ====================================================
        ID = 3 (  0004):     5.78   0.331     1.33    23.23

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.78   0.331     1.33    23.23
      + ID2= 2 (  0003):     0.83   0.051     1.33    22.73
        ====================================================
        ID = 1 (  0004):     6.61   0.382     1.33    23.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
******************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     2.07   0.142     2.33    31.02
      + ID2= 2 (  0002):     3.70   0.234     2.33    29.44
        ====================================================
        ID = 3 (  0004):     5.78   0.376     2.33    30.01

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.78   0.376     2.33    30.01
      + ID2= 2 (  0003):     0.83   0.058     2.25    29.43
        ====================================================
        ID = 1 (  0004):     6.61   0.434     2.33    29.93

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

```
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.169     2.17    29.85
      + ID2= 2 (  0002):      3.70   0.283     2.17    28.30
        ====================================================
        ID = 3 (  0004):      5.78   0.452     2.17    28.86

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.452     2.17    28.86
      + ID2= 2 (  0003):      0.83   0.069     2.17    28.29
        ====================================================
        ID = 1 (  0004):      6.61   0.522     2.17    28.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.186     1.83    32.15
      + ID2= 2 (  0002):      3.70   0.312     1.83    30.53
        ====================================================
        ID = 3 (  0004):      5.78   0.498     1.83    31.11

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.498     1.83    31.11
      + ID2= 2 (  0003):      0.83   0.076     1.75    30.52
        ====================================================
        ID = 1 (  0004):      6.61   0.573     1.83    31.04

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

```
*********************************
** SIMULATION:9. 25mm4hrChicago **
*********************************

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):      2.07   0.006     2.17     2.08
      + ID2= 2 (  0002):      3.70   0.008     2.25     1.80
        ====================================================
        ID = 3 (  0004):      5.78   0.014     2.17     1.90

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

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):      5.78   0.014     2.17     1.90
      + ID2= 2 (  0003):      0.83   0.002     2.08     1.80
        ====================================================
        ID = 1 (  0004):      6.61   0.016     2.17     1.89

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

Appendix D: Product Information

WATT Accutrol Roof Drains

NDS SC34 storm chambers

Stormceptor Hydrodynamic Oil Grit Separator

WATTS®

Adjustable Accutrol Weir

Tag: ____________

Adjustable Flow Control for Roof Drains

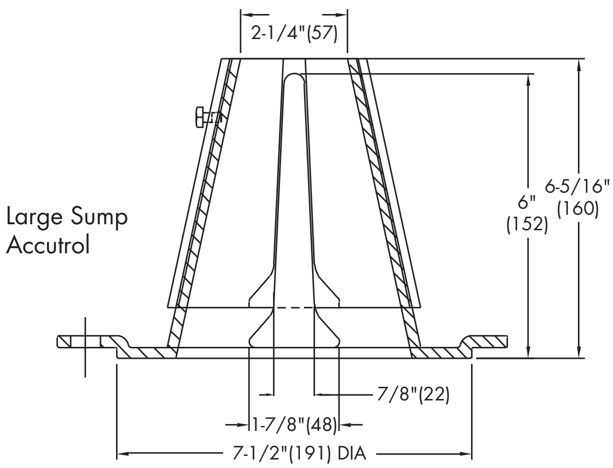
ADJUSTABLE ACCUTROL (for Large Sump Roof Drains only)

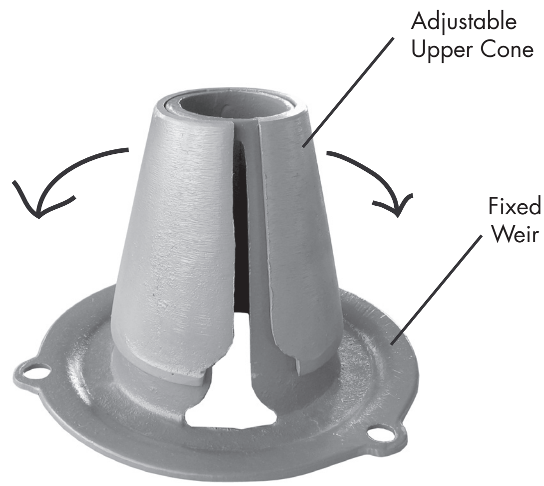
For more flexibility in controlling flow with heads deeper than 2", Watts Drainage offers the Adjustable Accutrol. The Adjustable Accutrol Weir is designed with a single parabolic opening that can be covered to restrict flow above 2" of head to less than 5 gpm per inch, up to 6" of head. To adjust the flow rate for depths over 2" of head, set the slot in the adjustable upper cone according to the flow rate required. Refer to Table 1 below.
Note: Flow rates are directly proportional to the amount of weir opening that is exposed.

EXAMPLE:

For example, if the adjustable upper cone is set to cover 1/2 of the weir opening, flow rates above 2"of head will be restricted to 2-1/2 gpm per inch of head.

Therefore, at 3"of head, the flow rate through the Accutrol Weir that has 1/2 the slot exposed will be:
[5 gpm (per inch of head) x 2 inches of head] + 2-1/2 gpm (for the third inch of head) = 12-1/2 gpm.





1/2 Weir Opening Exposed Shown Above

TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

Job Name ____________

Job Location ____________

Engineer ____________

Contractor ____________

Contractor's P.O. No. ____________

Representative ____________

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

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ES-WD-RD-ACCUTROLADJ-CAN 1615

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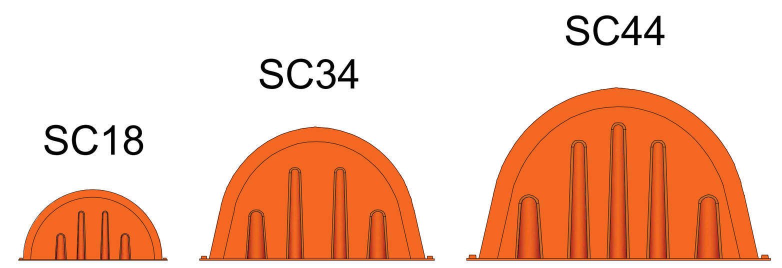


NDS STORMCHAMBERS

PROJECT NAME
PROJECT LOCATION

We put water in its place

NDS STORMCHAMBER SYSTEM SPECIFICATIONS

1. CHAMBERS SHALL BE NDS STORMCHAMBER .
2. CHAMBERS SHALL BE ARCH SHAPED AND SHALL BE MANUFACTURED FROM HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE.
3. CHAMBERS MEET OR EXCEED ASTM F2922 AND ASTM F2787. MEET AASHTO HS-20, HS-25 AND HL-93 LIVE LOADING PER AASHTO LRFD SECTION 12.
4. MANUFACTURED NOMINAL DIMENSIONS OF START, MIDDLE AND END CHAMBERS
   - SC18 3.17 FT WIDE X 18 INCHES TALL.
   - SC34 5 FT WIDE X 34 INCHES TALL.
   - SC44 6.35 FT WIDE X 44 INCHES TALL.
5. MINIMUM COVER FOR SC18 AND SC34 IS 18 INCHES, MINIMUM COVER FOR SC44 IS 22 INCHES .
6. SEDIMENTRAP MANUFACTURED WITH HIGH MOLECULAR WEIGHT, HIGH DENSITY POLYETHYLENE.
7. NON-WOVEN POLYPROPYLENE FILTER FABRIC TMG-4OZNWG BY TMPG OR APPROVED EQUAL
8. WOVEN POLYPROPYLENE FILTER FABRIC 300HTM BY WINFAB OR APPROVED EQUAL.
9. THE PERFORMANCE OF NDS STORMCHAMBER¨ IS DIRECTLY CORRELATED TO THE LOAD BEARING CAPACITY, PLASTICITY, AND PERMEABILITY OF NATIVE SOIL; FROST-HEAVE POTENTIAL; VOLUME AND LOAD-RATING OF PROJECT TRAFFIC; INSTALLATION METHODS USED; AS WELL AS THE TYPE, GRADATION, AND THICKNESS OF THE SURROUNDING AND OVERLAY ROCK.

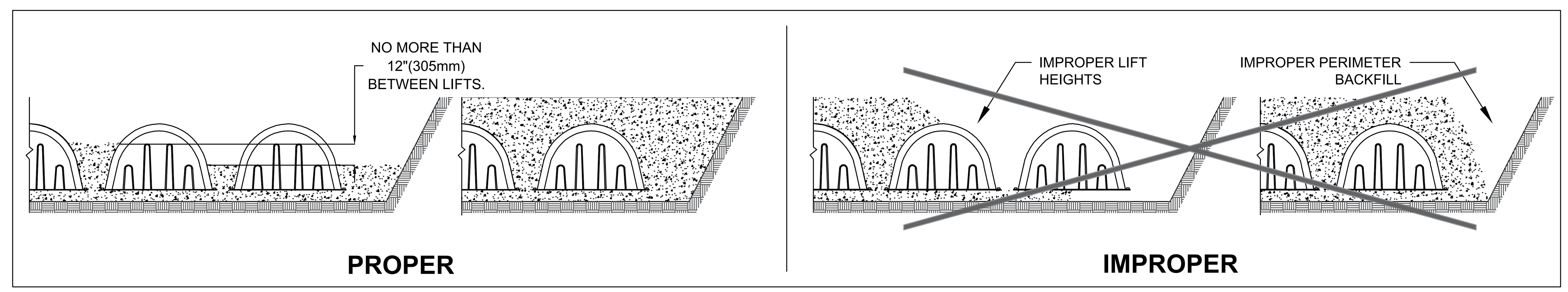
REQUIREMENTS FOR CONSTRUCTION EQUIPMENT

1. NDS RECOMMENDS 3 BACKFILL METHODS, STONESHOOTER LOCATED OFF THE CHAMBER BED, BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE AND BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR. CONVEYORS OR EXCAVATORS SHOULD BE LOCATED SUCH THAT THEIR LOADS DO NOT INFLUENCE THE CHAMBERS SHOULD BE USED TO PLACE BACKFILL STONE.
2. NO CONSTRUCTION EQUIPMENT ALLOWED ON TOP OF THE CHAMBER SYSTEM UNTIL MINIMUM STONE COVER REQUIREMENTS HAVE BEEN MET, 6-INCH FOR SC-18 AND SC-34 AND 12-INCH FOR SC-44, ONLY THEN SHOULD A SKID STEER OR SMALL DOZER (D4) BE ALLOWED ON TOP.
3. NO WHEEL LOADS SHOULD BE APPLIED OVER THE SYSTEM. ONCE THE MINIMUM STONE HAS BEEN PLACED OVER THE CROWN OF THE CHAMBERS, ONLY SMALL WALK BEHIND VIBRATORY COMPACTION EQUIPMENT CAN BE USED UNTIL A 12 INCHES OF COVER IS ACHIEVED. LIGHTWEIGHT TRACKED DOZERS WITH A MAXIMUM GROUND PRESSURE OF 1100 PSF ARE PERMITTED OVER THE STRUCTURE.
4. DOZERS MUST SPREAD STONE WORKING IN A DIRECTION PARALLEL WITH THE CHAMBER ROWS; NOT WORKING ACROSS THE CHAMBER ROWS. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMCHAMBER STANDARD WARRANTY.
5. ONCE 18"(457mm) OF COMPACTED MATERIAL IS OVER THE CHAMBERS, HIGHWAY VEHICLES OF HS-20 AND HS-25 CAN BE OPERATED OVER THE STRUCTURES.
6. A FRONT END LOADER CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE MAXIMUM WHEEL LOAD DOES NOT EXCEED 16000 POUNDS. COMPACTING EQUIPMENT CAN BE OPERATED OVER THE STRUCTURES AS LONG AS THE DYNAMIC FORCE FROM THE DRUM DOES NOT EXCEED 20000 POUNDS AND THE GROSS VEHICLE WEIGHT DOES NOT EXCEED 12000 POUNDS.

BACKFILL, HANDLING AND INSTALLATION REQUIREMENTS

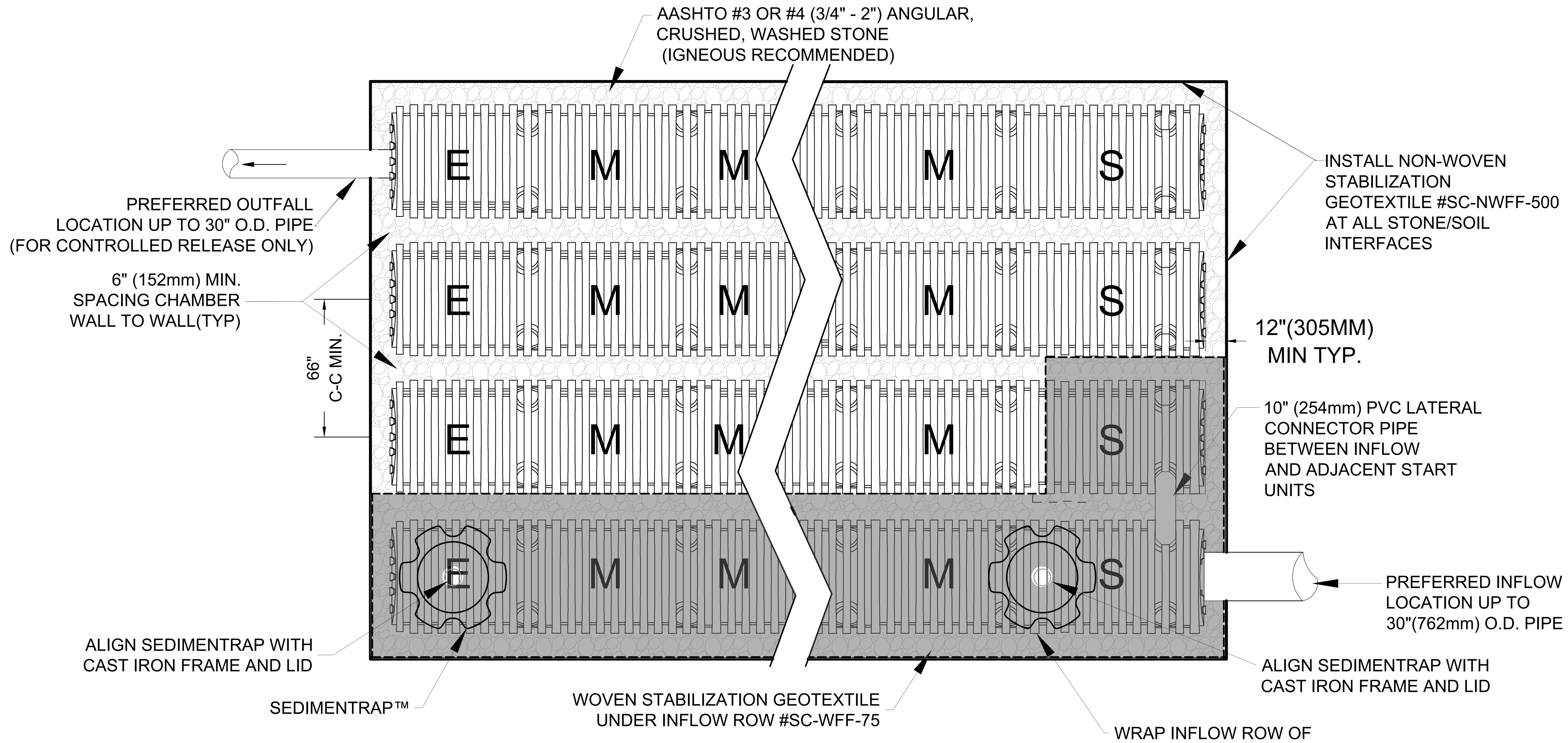
1. THIS DOCUMENT IS NOT A SUBSTITUTE FOR THE INSTALLATION GUIDE.
2. STORMCHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE NDS STORMCHAMBER INSTALLATION GUIDE.
3. STORMCHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS. **CONTACT NDS SPECIALIST 571-521-9538 OR LOCAL REPRESENTATIVE.**
4. IN HOT WEATHER CONDITIONS, IF POSSIBLE, STORE ALL CHAMBERS AND BACKFILL STONE IN A SHADED AREA UNTIL THEY ARE READY TO BE INSTALLED. OUR RECOMMENDATION IS THAT THE SYSTEM BE LAID OUT AND ALL PIPES CONNECTED THE DAY PRIOR TO BACKFILLING WITH STONE. **WHEN TEMPERATURES ARE ABOVE 85°F, BACKFILLING SHOULD BE RESTRICTED TO COOLER MORNING PERIODS ONLY.**
5. 3/4" TO 2" CLEAN, CRUSHED, WASHED, ANGULAR STONE AASHTO M43 DESIGNATION OF #3 OR #4 OR CRUSHED CONCRETE OF THE SAME SIZE. SEE ACCEPTABLE FILL MATERIAL TABLE ON PAGE 3.
6. FOOTING OF CHAMBERS SHOULD BE CONNECTED WITH A DRYWALL SCREW WHEN OVERLAPPING AND INSTALLING.
7. MINIMUM SPACING BETWEEN THE CHAMBER ROWS SC18 & SC34 = 6 INCHES, SC44 = 9 INCHES.
8. INLET, OUTLET, AND INSPECTION PIPES MUST BE INSERTED A MINIMUM OF 12 INCHES (300 mm) INTO CHAMBER.
9. STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
10. PLACE THE BACKFILL MATERIAL IN 6-8 INCH LOOSE LIFTS AND COMPACT. USE MECHANICAL HAND TAMPERS OR APPROVED COMPACTING EQUIPMENT TO COMPACT ALL BACKFILL AND EMBANKMENT IMMEDIATELY ADJACENT TO EACH SIDE OF THE INSTALLATION AND OVER TOP OF THE INSTALLATION TO THE MINIMUM DEPTH SPECIFIED.
11. PLACE BACKFILL SO THERE IS NO MORE THAN A TWO LIFT DIFFERENTIAL BETWEEN ANY OF THE CHAMBERS AT ANYTIME DURING THE BACKFILLING PROCESS (12 INCHES) .
12. PERIMETER STONE MUST BE BROUGHT UP EVENLY WITH CHAMBER ROWS. PERIMETER MUST BE FULLY BACKFILLED WITH STONE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL.

BACKFILL METHODS



CHAMBER PART	WIDTH (IN)(MM)	HEIGHT (IN)(MM)	WEIGHT (LBS)	ACTUAL LENGTH (IN)(MM)	INSTALLED LENGTH (IN)(MM)	CHAMBER VOLUME (CF)(CM)	INSTALLED STORAGE VOLUME(CF)(CM)
START	60"(1524)	34"(864)	100	103"(2616)	97"(2464)	77.2(2.18)	122.9(3.48)
MIDDLE	60"(1524)	34"(864)	100	101"(2565)	91"(2311)	72.4(2.05)	107.4(3.04)
END	60"(1524)	34"(864)	100	103"(2616)	97"(2464)	77.2(2.18)	122.9(3.48
CLOSED	60"(1524)	34"(864)	100	103"(2616)	103"(2616)	82.0(2.32)	162.8(4.60)

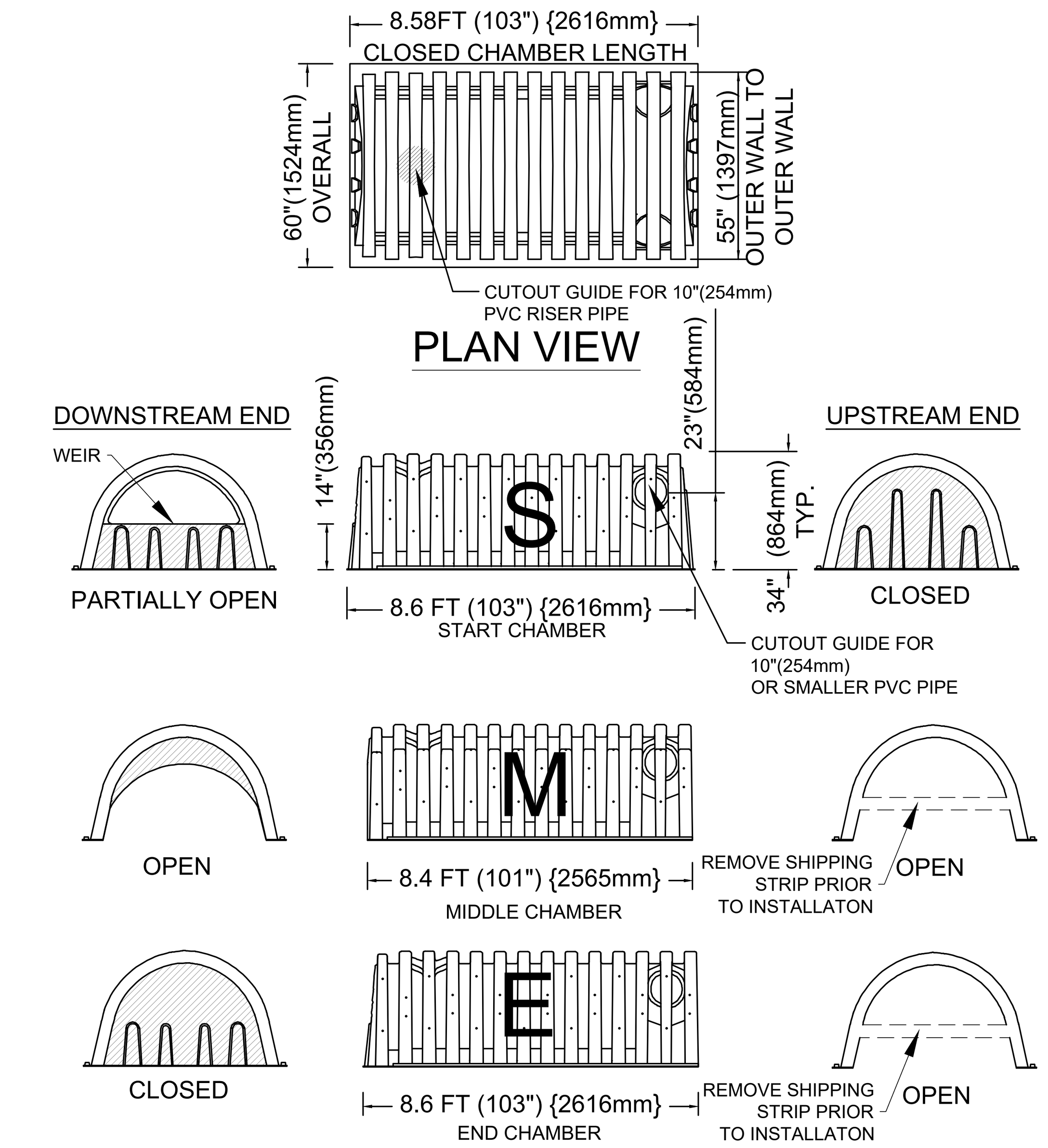
6"(152mm) ABOVE AND BELOW CHAMBER, 6"(152mm) CHAMBER SPACING, 12"(305mm) PERIMETER STONE AND 40% POROSITY



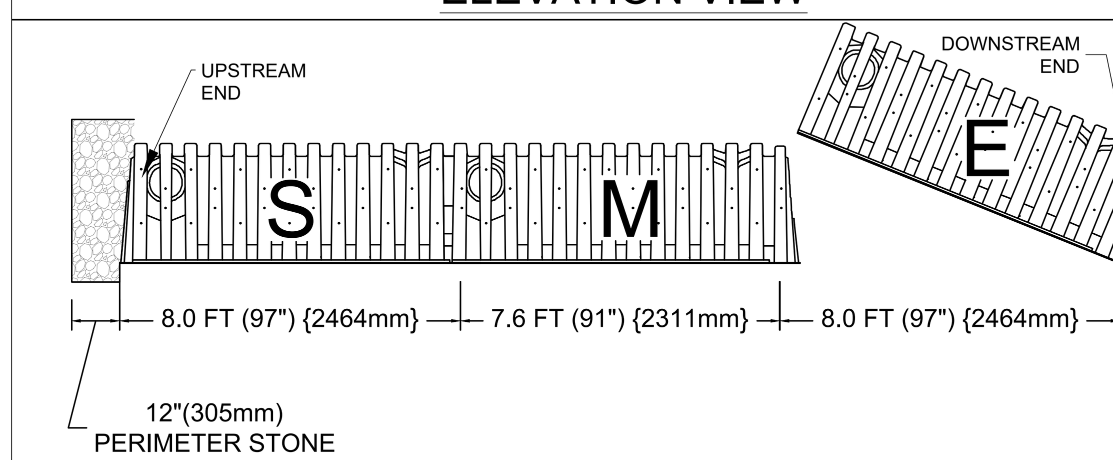
TYPICAL PLAN VIEW

SC-3475 DIMENSIONS

(DIMENSIONS MAY VARY SLIGHTLY)
WEIGHT: 100 LBS EA.

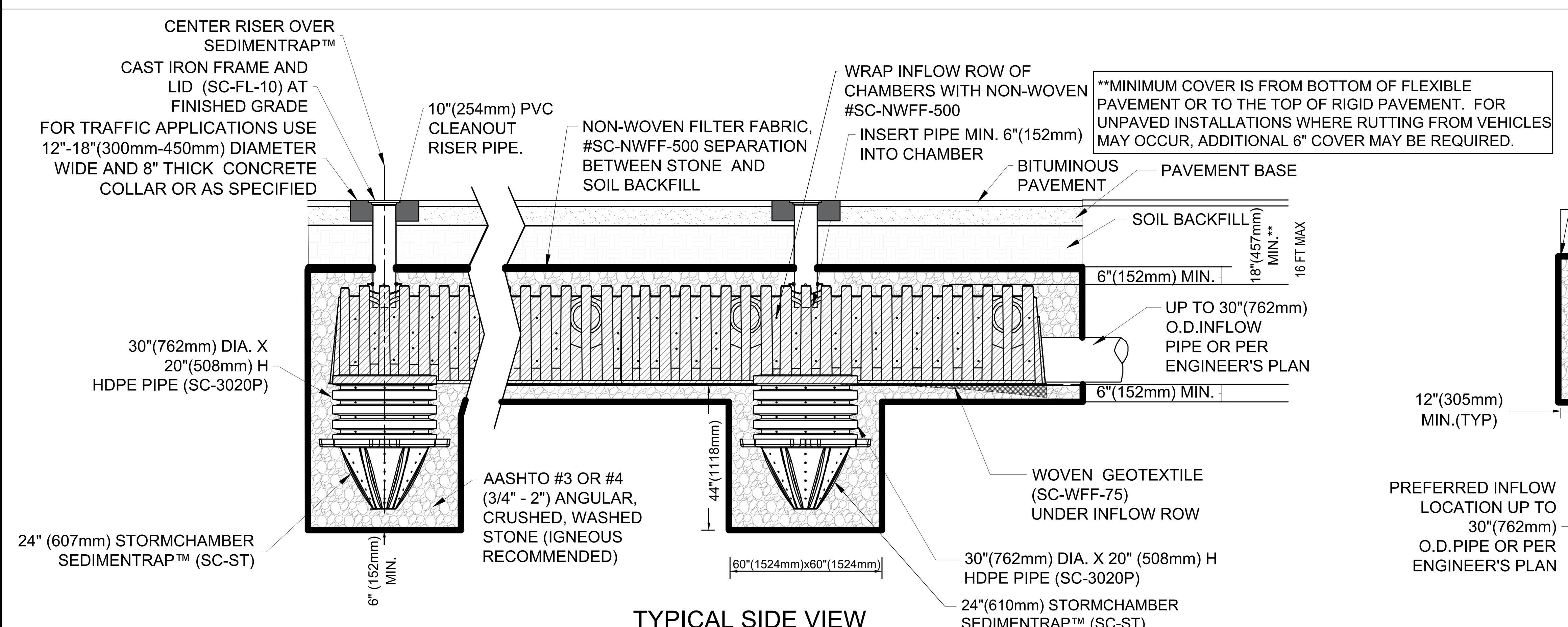


DELIVERY LENGTHS
ELEVATION VIEW

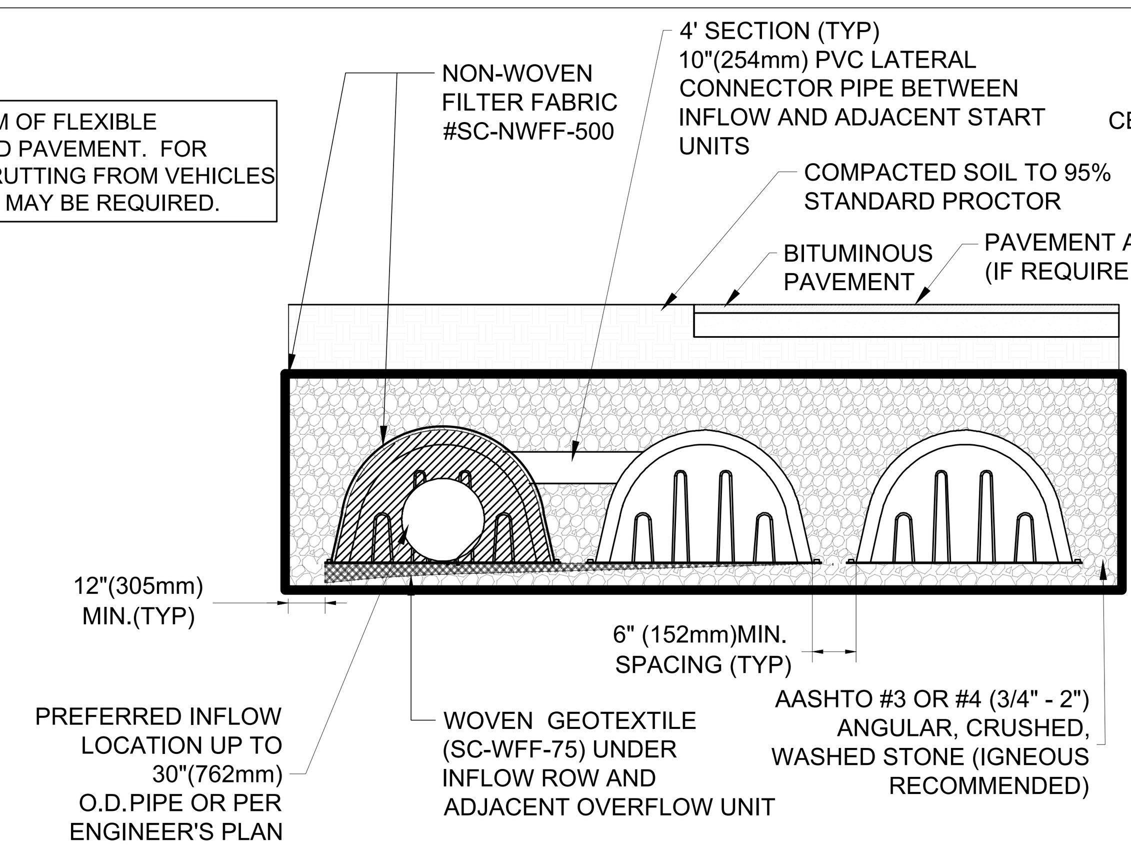


NOTES:
1. START CHAMBERS (CLOSED AT THE SIDE PORTAL END) ARE PLACED AT THE INFLOW END OF THE ROWS.
2. BEGIN PLACEMENTS WITH START CHAMBERS AND END ROWS WITH END CHAMBERS.
3. PLACE FIRST RIB OF THE NEXT CHAMBER IN THE ROW OVER THE LAST RIB OF THE PREVIOUS CHAMBER WITH SCREWS.

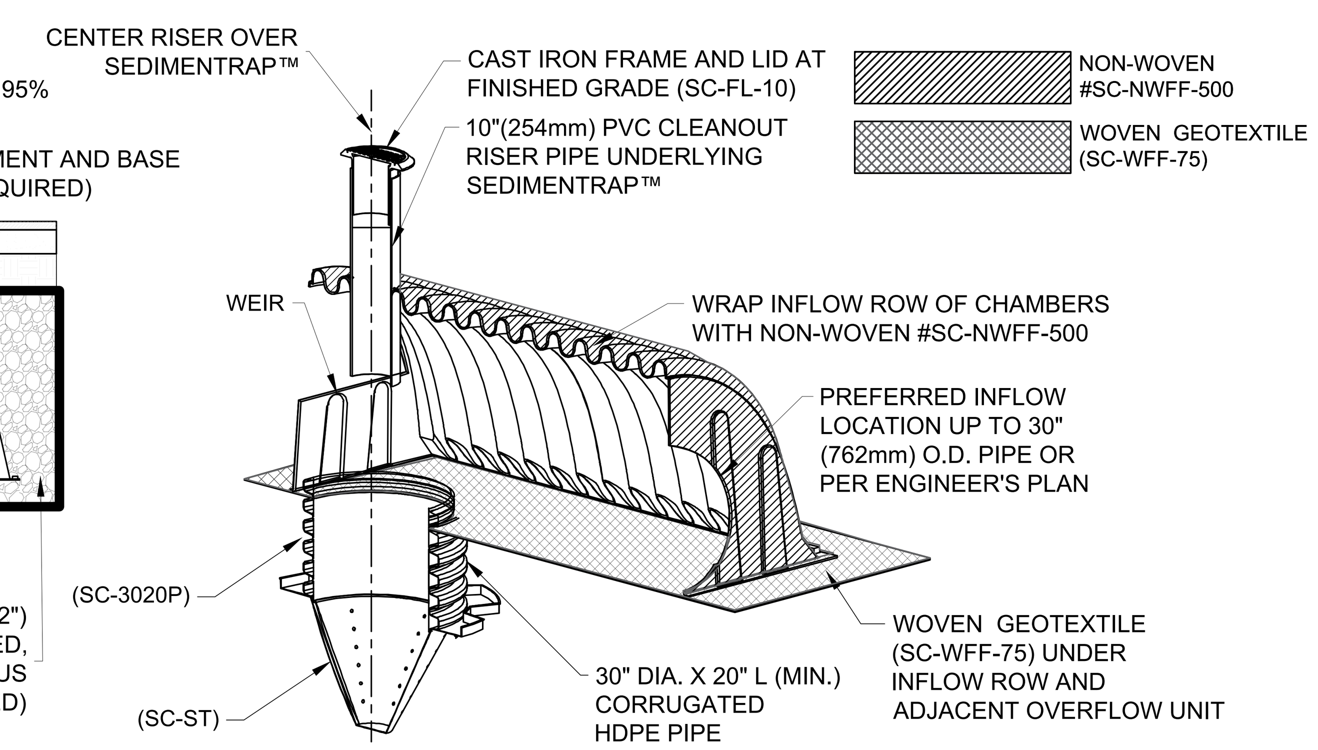
INSTALLED LENGTHS
ELEVATION VIEW



TYPICAL SIDE VIEW



TYPICAL FRONT VIEW



START CHAMBER CUTAWAY

MATERIAL LIST

DESCRIPTION	STOCK CODE	QTY	UNITS
CHAMBERS AND ACCESSORIES:			
START CHAMBER	SC-3475-S-O		EACH
MIDDLE CHAMBER	SC-3475-M-O		EACH
END CHAMBER	SC-3475-E-O		EACH
CLOSED CHAMBER	SC-3475-C-O		EACH
SEDIMENTRAP™	SC-ST		EACH
NON-WOVEN GEOTEXTILE	SC-NWFF-500		ROLLS
WOVEN STABILIZATION GEOTEXTILE	SC-WFF-75		ROLLS
30"Ø X 20"H HDPE PIPE FOR SEDIMENTRAP™	SC-3020P		EACH
10" CAST IRON FRAME AND LID	SC-FL-10		EACH
MATERIALS BY OTHERS:			
10"(254mm) DIAMETER RISER / LATERAL PIPE	OTHERS		EACH
IN-PLACE EXCAVATION (NO BULKING FACTOR)	OTHERS		CU YD
STONE BACKFILL	OTHERS		CU YD
1/4" X 1-1/2" NUT AND BOLT	OTHERS		EACH
3" SCREWS	OTHERS		EACH
IMPERVIOUS LINER	OTHERS		CU YD

PROJECT #

DRAWN BY: ARH

STORMCHAMBER® NDS Design Worx™

SC-3475 STORMCHAMBER LAYOUT

MEETS OR EXCEEDS ASTM F2922 AND ASTM F2787.
MEETS AASHTO HS-20, HS-25 AND HL-93 LIVE LOADING PER AASHTO LRFD SECTION 12

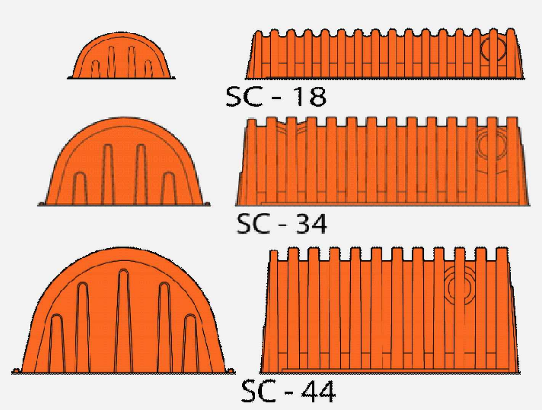
DRAWING# 3475-DT	
REV. E	DATE 11-10-2022

ENTER SYSTEM PARAMETERS

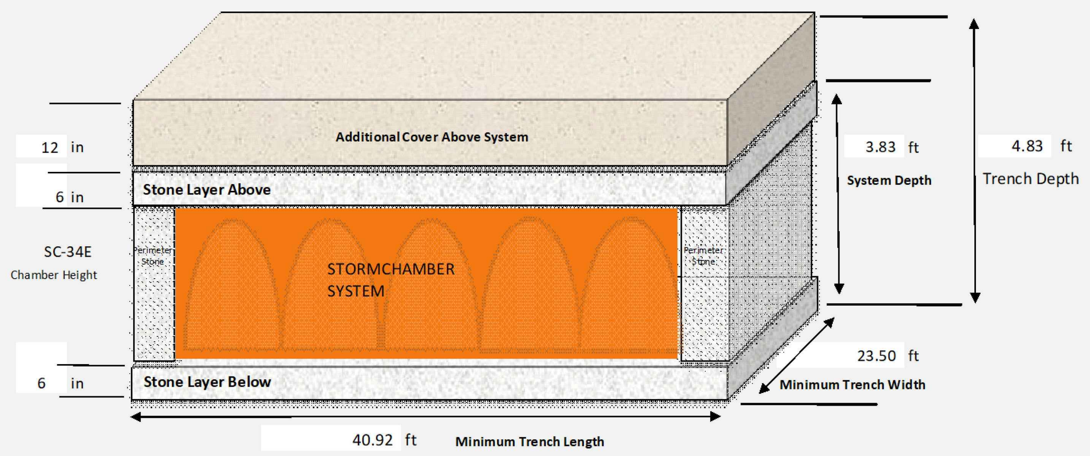
Measurement Type	Imperial	
Input Storage Volume	2,350	ft^3
Select the Chamber Model	SC-34E	
Select Design Constraint	Width	
Design Constraint Dimension	25	ft
Stone Above Chambers (min. 6 inches; max. 192 inches)	6	in
Stone Below Chambers (min. 6 inches)	6	in
Total Cover Over Chambers (min. 18 inches; max. 192 inches)	18	in
Stone Void (Industry Standard is 40%)	40	%
Desired Number of Layers	1	
Space Between each Layer (min. 12 Inches)	12	in
Number of Rows Desired	4	
Maximum Number of Rows Based on Constraint Dimension	*4*	
Space Between Each Row (min. 6 inches)	6	in
Number of SedimenTraps Desired	2	
Minimum Suggested Number of SedimenTraps (per inflow row)	*2*	
Do you need impervious liner to restrict infiltration?	no	
Number of Inflow Rows	1	

Perimeter stone border size 12 Inches

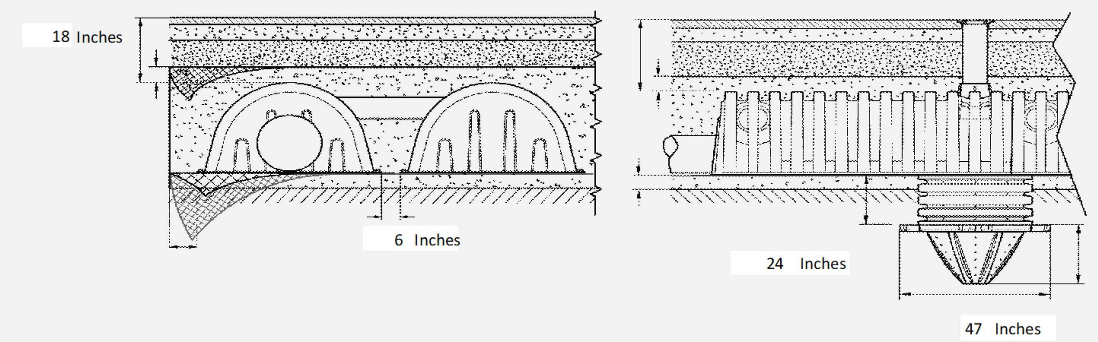
Trench depths beyond the range suggested may be achievable.
*For assistance please contact us at **(888) 825-4716.***



SYSTEM RESULTS



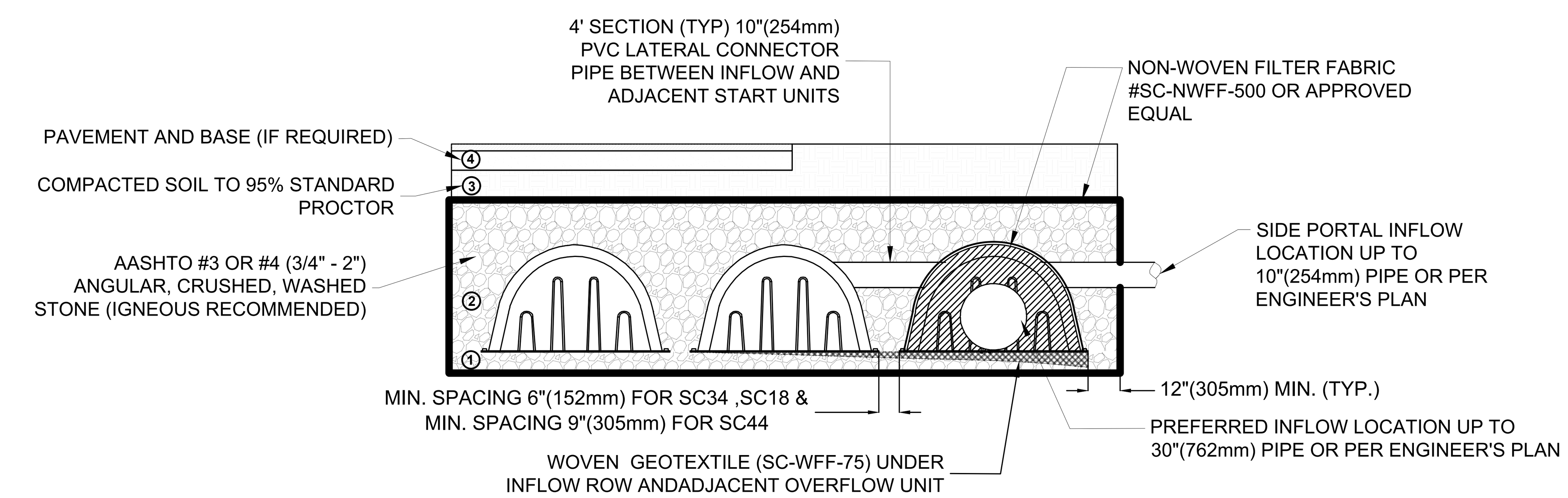
Total Chamber Storage Volume	1,494.40	Cubic Feet
Total Stone Storage Volume	876.60	Cubic Feet
Installed System Storage Volume	2,371.00	Cubic Feet
Minimum Internal Storage of a Chamber	72.80	Cubic Feet
Minimum Installed Storage with stone	107.63	Cubic Feet
Total Number of Chambers Required	20	Total #



Minimum Trench Length	40.92	ft
Minimum Trench Width	23.50	ft
System Depth	3.83	ft
Trench Depth	4.83	ft
Minimum Bed Size Required	962	Square Feet

OTHER SYSTEM COMPONENTS

Minimum Amount of Stone Required	88	Cubic Yards	3/4" - 2" crushed, washed, ANGULAR stone.
Volume of Excavation (not including fill)	137	Cubic Yards	
Non-woven Filter Fabric Required	414	Square Yards	
Stabilization Fabric	1	Pieces	
Impervious Liner	-	Square Yards	



ACCEPTABLE FILL MATERIALS: NDS STORMCHAMBER SYSTEMS

	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATION	COMPACTION/DENSITY REQUIREMENT
4	FILL MATERIAL FOR LAYER '4'ISTARTS FROM THE TOP OF THE '3' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THIS LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.		PREPARE PER ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
3	FILL MATERIAL FOR LAYER '3' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('2' LAYER) TO 18" [457mm] ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THIS LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, 35% FINES. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 A-1, A-2-4, A-3 OR AASHTO M43 #3; 357, 4, 467, 5, 56, 57, 6,67,68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTION AFTER 12" [305mm] OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" [152 mm] LIFTS TO A MIN. 95% STANDARD PROCTOR DENSITY, ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs. [53kN]. DYNAMIC FORCE NOT TO EXCEED 20,000lbs [89kN].
2	EMBEDMENT STONE SURROUNDING THE CHAMBERS FROM THE FOUNTAIN STONE ('1' LAYER) TO THE '3' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION $\frac{3}{4}$ -2 INCH [19-51mm]	AASHTO M43 - #3, 4	90% T99.
1	FOUNDATION STONE BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION $\frac{3}{4}$ -2 INCH [19-51mm]	AASHTO M43 - #3, 4	PLATE COMPACTOR OR ROLL TO ACHIEVE A 95% STANDARD PROCTOR DENSITY. T99 AASHTO.

INSPECTION AND MAINTENANCE OF STORMCHAMBER SEDIMENTRAP ROW

STORMCHAMBER™ WITH SEDIMENTRAP™ ROW IS DESIGNED FOR EASE OF INSPECTION AND REDUCED LONG-TERM MAINTENANCE COST MONITORING T.S.S. BUILDUP IN A SEDIMENTRAP™ CAN BE DONE WITHOUT THE NEED FOR A THIRD PARTY AS THE TRAP SITS DIRECTLY BELOW THE OBSERVATION PORT. A CAMERA WITH LIGHT AND/OR LONG MEASURING STICK CAN SUCCESSFULLY INSPECT AND DETERMINE WHEN MAINTENANCE IS NEEDED. AS NEEDED, SEDIMENT REMOVAL WITH A VACUUM TRUCK REQUIRES LITTLE OR NO WATER JETTING AS WITH OTHER COMPETING SYSTEMS.

INSPECTION AND MAINTENANCE SCHEDULE

THE QUANTITY AND LOCATION OF INSPECTION PORTS VARY BY SITE. PLEASE REFER TO THE SITE PLAN AND LAYOUT TO CONFIRM INSPECTION PORT LOCATIONS. NEW INSTALLATIONS SHOULD BE INSPECTED QUARTERLY AND AFTER EACH LARGE STORM EVENT TO SEE HOW IT PERFORMS. IT IS RECOMMENDED THAT A LOGBOOK BE MAINTAINED SHOWING THE DEPTH OF WATER IN THE STORMCHAMBER AT EACH OBSERVATION IN ORDER TO DETERMINE THE RATE AT WHICH THE STORMCHAMBER SYSTEM DEWATERS AFTER RUNOFF PRODUCING STORM EVENTS. ONCE THE PERFORMANCE CHARACTERISTICS OF THE STORMCHAMBER HAVE BEEN VERIFIED, THE MONITORING SCHEDULE CAN BE REDUCED TO AN ANNUAL BASIS, UNLESS THE PERFORMANCE DATA SUGGESTS THAT A MORE FREQUENT SCHEDULE IS REQUIRED.
SEDIMENT SHOULD BE SERVICED WHEN DEPOSITS APPROACH WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTRAP OR CHAMBER BOTTOM.

1: MAINTENANCE WITH SEDIMENTRAP - VACUUM TRUCK METHOD

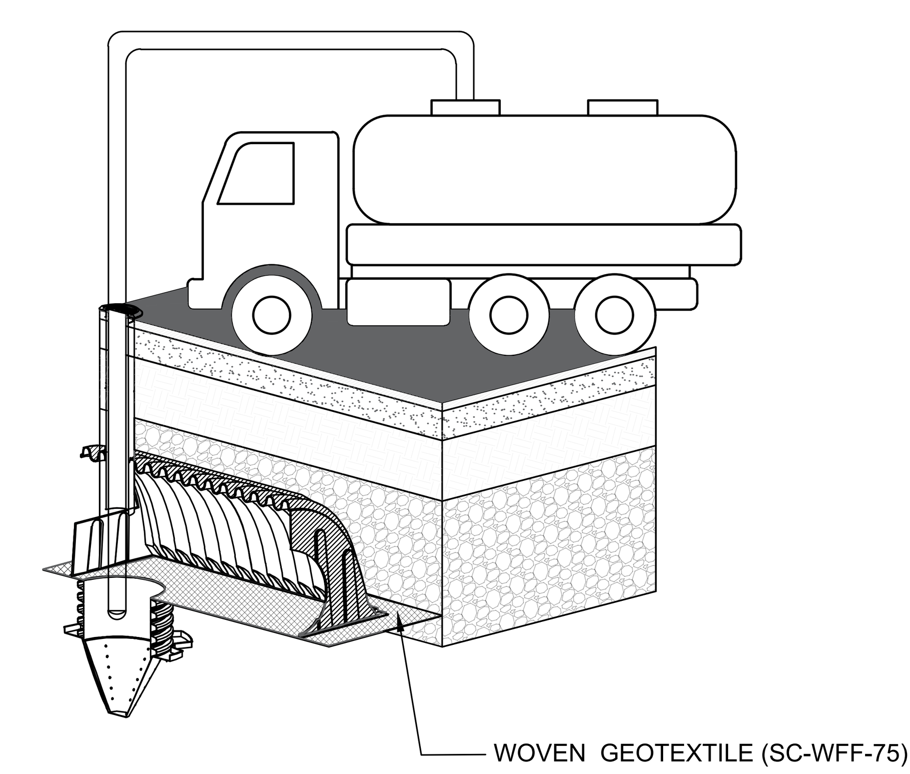
REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP IN THE SEDIMENTRAPS.IF SEDIMENT BUILD-UP IN THE SEDIMENTRAP IS WITHIN 6 INCHES FROM THE TOP OF THE SEDIMENTRAP OR CHAMBER BOTTOM THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN6 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- INSERT VACUUM TUBE THROUGH 10 INCH CLEAN OUT RISER.
- VACUUM TUBE WILL NEED TO REACH THE BOTTOM DEPTH OF SEDIMENTRAP (TYP. 7-10 FEET BELOW FINISHED GRADE).
- REMOVE SEDIMENT USING VACUUM TRUCK/EQUIPMENT UNTIL NO FURTHER SEDIMENT IS BEING REMOVED.
- INSPECT SEDIMENT BUILD-UP AGAIN TO ENSURE PROPER CLEANOUT.

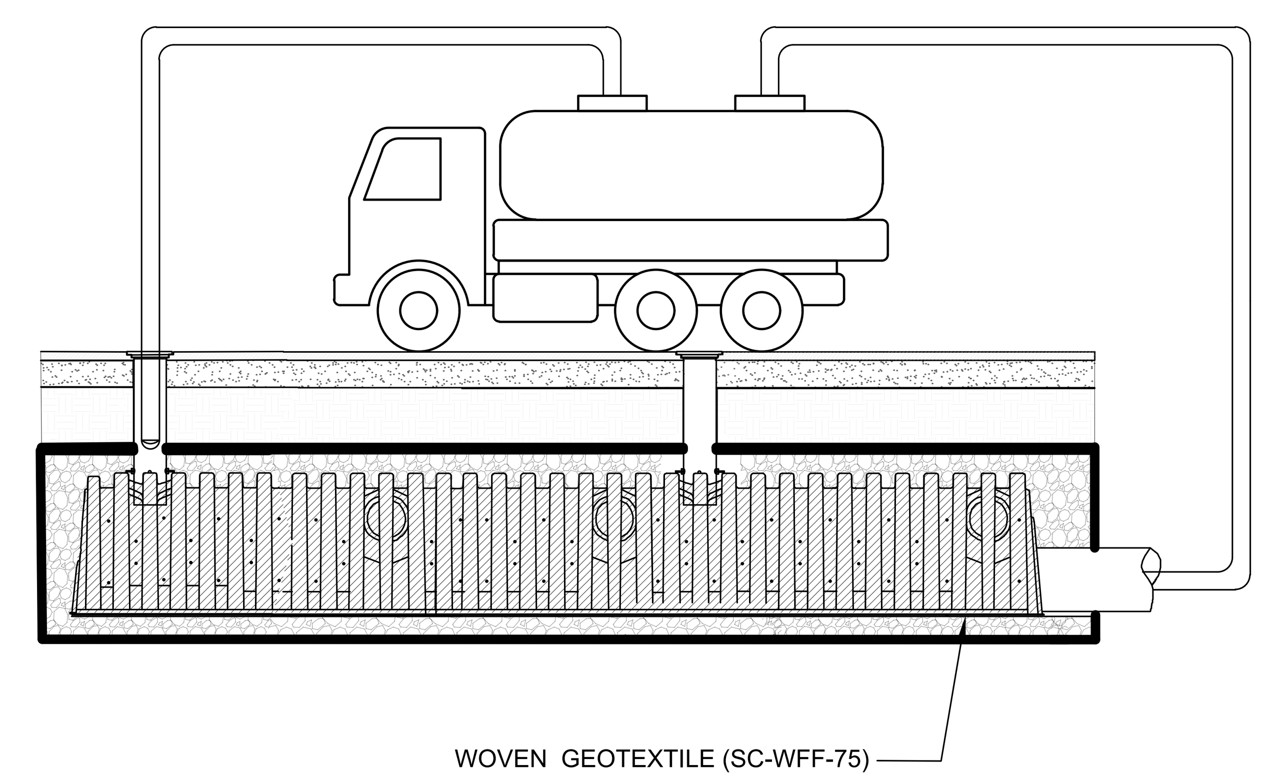
2: MAINTENANCE WITHOUT SEDIMENTRAP - WATER JET METHOD

REMOVE LID FROM INSPECTION PORTS. MEASURE THE DEPTH OF SEDIMENT BUILD-UP ON THE UNDERLYING WOVEN FABRIC UNDER THE CHAMBERS. IF SEDIMENT BUILD-UP ON THE BOTTOM IS GREATER THAN 3 INCHES THEN PROCEED TO MAINTENANCE STEPS BELOW. IF SEDIMENT BUILD-UP IS LESS THAN 3 INCHES, LOG THE RESULTS AND PLACE THE LIDS BACK ON.

- REMOVE SEDIMENT FROM SEDIMENT ROW USING A HIGH PRESSURE WATER JET SYSTEM.
- PREFERRED EQUIPMENT REQUIRED SHOULD HAVE A FIXED FLOOR CLEANING NOZZLE (REAR FACING) WITH A SPREAD OF AROUND 45 INCHES.
- APPLY AS MANY PASSES IN THE ROW UNTIL THE BACKFLUSH WATER IS CLEAN.
- VACUUM AREAS UNDER INSPECTION PORTS AND OUT OF ANY MANHOLES.



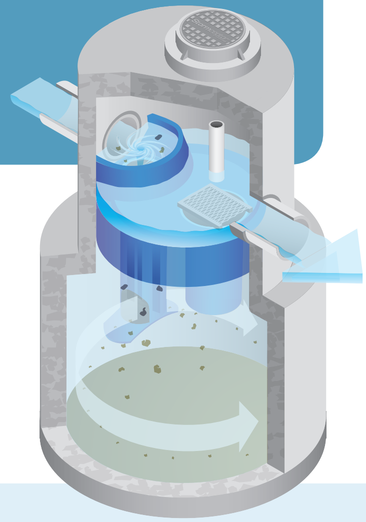
MAINTENANCE WITH SEDIMENTRAPS USING VACUUM TRUCK



MAINTENANCE WITHOUT SEDIMENTRAPS USING WATER JET

PROJECT NAME : PROJECT LOCATION :	DRAWN BY: ARH	STORMCHAMBER® / NDS Design Worx™	NDS STORMCHAMBER SYSTEM DETAILS NDS SPECIALIST: **571-521-9538**

Stormceptor® OSR



STORMCEPTOR® OSR

The Stormceptor OSR is optimized to remove oil and sediment from stormwater runoff. Recommended applications include pretreatment and redevelopment/retrofit projects to meet your water quality objectives.

Product Overview

- Patented design is optimized for fine sand-sized particle removal and increased hydraulic capacity
- Typically designed for removal of 50 micron particles and greater
- Easily and flexibly sized to meet your site's needs
- Hydrocarbon spill protection in wet and dry weather conditions

Proven performance

- Independent third-party tested
- Independent verification by New Jersey Corporation for Advanced Technology (NJCAT)

Flexible and versatile

- Easy installation – small footprint saves time and money with limited site disruption
- Minimal drop between inlet and outlet; 1-inch (25mm) or 3-inch (75mm)
- Can be used as a bend structure
- Low head loss from inlet to outlet makes it a compatible with existing infrastructure
- Ideal for new developments, redevelopment and retrofit applications

Essential part of a stormwater treatment train

- Seamless support with pretreatment of existing BMPs (wet/dry ponds, filtration and infiltration devices)
- Improves water quality, extends BMP maintenance life and minimizes costs

Maintenance made easy

- Maintenance is convenient and trouble-free, with virtually no site disruption
- Easy unit entrance from surface access cover – no confined space entry needed

With over 40,000 units operating worldwide, Stormceptor performs and protects every day, in every storm.

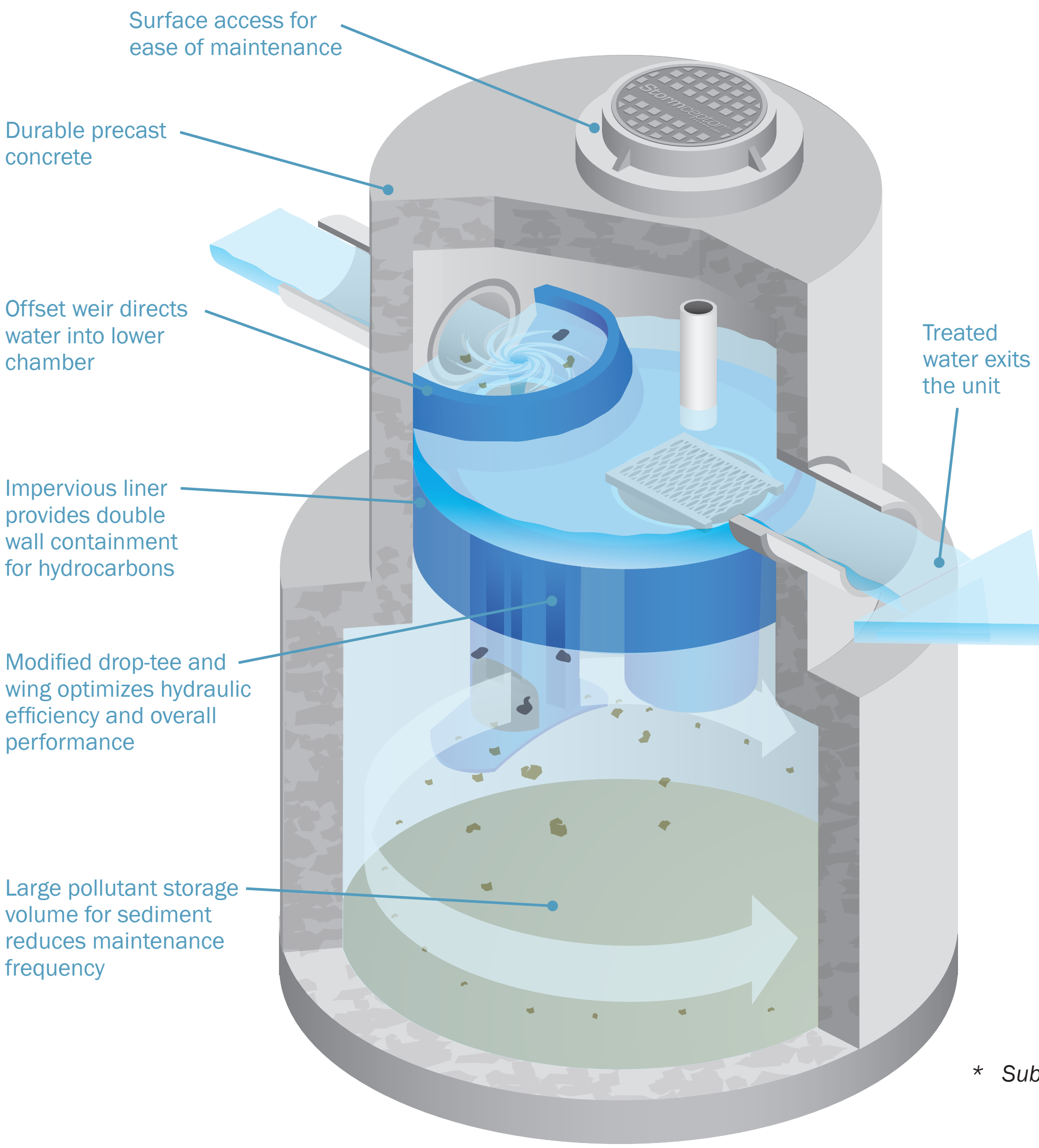
imbrium®

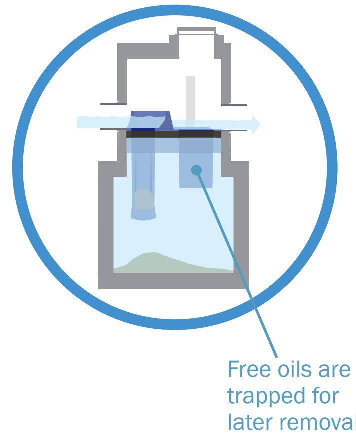
CANADA: (800) 565 4801 | USA: (888) 279 8826 | INTERNATIONAL: +1 (416) 960 9900

www.imbriumsystems.com

Stormceptor® OSR

Oil & Sediment Removal



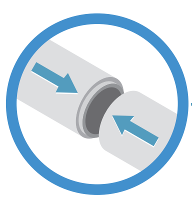


Stormceptor OSR Models		
Model	**US**	**CAD**
Inlet OSR	065	300
In-line OSR	140	750
	250	2000
	390	4000
	560	6000
Series OSR	780	9000
	1125	14000

** Submerged conditions can be accommodated*
*** Fiberglass units are available*

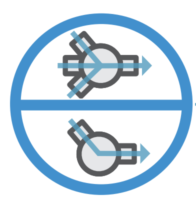
Easy to install

Small footprint saves time and money with limited disruption to your site.



Seamless

Minimal drop between inlet and outlet pipes makes Stormceptor ideal for retro-fits and new development projects.



Flexible

Inlet OSR can connect multiple inlet pipes.

Can be used as a bend structure.

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Appendix E: Roof Drainage

```
*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.083      1.00      30.67
   OUTFLOW: ID= 1 (  0014)      0.395      0.008      1.50      30.68
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.69
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0074

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.083      2.00      35.65
   OUTFLOW: ID= 1 (  0014)      0.395      0.008      2.50      35.66
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.71
```

```
                    TIME SHIFT OF PEAK FLOW         (min)= 30.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0075

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|      OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0065     0.0028
                           0.0010     0.0000   |   0.0070     0.0039
                           0.0020     0.0000   |   0.0075     0.0053
                           0.0030     0.0002   |   0.0080     0.0070
                           0.0040     0.0004   |   0.0085     0.0090
                           0.0050     0.0007   |   0.0090     0.0113
                           0.0055     0.0012   |   0.0095     0.0140
                           0.0060     0.0019   |   0.0100     0.0171

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.114      1.00      41.29
   OUTFLOW: ID= 1 (  0014)      0.395      0.009      1.67      41.31
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.78
                    TIME SHIFT OF PEAK FLOW         (min)= 40.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0106

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|      OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0065     0.0028
                           0.0010     0.0000   |   0.0070     0.0039
                           0.0020     0.0000   |   0.0075     0.0053
                           0.0030     0.0002   |   0.0080     0.0070
                           0.0040     0.0004   |   0.0085     0.0090
                           0.0050     0.0007   |   0.0090     0.0113
                           0.0055     0.0012   |   0.0095     0.0140
                           0.0060     0.0019   |   0.0100     0.0171

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.114      2.00      47.79
   OUTFLOW: ID= 1 (  0014)      0.395      0.009      2.67      47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.80
                    TIME SHIFT OF PEAK FLOW         (min)= 40.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0108

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0014)|      OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0065     0.0028
                           0.0010     0.0000   |   0.0070     0.0039
                           0.0020     0.0000   |   0.0075     0.0053
                           0.0030     0.0002   |   0.0080     0.0070
                           0.0040     0.0004   |   0.0085     0.0090
                           0.0050     0.0007   |   0.0090     0.0113
                           0.0055     0.0012   |   0.0095     0.0140
                           0.0060     0.0019   |   0.0100     0.0171

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.195      1.00      70.39
   OUTFLOW: ID= 1 (  0014)      0.353      0.010      1.25      70.21
   OVERFLOW:ID= 3 (  0003)      0.042      0.024      1.17      70.21

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  6.36

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.11
                    TIME SHIFT OF PEAK FLOW         (min)= 15.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0014)|      OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0065     0.0028
                           0.0010     0.0000   |   0.0070     0.0039
                           0.0020     0.0000   |   0.0075     0.0053
                           0.0030     0.0002   |   0.0080     0.0070
                           0.0040     0.0004   |   0.0085     0.0090
                           0.0050     0.0007   |   0.0090     0.0113
                           0.0055     0.0012   |   0.0095     0.0140
                           0.0060     0.0019   |   0.0100     0.0171

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.195      2.00      81.02
```

```
   OUTFLOW: ID= 1 (  0014)      0.348      0.010      2.17      82.30
   OVERFLOW:ID= 3 (  0003)      0.047      0.053      2.17      82.30

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =    10
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.83
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  7.58

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.11
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.168      2.00      79.27
   OUTFLOW: ID= 1 (  0014)      0.325      0.010      2.00      80.30
   OVERFLOW:ID= 3 (  0003)      0.070      0.158      2.00      80.30

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     2
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.17
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  1.69

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.94
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171
```

```
                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.117      1.50      82.69
   OUTFLOW: ID= 1 (  0014)      0.268      0.010      1.50      88.84
   OVERFLOW:ID= 3 (  0003)      0.127      0.142      1.50      88.84

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.48

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.55
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065      0.0028
                          0.0010     0.0000   |   0.0070      0.0039
                          0.0020     0.0000   |   0.0075      0.0053
                          0.0030     0.0002   |   0.0080      0.0070
                          0.0040     0.0004   |   0.0085      0.0090
                          0.0050     0.0007   |   0.0090      0.0113
                          0.0055     0.0012   |   0.0095      0.0140
                          0.0060     0.0019   |   0.0100      0.0171

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.054      1.50      23.83
   OUTFLOW: ID= 1 (  0014)      0.395      0.007      1.92      23.84
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.13
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0043

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

```
*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065      0.0028
                          0.0010     0.0000   |   0.0070      0.0039
                          0.0020     0.0000   |   0.0075      0.0053
                          0.0030     0.0002   |   0.0080      0.0070
                          0.0040     0.0004   |   0.0085      0.0090
                          0.0050     0.0007   |   0.0090      0.0113
                          0.0055     0.0012   |   0.0095      0.0140
                          0.0060     0.0019   |   0.0100      0.0171

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.083       1.00       30.67
   OUTFLOW: ID= 1 (  0014)      0.395      0.008       1.50       30.68
   OVERFLOW:ID= 3 (  0003)      0.000      0.000       0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.69
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0074

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065      0.0028
                          0.0010     0.0000   |   0.0070      0.0039
                          0.0020     0.0000   |   0.0075      0.0053
                          0.0030     0.0002   |   0.0080      0.0070
                          0.0040     0.0004   |   0.0085      0.0090
                          0.0050     0.0007   |   0.0090      0.0113
                          0.0055     0.0012   |   0.0095      0.0140
                          0.0060     0.0019   |   0.0100      0.0171

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.083       2.00       35.65
   OUTFLOW: ID= 1 (  0014)      0.395      0.008       2.50       35.66
   OVERFLOW:ID= 3 (  0003)      0.000      0.000       0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.71
```

```
                     TIME SHIFT OF PEAK FLOW          (min)= 30.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=  0.0075

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.114      1.00      41.29
   OUTFLOW: ID= 1 (  0014)      0.395      0.009      1.67      41.31
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                     TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                     CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                     PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.78
                     TIME SHIFT OF PEAK FLOW          (min)= 40.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=  0.0106

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.114      2.00      47.79
   OUTFLOW: ID= 1 (  0014)      0.395      0.009      2.67      47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                     TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.80
                    TIME SHIFT OF PEAK FLOW         (min)= 40.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0108

-------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065      0.0028
                          0.0010     0.0000   |   0.0070      0.0039
                          0.0020     0.0000   |   0.0075      0.0053
                          0.0030     0.0002   |   0.0080      0.0070
                          0.0040     0.0004   |   0.0085      0.0090
                          0.0050     0.0007   |   0.0090      0.0113
                          0.0055     0.0012   |   0.0095      0.0140
                          0.0060     0.0019   |   0.0100      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.195      1.00      70.39
   OUTFLOW: ID= 1 (  0014)      0.353      0.010      1.25      70.21
   OVERFLOW:ID= 3 (  0003)      0.042      0.024      1.17      70.21

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  6.36

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.11
                    TIME SHIFT OF PEAK FLOW         (min)= 15.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

-------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065      0.0028
                          0.0010     0.0000   |   0.0070      0.0039
                          0.0020     0.0000   |   0.0075      0.0053
                          0.0030     0.0002   |   0.0080      0.0070
                          0.0040     0.0004   |   0.0085      0.0090
                          0.0050     0.0007   |   0.0090      0.0113
                          0.0055     0.0012   |   0.0095      0.0140
                          0.0060     0.0019   |   0.0100      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.195      2.00      81.02
```

```
  OUTFLOW: ID= 1 (  0014)      0.348      0.010      2.17      82.30
  OVERFLOW:ID= 3 (  0003)      0.047      0.053      2.17      82.30

                TOTAL NUMBER OF SIMULATION OVERFLOW  =    10
                CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.83
                PERCENTAGE OF TIME OVERFLOWING   (%) =  7.58

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.11
                TIME SHIFT OF PEAK FLOW         (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0001)      0.395      0.168      2.00      79.27
  OUTFLOW: ID= 1 (  0014)      0.325      0.010      2.00      80.30
  OVERFLOW:ID= 3 (  0003)      0.070      0.158      2.00      80.30

                TOTAL NUMBER OF SIMULATION OVERFLOW  =     2
                CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.17
                PERCENTAGE OF TIME OVERFLOWING   (%) =  1.69

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  5.94
                TIME SHIFT OF PEAK FLOW         (min)=  0.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0065     0.0028
                          0.0010     0.0000   |   0.0070     0.0039
                          0.0020     0.0000   |   0.0075     0.0053
                          0.0030     0.0002   |   0.0080     0.0070
                          0.0040     0.0004   |   0.0085     0.0090
                          0.0050     0.0007   |   0.0090     0.0113
                          0.0055     0.0012   |   0.0095     0.0140
                          0.0060     0.0019   |   0.0100     0.0171
```

```
                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.117      1.50      82.69
   OUTFLOW: ID= 1 (  0014)      0.268      0.010      1.50      88.84
   OVERFLOW:ID= 3 (  0003)      0.127      0.142      1.50      88.84

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.48

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.55
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0014)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          0.0000     0.0000    |   0.0065      0.0028
                          0.0010     0.0000    |   0.0070      0.0039
                          0.0020     0.0000    |   0.0075      0.0053
                          0.0030     0.0002    |   0.0080      0.0070
                          0.0040     0.0004    |   0.0085      0.0090
                          0.0050     0.0007    |   0.0090      0.0113
                          0.0055     0.0012    |   0.0095      0.0140
                          0.0060     0.0019    |   0.0100      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0001)      0.395      0.054      1.50      23.83
   OUTFLOW: ID= 1 (  0014)      0.395      0.007      1.92      23.84
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.13
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0043

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

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*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      1.00       30.67
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      1.42       30.68
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.77
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0072

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      2.00       35.66
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      2.42       35.66
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.81
```

```
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0073

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      1.00       41.29
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      1.50       41.30
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.62
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0102

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      2.00       47.79
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      2.50       47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.66
                   TIME SHIFT OF PEAK FLOW        (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0104

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      1.00      70.39
   OUTFLOW: ID= 1 (  0016)      0.362      0.015      1.17      73.05
   OVERFLOW:ID= 3 (  0003)      0.046      0.067      1.17      73.05

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     6
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.50
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW        (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      2.00      81.02
```

```
   OUTFLOW: ID= 1 (  0016)      0.373      0.015      2.17      81.87
   OVERFLOW:ID= 3 (  0003)      0.035      0.050      2.17      81.87

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.174      2.00      79.27
   OUTFLOW: ID= 1 (  0016)      0.345      0.015      2.00      80.77
   OVERFLOW:ID= 3 (  0003)      0.063      0.159      2.00      80.77

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     1
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.08
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  1.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.59
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.121     1.50      82.69
   OUTFLOW: ID= 1 (  0016)    0.292     0.015     1.50      88.75
   OVERFLOW:ID= 3 (  0003)    0.116     0.128     1.50      88.75

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  7.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.36
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.056     1.50      23.83
   OUTFLOW: ID= 1 (  0016)    0.408     0.009     1.83      23.84
   OVERFLOW:ID= 3 (  0003)    0.000     0.000     0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.28
                   TIME SHIFT OF PEAK FLOW         (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0042

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

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*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080     0.0028
                          0.0010     0.0000   |   0.0089     0.0039
                          0.0020     0.0000   |   0.0099     0.0053
                          0.0030     0.0002   |   0.0109     0.0070
                          0.0040     0.0004   |   0.0119     0.0090
                          0.0050     0.0007   |   0.0129     0.0113
                          0.0060     0.0012   |   0.0139     0.0140
                          0.0069     0.0019   |   0.0149     0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408     0.086      1.00       30.67
   OUTFLOW: ID= 1 (  0016)      0.408     0.011      1.42       30.68
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.77
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0072

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080     0.0028
                          0.0010     0.0000   |   0.0089     0.0039
                          0.0020     0.0000   |   0.0099     0.0053
                          0.0030     0.0002   |   0.0109     0.0070
                          0.0040     0.0004   |   0.0119     0.0090
                          0.0050     0.0007   |   0.0129     0.0113
                          0.0060     0.0012   |   0.0139     0.0140
                          0.0069     0.0019   |   0.0149     0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408     0.086      2.00       35.66
   OUTFLOW: ID= 1 (  0016)      0.408     0.011      2.42       35.66
   OVERFLOW:ID= 3 (  0003)      0.000     0.000      0.00        0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.81
```

```
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0073

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*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      1.00      41.29
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      1.50      41.30
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.62
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0102

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      2.00      47.79
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      2.50      47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.66
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0104

-------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      1.00      70.39
   OUTFLOW: ID= 1 (  0016)      0.362      0.015      1.17      73.05
   OVERFLOW:ID= 3 (  0003)      0.046      0.067      1.17      73.05

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     6
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.50
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

-------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      2.00      81.02
```

```
   OUTFLOW: ID= 1 (  0016)      0.373      0.015      2.17      81.87
   OVERFLOW:ID= 3 (  0003)      0.035      0.050      2.17      81.87

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.174      2.00      79.27
   OUTFLOW: ID= 1 (  0016)      0.345      0.015      2.00      80.77
   OVERFLOW:ID= 3 (  0003)      0.063      0.159      2.00      80.77

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     1
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.08
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  1.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.59
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.121     1.50      82.69
   OUTFLOW: ID= 1 (  0016)    0.292     0.015     1.50      88.75
   OVERFLOW:ID= 3 (  0003)    0.116     0.128     1.50      88.75

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  7.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.36
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.056     1.50      23.83
   OUTFLOW: ID= 1 (  0016)    0.408     0.009     1.83      23.84
   OVERFLOW:ID= 3 (  0003)    0.000     0.000     0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.28
                   TIME SHIFT OF PEAK FLOW         (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0042

--------------------------------------------------------------------------------
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******************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      1.00      30.67
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      1.42      30.68
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.77
                   TIME SHIFT OF PEAK FLOW          (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0072

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      2.00      35.66
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      2.42      35.66
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.81
```

```
                    TIME SHIFT OF PEAK FLOW         (min)= 25.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0073

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      1.00      41.29
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      1.50      41.30
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                    CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                    PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.62
                    TIME SHIFT OF PEAK FLOW         (min)= 30.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0102

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      2.00      47.79
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      2.50      47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                    TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.66
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0104

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      1.00      70.39
   OUTFLOW: ID= 1 (  0016)      0.362      0.015      1.17      73.05
   OVERFLOW:ID= 3 (  0003)      0.046      0.067      1.17      73.05

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     6
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.50
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      2.00      81.02
```

```
   OUTFLOW: ID= 1 (  0016)      0.373      0.015      2.17      81.87
   OVERFLOW:ID= 3 (  0003)      0.035      0.050      2.17      81.87

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.174      2.00      79.27
   OUTFLOW: ID= 1 (  0016)      0.345      0.015      2.00      80.77
   OVERFLOW:ID= 3 (  0003)      0.063      0.159      2.00      80.77

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     1
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.08
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  1.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.59
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171
```

```
                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.121      1.50      82.69
   OUTFLOW: ID= 1 (  0016)      0.292      0.015      1.50      88.75
   OVERFLOW:ID= 3 (  0003)      0.116      0.128      1.50      88.75

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  7.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.36
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.056      1.50      23.83
   OUTFLOW: ID= 1 (  0016)      0.408      0.009      1.83      23.84
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.28
                   TIME SHIFT OF PEAK FLOW         (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0042

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Appendix F: Stormwater Management Storage Swale

STAGE STORAGE WORKSHEET

OTTHYMO MODEL ROUTE RESERVOIR REPORT

Stage Storage Discharge Worksheet
Client: 1000198532 Ontario Inc.
Job No.: 221099
Location: 2725 Moodie Drive, Ottawa, ON
Date: Friday, October 24, 2025

Total Chambers: 528

Orifice 1 Information	
Dia (m):	0.135
Area (m2.):	0.0143
Orifice Coeff, C_d:	0.60
Orifice Coeff , C_w:	0.62
Orifice Top (m):	115.94
Orifice Cen (m):	115.87
Orifice Inv (m):	115.80

Stage, WSE Elev (m)	Comment	Layer Thickness [m]	Storage Chamber Group A (126 Chambers) [ha. M.]	Storage Chamber Group B (342 Chambers) [ha. M.]	Storage Chamber Group C (60 Chambers) [ha. M.]	Cumulative pond [ha. M.]	Orifice 1 Flow: Flow Depth (m)	Orifice 1 Flow: n	Orifice 1 Flow: Orifice 1 Flow (m^3/sec)	Total Outflow (m^3/sec)	Quantity Storage (Ha.m)	Incremental Drawdown (hrs)	Total Drawdown (hrs)
116.75		0.05	0.0338	0.0895	0.0177	0.1989	0.950	7.04	0.035	0.03530	0.33991	1.3	45.8
116.70		0.05	0.0327	0.0866	0.0171	0.1868	0.900	6.67	0.034	0.03432	0.32320	1.3	44.4
116.65		0.05	0.0316	0.0837	0.0165	0.1748	0.850	6.30	0.033	0.03330	0.30672	1.4	43.1
116.60		0.05	0.0305	0.0807	0.0159	0.1632	0.800	5.93	0.032	0.03226	0.29027	1.5	41.7
116.55		0.05	0.0292	0.0772	0.0152	0.1517	0.750	5.56	0.031	0.03119	0.27321	1.6	40.3
116.50		0.05	0.0276	0.0730	0.0144	0.1405	0.700	5.19	0.030	0.03007	0.25552	1.7	38.7
116.45		0.05	0.0259	0.0685	0.0135	0.1295	0.650	4.81	0.029	0.02892	0.23744	1.8	37.0
116.40		0.05	0.0241	0.0637	0.0126	0.1187	0.600	4.44	0.028	0.02771	0.21916	1.8	35.3
116.35		0.05	0.0222	0.0587	0.0116	0.1082	0.550	4.07	0.026	0.02645	0.20075	1.9	33.4
116.30		0.05	0.0203	0.0535	0.0106	0.0979	0.500	3.70	0.025	0.02513	0.18230	2.0	31.5
116.25		0.05	0.0183	0.0482	0.0096	0.0878	0.450	3.33	0.024	0.02372	0.16383	2.2	29.4
116.20		0.05	0.0162	0.0427	0.0085	0.0780	0.400	2.96	0.022	0.02221	0.14539	2.3	27.3
116.15		0.05	0.0141	0.0371	0.0075	0.0683	0.350	2.59	0.021	0.02057	0.12699	2.5	25.0
116.10		0.05	0.0120	0.0314	0.0064	0.0589	0.300	2.22	0.019	0.01874	0.10868	2.6	22.5
116.05		0.05	0.0099	0.0259	0.0053	0.0497	0.250	1.85	0.017	0.01663	0.09084	2.3	19.9
116.00		0.05	0.0088	0.0230	0.0047	0.0408	0.200	1.48	0.014	0.01404	0.07731	2.6	17.6
115.95		0.05	0.0077	0.0201	0.0041	0.0320	0.150	1.11	0.011	0.01065	0.06401	3.4	15.0
115.90		0.05	0.0066	0.0173	0.0036	0.0235	0.100	0.74	0.006	0.00620	0.05093	5.8	11.6
115.85		0.05	0.0055	0.0144	0.0030	0.0152	0.050	0.37	0.002	0.00181	0.03807	5.8	5.8
115.80		0.05	0.0044	0.0115	0.0024	0.0072	0.000	0.00	0.000	0.00000	0.02543	0.0	0.0
115.75		0.05	0.0033	0.0086	0.0018	0.0013				0.00000	0.01502		0.0
115.70		0.05	0.0022	0.0058	0.0012	0.0000				0.00000	0.00913		0.0
115.65		0.00	0.0011	0.0029	0.0006	0.0000				0.00000	0.00457		0.0

```
******************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      1.00      30.67
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      1.42      30.68
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.77
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0072

-------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.086      2.00      35.66
   OUTFLOW: ID= 1 (  0016)      0.408      0.011      2.42      35.66
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.81
```

```
                       TIME SHIFT OF PEAK FLOW         (min)= 25.00
                       MAXIMUM  STORAGE   USED       (ha.m.)=  0.0073

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      1.00      41.29
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      1.50      41.30
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                       TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                       CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                       PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                       PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.62
                       TIME SHIFT OF PEAK FLOW         (min)= 30.00
                       MAXIMUM  STORAGE   USED       (ha.m.)=  0.0102

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.117      2.00      47.79
   OUTFLOW: ID= 1 (  0016)      0.408      0.012      2.50      47.80
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                       TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
```

```
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.66
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0104

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      1.00      70.39
   OUTFLOW: ID= 1 (  0016)      0.362      0.015      1.17      73.05
   OVERFLOW:ID= 3 (  0003)      0.046      0.067      1.17      73.05

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =      6
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.50
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408      0.202      2.00      81.02
```

```
   OUTFLOW: ID= 1 (  0016)      0.373       0.015      2.17      81.87
   OVERFLOW:ID= 3 (  0003)      0.035       0.050      2.17      81.87

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  6.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.39
                   TIME SHIFT OF PEAK FLOW         (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      0.408       0.174      2.00      79.27
   OUTFLOW: ID= 1 (  0016)      0.345       0.015      2.00      80.77
   OVERFLOW:ID= 3 (  0003)      0.063       0.159      2.00      80.77

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     1
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.08
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  1.03

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  8.59
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171
```

```
                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.121     1.50      82.69
   OUTFLOW: ID= 1 (  0016)    0.292     0.015     1.50      88.75
   OVERFLOW:ID= 3 (  0003)    0.116     0.128     1.50      88.75

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     7
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.58
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  7.87

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 12.36
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0171

--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
--------------------
| RESERVOIR(  0016)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0080      0.0028
                          0.0010     0.0000   |   0.0089      0.0039
                          0.0020     0.0000   |   0.0099      0.0053
                          0.0030     0.0002   |   0.0109      0.0070
                          0.0040     0.0004   |   0.0119      0.0090
                          0.0050     0.0007   |   0.0129      0.0113
                          0.0060     0.0012   |   0.0139      0.0140
                          0.0069     0.0019   |   0.0149      0.0171

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0003)    0.408     0.056     1.50      23.83
   OUTFLOW: ID= 1 (  0016)    0.408     0.009     1.83      23.84
   OVERFLOW:ID= 3 (  0003)    0.000     0.000     0.00       0.00

                   TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                   CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                   PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.28
                   TIME SHIFT OF PEAK FLOW         (min)= 20.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0042

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

Appendix G: OTTHYMO Models for Low Impact Design Components

Rain Garden

Enhanced Swales

```
*****************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length           (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope          =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK           TPEAK         R.V.
                       (ha)        (cms)           (hrs)         (mm)
     INFLOW:ID= 2      0.22        0.001            1.33         1.95
    OUTFLOW:ID= 1      0.00        0.000            0.00         0.00
   OVERFLOW:ID= 3      0.00        0.000            0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        1.73
               Time to reach Max storage              (Hr)=        2.17
               Volume of water for drawdown in LID (cu.m.)=        0.99
               Calculated Drawdown Time               (Hr)=        2.42
****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length           (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope          =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK           TPEAK         R.V.
                       (ha)        (cms)           (hrs)         (mm)
     INFLOW:ID= 2      0.22        0.001            2.25         3.04
    OUTFLOW:ID= 1      0.00        0.000            0.00         0.00
   OVERFLOW:ID= 3      0.00        0.000            0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        2.15
               Time to reach Max storage              (Hr)=        3.08
               Volume of water for drawdown in LID (cu.m.)=        0.62
               Calculated Drawdown Time               (Hr)=        2.00
****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length           (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope          =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK           TPEAK         R.V.
                       (ha)        (cms)           (hrs)         (mm)
```

```
      INFLOW:ID= 2     0.22         0.003             1.25         4.52
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
              Maximum ponding/storage volume      (cu.m.)=        4.82
              Time to reach Max storage              (Hr)=        2.17
              Volume of water for drawdown in LID (cu.m.)=        3.02
              Calculated Drawdown Time               (Hr)=        3.75
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK          R.V.
                       (ha)         (cms)             (hrs)          (mm)
      INFLOW:ID= 2     0.22         0.004             2.17         6.52
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.22         0.000             2.83         0.20

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=       96.90
              Maximum ponding/storage volume      (cu.m.)=        5.40
              Time to reach Max storage              (Hr)=        2.75
              Volume of water for drawdown in LID (cu.m.)=        1.96
              Calculated Drawdown Time               (Hr)=        3.17
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK          R.V.
                       (ha)         (cms)             (hrs)          (mm)
      INFLOW:ID= 2     0.22         0.012             1.17        15.51
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.22         0.011             1.17         9.84

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=       36.58
              Maximum ponding/storage volume      (cu.m.)=        5.40
              Time to reach Max storage              (Hr)=        1.08
              Volume of water for drawdown in LID (cu.m.)=        3.96
              Calculated Drawdown Time               (Hr)=        4.08
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
```

```
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope        =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)   =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK            TPEAK         R.V.
                       (ha)        (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.22        0.014             2.17        20.66
     OUTFLOW:ID= 1     0.00        0.000             0.00         0.00
    OVERFLOW:ID= 3     0.22        0.013             2.17        12.27

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       40.61
               Maximum ponding/storage volume      (cu.m.)=        5.40
               Time to reach Max storage              (Hr)=        2.08
               Volume of water for drawdown in LID (cu.m.)=        3.95
               Calculated Drawdown Time               (Hr)=        4.08
****************************************
** SIMULATION:7. Historical Aug 4 1988 **
****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope        =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)   =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK            TPEAK         R.V.
                       (ha)        (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.22        0.018             2.08        19.78
     OUTFLOW:ID= 1     0.00        0.000             0.00         0.00
    OVERFLOW:ID= 3     0.22        0.017             2.08        12.17

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       38.47
               Maximum ponding/storage volume      (cu.m.)=        5.40
               Time to reach Max storage              (Hr)=        1.75
               Volume of water for drawdown in LID (cu.m.)=        3.25
               Calculated Drawdown Time               (Hr)=        3.83
*****************************************
** SIMULATION:8. Historical July 1 1979 **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope        =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)   =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA        QPEAK            TPEAK         R.V.
                       (ha)        (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.22        0.018             1.67        21.51
     OUTFLOW:ID= 1     0.00        0.000             0.00         0.00
    OVERFLOW:ID= 3     0.22        0.017             1.67        16.17

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       24.82
```

```
              Maximum ponding/storage volume      (cu.m.)=        5.40
              Time to reach Max storage              (Hr)=        1.42
              Volume of water for drawdown in LID (cu.m.)=        3.90
              Calculated Drawdown Time               (Hr)=        4.08
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope        =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)   =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.22         0.000             2.17         0.82
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
              Maximum ponding/storage volume      (cu.m.)=        0.46
              Time to reach Max storage              (Hr)=        3.83
              Volume of water for drawdown in LID (cu.m.)=        0.28
              Calculated Drawdown Time               (Hr)=        1.42
```

```
******************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
******************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.12         0.001             1.33         1.95
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        0.87
               Time to reach Max storage              (Hr)=        2.08
               Volume of water for drawdown in LID (cu.m.)=        0.46
               Calculated Drawdown Time               (Hr)=        1.92
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
      INFLOW:ID= 2     0.12         0.001             2.25         3.04
     OUTFLOW:ID= 1     0.00         0.000             0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        1.09
               Time to reach Max storage              (Hr)=        3.00
               Volume of water for drawdown in LID (cu.m.)=        0.25
               Calculated Drawdown Time               (Hr)=        1.42
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
```

```
     INFLOW:ID= 2     0.12         0.002            1.25         4.52
    OUTFLOW:ID= 1     0.00         0.000            0.00         0.00
   OVERFLOW:ID= 3     0.00         0.000            0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
              Maximum ponding/storage volume      (cu.m.)=        2.47
              Time to reach Max storage              (Hr)=        2.08
              Volume of water for drawdown in LID (cu.m.)=        1.45
              Calculated Drawdown Time               (Hr)=        3.00
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2     0.12         0.002            2.17         6.52
    OUTFLOW:ID= 1     0.00         0.000            0.00         0.00
   OVERFLOW:ID= 3     0.00         0.000            0.00         0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
              Maximum ponding/storage volume      (cu.m.)=        2.96
              Time to reach Max storage              (Hr)=        3.00
              Volume of water for drawdown in LID (cu.m.)=        0.85
              Calculated Drawdown Time               (Hr)=        2.42
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2     0.12         0.007            1.17        15.51
    OUTFLOW:ID= 1     0.00         0.000            0.00         0.00
   OVERFLOW:ID= 3     0.12         0.005            1.25         6.82

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=       56.03
              Maximum ponding/storage volume      (cu.m.)=        4.73
              Time to reach Max storage              (Hr)=        1.25
              Volume of water for drawdown in LID (cu.m.)=        3.52
              Calculated Drawdown Time               (Hr)=        4.17
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
```

```
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.12         0.008             2.17        20.66
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.12         0.006             2.25         8.55

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       58.60
               Maximum ponding/storage volume      (cu.m.)=        4.73
               Time to reach Max storage              (Hr)=        2.17
               Volume of water for drawdown in LID (cu.m.)=        2.66
               Calculated Drawdown Time               (Hr)=        3.75
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.12         0.010             2.08        19.78
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.12         0.009             2.08         9.30

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       52.97
               Maximum ponding/storage volume      (cu.m.)=        4.73
               Time to reach Max storage              (Hr)=        1.92
               Volume of water for drawdown in LID (cu.m.)=        2.07
               Calculated Drawdown Time               (Hr)=        3.42
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.12         0.010             1.67        21.51
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.12         0.009             1.67        13.50

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       37.23
```

```
               Maximum ponding/storage volume      (cu.m.)=        4.73
               Time to reach Max storage              (Hr)=        1.50
               Volume of water for drawdown in LID (cu.m.)=        3.36
               Calculated Drawdown Time               (Hr)=        4.08
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
------------------
| SWALE(  0025)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=   75.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope         =    2.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK          R.V.
                       (ha)         (cms)            (hrs)          (mm)
      INFLOW:ID= 2     0.12         0.000             2.17          0.82
     OUTFLOW:ID= 1     0.00         0.000             0.00          0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00          0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        0.21
               Time to reach Max storage              (Hr)=        3.50
               Volume of water for drawdown in LID (cu.m.)=        0.13
               Calculated Drawdown Time               (Hr)=        1.08
```

```
******************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK         R.V.
                       (ha)         (cms)             (hrs)         (mm)
      INFLOW:ID= 2     0.22         0.001              1.33         1.95
     OUTFLOW:ID= 1     0.00         0.000              0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000              0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        1.73
               Time to reach Max storage              (Hr)=        2.17
               Volume of water for drawdown in LID (cu.m.)=        0.99
               Calculated Drawdown Time               (Hr)=        2.42
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK         R.V.
                       (ha)         (cms)             (hrs)         (mm)
      INFLOW:ID= 2     0.22         0.001              2.25         3.04
     OUTFLOW:ID= 1     0.00         0.000              0.00         0.00
    OVERFLOW:ID= 3     0.00         0.000              0.00         0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        2.15
               Time to reach Max storage              (Hr)=        3.08
               Volume of water for drawdown in LID (cu.m.)=        0.62
               Calculated Drawdown Time               (Hr)=        2.00
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height            (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope          =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)     =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK         R.V.
                       (ha)         (cms)             (hrs)         (mm)
```

```
     INFLOW:ID= 2     0.22         0.003             1.25          4.52
    OUTFLOW:ID= 1     0.00         0.000             0.00          0.00
   OVERFLOW:ID= 3     0.00         0.000             0.00          0.00

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=       100.00
              Maximum ponding/storage volume      (cu.m.)=         4.82
              Time to reach Max storage              (Hr)=         2.17
              Volume of water for drawdown in LID (cu.m.)=         3.02
              Calculated Drawdown Time               (Hr)=         3.75
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK         R.V.
                       (ha)         (cms)             (hrs)         (mm)
     INFLOW:ID= 2     0.22         0.004              2.17          6.52
    OUTFLOW:ID= 1     0.00         0.000              0.00          0.00
   OVERFLOW:ID= 3     0.22         0.000              2.83          0.20

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=        96.90
              Maximum ponding/storage volume      (cu.m.)=         5.40
              Time to reach Max storage              (Hr)=         2.75
              Volume of water for drawdown in LID (cu.m.)=         1.96
              Calculated Drawdown Time               (Hr)=         3.17
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope         =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK             TPEAK         R.V.
                       (ha)         (cms)             (hrs)         (mm)
     INFLOW:ID= 2     0.22         0.012              1.17         15.51
    OUTFLOW:ID= 1     0.00         0.000              0.00          0.00
   OVERFLOW:ID= 3     0.22         0.011              1.17          9.84

              Volume Reduction Rate[(RVin-RVout)/RVin](%)=        36.58
              Maximum ponding/storage volume      (cu.m.)=         5.40
              Time to reach Max storage              (Hr)=         1.08
              Volume of water for drawdown in LID (cu.m.)=         3.96
              Calculated Drawdown Time               (Hr)=         4.08
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
```

```
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.22         0.014             2.17        20.66
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.22         0.013             2.17        12.27

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       40.61
               Maximum ponding/storage volume      (cu.m.)=        5.40
               Time to reach Max storage              (Hr)=        2.08
               Volume of water for drawdown in LID (cu.m.)=        3.95
               Calculated Drawdown Time               (Hr)=        4.08
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.22         0.018             2.08        19.78
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.22         0.017             2.08        12.17

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       38.47
               Maximum ponding/storage volume      (cu.m.)=        5.40
               Time to reach Max storage              (Hr)=        1.75
               Volume of water for drawdown in LID (cu.m.)=        3.25
               Calculated Drawdown Time               (Hr)=        3.83
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope         =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)    =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK         R.V.
                       (ha)         (cms)            (hrs)         (mm)
     INFLOW:ID= 2      0.22         0.018             1.67        21.51
    OUTFLOW:ID= 1      0.00         0.000             0.00         0.00
   OVERFLOW:ID= 3      0.22         0.017             1.67        16.17

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=       24.82
```

```
               Maximum ponding/storage volume      (cu.m.)=        5.40
               Time to reach Max storage              (Hr)=        1.42
               Volume of water for drawdown in LID (cu.m.)=        3.90
               Calculated Drawdown Time               (Hr)=        4.08
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************
------------------
| SWALE(  0027)  |  SURFACE PONDING LAYER:
|IN= 2--> OUT= 3 |  Length          (m)=  250.00  Height           (m)=    0.30
|DT=  5.0 MIN    |  Left Slope        =    3.00  Right Slope        =    3.00
------------------  Bottom Width    (m)=    0.30  Surface slope(%)   =    1.00

                    NATIVE SOIL LAYER:
                    Infiltration (m/hr) = 0.0500

                       AREA         QPEAK            TPEAK          R.V.
                       (ha)         (cms)            (hrs)          (mm)
      INFLOW:ID= 2     0.22         0.000             2.17          0.82
     OUTFLOW:ID= 1     0.00         0.000             0.00          0.00
    OVERFLOW:ID= 3     0.00         0.000             0.00          0.00

               Volume Reduction Rate[(RVin-RVout)/RVin](%)=      100.00
               Maximum ponding/storage volume      (cu.m.)=        0.46
               Time to reach Max storage              (Hr)=        3.83
               Volume of water for drawdown in LID (cu.m.)=        0.28
               Calculated Drawdown Time               (Hr)=        1.42
```

Appendix H: Post-Development OTTHYMO Model Results

Summary output from Post-development Model

Detailed output from last link in Post-development Model

```
*******************************************
** SIMULATION:1. CHICAGO [2 YR] [3 HR]  **
*******************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.020     5.33    23.38
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):     5.59   0.020     5.33    23.38

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):     5.59   0.020     5.33    23.38
      + ID2= 2 (  0029):     0.25   0.000     3.17     0.51
        ===================================================
        ID = 1 (  0030):     5.84   0.020     5.33    22.41

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     5.84   0.020     5.33    22.41
      + ID2= 2 (  0052):     0.34   0.002     1.25     2.31
        ===================================================
        ID = 3 (  0030):     6.18   0.020     5.33    21.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
*****************************************
** SIMULATION:2. CHICAGO [2 YR] [6 HR] **
*****************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.022     6.92    28.17
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):     5.59   0.022     6.92    28.17

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

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

```
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):     5.59   0.022     6.92    28.17
      + ID2= 2 (  0029):     0.25   0.000     6.08     0.95
        ===================================================
        ID = 1 (  0030):     5.84   0.022     6.50    27.01

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     5.84   0.022     6.50    27.01
      + ID2= 2 (  0052):     0.34   0.003     2.25     3.50
        ===================================================
        ID = 3 (  0030):     6.18   0.022     6.08    25.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
*****************************************
** SIMULATION:3. CHICAGO [5 YR] [3 HR] **
*****************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.024     6.50    33.62
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):     5.59   0.024     6.50    33.62

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):     5.59   0.024     6.50    33.62
      + ID2= 2 (  0029):     0.25   0.000     3.25     0.60
        ===================================================
        ID = 1 (  0030):     5.84   0.024     6.50    32.22

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     5.84   0.024     6.50    32.22
      + ID2= 2 (  0052):     0.34   0.005     1.17     5.08
        ===================================================
        ID = 3 (  0030):     6.18   0.024     6.50    30.74
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*****************************************
** SIMULATION:4. CHICAGO [5 YR] [6 HR] **
*****************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.026     8.08    39.94
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):     5.59   0.026     8.08    39.94

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0030):     5.59   0.026     8.08    39.94
      + ID2= 2 (  0029):     0.47   0.001     2.83     0.66
        ===================================================
        ID = 1 (  0030):     6.06   0.026     8.08    36.88

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0030):     6.06   0.026     8.08    36.88
      + ID2= 2 (  0052):     0.34   0.006     2.17     7.21
        ===================================================
        ID = 3 (  0030):     6.40   0.026     8.08    35.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************************
** SIMULATION:5. CHICAGO [100 YR] [3 HR] **
*******************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.032     8.92    62.18
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):     5.59   0.032     8.92    62.18

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

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):     5.59   0.032     8.92    62.18
      + ID2= 2 (  0029):     0.60   0.015     1.25     5.45
        ==================================================
        ID = 1 (  0030):     6.19   0.035     1.25    56.73

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.19   0.035     1.25    56.73
      + ID2= 2 (  0052):     0.34   0.020     1.17    16.64
        ==================================================
        ID = 3 (  0030):     6.52   0.053     1.25    54.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************************
** SIMULATION:6. CHICAGO [100 YR] [6 HR] **
*******************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):     5.59   0.034    10.58    72.56
      + ID2= 2 (  0022):     0.00   0.000     0.00     0.00
        ==================================================
        ID = 3 (  0030):     5.59   0.034    10.58    72.56

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):     5.59   0.034    10.58    72.56
      + ID2= 2 (  0029):     0.60   0.018     2.25     7.00
        ==================================================
        ID = 1 (  0030):     6.19   0.039     2.25    66.25

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):     6.19   0.039     2.25    66.25
```

```
      + ID2= 2 (  0052):      0.34   0.022     2.17    21.99
        ===================================================
        ID = 3 (  0030):      6.52   0.059     2.25    63.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*****************************************
** SIMULATION:7. Historical Aug 4 1988 **
*****************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):      5.59   0.035     9.50    73.12
      + ID2= 2 (  0022):      0.00   0.000     0.00     0.00
        ===================================================
        ID = 3 (  0030):      5.59   0.035     9.50    73.12

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0030):      5.59   0.035     9.50    73.12
      + ID2= 2 (  0029):      0.60   0.026     2.08     7.14
        ===================================================
        ID = 1 (  0030):      6.19   0.052     2.08    66.77

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0030):      6.19   0.052     2.08    66.77
      + ID2= 2 (  0052):      0.34   0.029     2.08    21.07
        ===================================================
        ID = 3 (  0030):      6.52   0.081     2.08    64.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:8. Historical July 1 1979 **
******************************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0021):      5.52   0.035     6.83    76.21
      + ID2= 2 (  0022):      0.08   0.021     6.83    76.21
        ===================================================
        ID = 3 (  0030):      5.59   0.056     6.83    76.21
```

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):      5.59   0.056     6.83    76.21
      + ID2= 2 (  0029):      0.60   0.026     1.67     9.23
        =====================================================
        ID = 1 (  0030):      6.19   0.056     6.83    69.76

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0030):      6.19   0.056     6.83    69.76
      + ID2= 2 (  0052):      0.34   0.029     1.67    22.87
        =====================================================
        ID = 3 (  0030):      6.52   0.080     1.67    67.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************
** SIMULATION:9. 25mm4hrChicago **
**********************************

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0022 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0021):      5.59   0.017     5.17    16.85
      + ID2= 2 (  0022):      0.00   0.000     0.00     0.00
        =====================================================
        ID = 3 (  0030):      5.59   0.017     5.17    16.85

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

--------------------
| ADD HYD  (  0030)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0030):      5.59   0.017     5.17    16.85
      + ID2= 2 (  0029):      0.25   0.000     4.17     0.40
        =====================================================
        ID = 1 (  0030):      5.84   0.017     5.17    16.15

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

--------------------
| ADD HYD  (  0030)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
       ID1= 1 (  0030):     5.84   0.017     5.17    16.15
     + ID2= 2 (  0052):     0.34   0.000     2.00     1.04
       ====================================================
       ID = 3 (  0030):     6.18   0.017     5.17    15.32

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

```
==========================================================================================================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


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  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
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DATE: 10-21-2025                           TIME: 02:41:25

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 1. CHICAGO [2 YR] [3 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.00  1.33   1.95 0.06   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
```

```
 ** CALIB NASHYD          0009  1  5.0    0.12    0.00  1.33   1.95 0.06   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.00  1.33   1.95 0.06   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0011  1  5.0    0.25    0.00  1.33   1.95 0.06   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:              0058  1  5.0    0.25    0.00  3.17   0.51  n/a   0.000
*
    ADD [  0024+  0026]   0029  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0029+  0028]   0029  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0029+  0058]   0029  3  5.0    0.25    0.00  3.17   0.51  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0012  1  5.0    0.13    0.00  1.25   2.27 0.07   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                  10.0
    [ Ptot= 31.86 mm ]
*
 ** CALIB NASHYD          0013  1  5.0    0.21    0.00  1.25   2.33 0.07   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]   0052  3  5.0    0.34    0.00  1.25   2.31  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD        0004  1  5.0    0.37    0.08  1.00  30.67 0.96   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0017  1  5.0    0.37    0.01  1.42  30.68  n/a   0.000
*
```

```
    CHIC STORM                   10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD          0005  1  5.0    0.37    0.08  1.00  30.67 0.96   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0018  1  5.0    0.37    0.01  1.42  30.68  n/a   0.000
*
    ADD [  0017+  0018]     0054  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0017+  0018]     0053  3  5.0    0.74    0.02  1.42  30.68  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD          0007  1  5.0    1.29    0.27  1.00  29.57 0.93   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]     0056  3  5.0    0.74    0.02  1.42  30.68  n/a   0.000
*
    ADD [  0056+  0007]     0056  1  5.0    2.03    0.28  1.00  29.97  n/a   0.000
*
 ** Reservoir
    OUTFLOW:                0057  1  5.0    2.03    0.04  1.92  29.91  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD          0001  1  5.0    0.40    0.08  1.00  30.67 0.96   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0014  1  5.0    0.40    0.01  1.50  30.68  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD          0002  1  5.0    0.46    0.10  1.00  30.67 0.96   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0015  1  5.0    0.46    0.01  1.42  30.68  n/a   0.000
*
    CHIC STORM                   10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD          0003  1  5.0    0.41    0.09  1.00  30.67 0.96   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0016  1  5.0    0.41    0.01  1.42  30.68  n/a   0.000
*
    ADD [  0014+  0015]     0050  3  5.0    0.86    0.02  1.42  30.68  n/a   0.000
*
    ADD [  0050+  0016]     0050  1  5.0    1.27    0.03  1.42  30.68  n/a   0.000
*
    ADD [  0014+  0015]     0051  3  0.0    0.00    0.00  0.00  30.68  n/a   0.000
*
    ADD [  0051+  0016]     0051  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
```

```
*
    CHIC STORM                 10.0
    [ Ptot= 31.86 mm ]
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    0.38  1.00  25.42 0.80   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.03  1.42  30.68  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.30    0.07  1.50  30.21  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.59    0.44  1.00  28.24  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    0.44  1.00  28.24  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0020  1  5.0    5.59    0.02  5.33  23.38  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.02  5.33  23.38  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    5.84    0.02  5.33  22.41  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.18    0.02  5.33  21.31  n/a   0.000
*
===============================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


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DATE: 10-21-2025                           TIME: 02:41:22

USER:


COMMENTS: ____________________________________________________________
```

```
  ************************************************
  ** SIMULATION : 2. CHICAGO [2 YR] [6 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.00  2.25    3.04 0.08   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00    0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.00  2.25    3.04 0.08   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.00    0.00  0.00    0.00  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00    0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.00  2.25    3.04 0.08   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.00    0.00  0.00    0.00  n/a   0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00    0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0011  1  5.0    0.25    0.00  2.25    3.04 0.08   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:              0058  1  5.0    0.25    0.00  6.08    0.95  n/a   0.000
*
    ADD [  0024+  0026]   0029  3  0.0    0.00    0.00  0.00    0.00  n/a   0.000
*
    ADD [  0029+  0028]   0029  1  0.0    0.00    0.00  0.00    0.00  n/a   0.000
*
    ADD [  0029+  0058]   0029  3  5.0    0.25    0.00  6.08    0.95  n/a   0.000
*
    CHIC STORM                  10.0
```

```
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0012  1  5.0    0.13    0.00  2.25   3.47 0.09   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 ** CALIB NASHYD          0013  1  5.0    0.21    0.00  2.25   3.51 0.10   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]   0052  3  5.0    0.34    0.00  2.25   3.50  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0004  1  5.0    0.37    0.08  2.00  35.65 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0017  1  5.0    0.37    0.01  2.42  35.66  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0005  1  5.0    0.37    0.08  2.00  35.65 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0018  1  5.0    0.37    0.01  2.42  35.66  n/a   0.000
*
    ADD [  0017+  0018]   0054  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0017+  0018]   0053  3  5.0    0.74    0.02  2.42  35.66  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0007  1  5.0    1.29    0.27  2.00  34.50 0.94   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]   0056  3  5.0    0.74    0.02  2.42  35.66  n/a   0.000
*
    ADD [  0056+  0007]   0056  1  5.0    2.03    0.28  2.00  34.92  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0057  1  5.0    2.03    0.04  2.92  34.86  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0001  1  5.0    0.40    0.08  2.00  35.65 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0014  1  5.0    0.40    0.01  2.50  35.66  n/a   0.000
*
    CHIC STORM                  10.0
```

```
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0002  1  5.0    0.46    0.10  2.00  35.66 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0015  1  5.0    0.46    0.01  2.42  35.67  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0003  1  5.0    0.41    0.09  2.00  35.66 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0016  1  5.0    0.41    0.01  2.42  35.66  n/a   0.000
*
    ADD [  0014+  0015]   0050  3  5.0    0.86    0.02  2.42  35.66  n/a   0.000
*
    ADD [  0050+  0016]   0050  1  5.0    1.27    0.03  2.42  35.66  n/a   0.000
*
    ADD [  0014+  0015]   0051  3  0.0    0.00    0.00  0.00  35.66  n/a   0.000
*
    ADD [  0051+  0016]   0051  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 36.86 mm ]
*
 *  CALIB STANDHYD        0006  1  5.0    2.29    0.38  2.00  29.97 0.81   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]   0019  3  5.0    1.27    0.03  2.42  35.66  n/a   0.000
*
    ADD [  0019+  0057]   0019  1  5.0    3.30    0.07  2.50  35.17  n/a   0.000
*
    ADD [  0019+  0006]   0019  3  5.0    5.59    0.44  2.00  33.04  n/a   0.000
*
    ADD [  0019+  0059]   0062  3  5.0    5.59    0.44  2.00  33.04  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0020  1  5.0    5.59    0.02  6.92  28.17  n/a   0.000
*
    ADD [  0021+  0022]   0030  3  5.0    5.59    0.02  6.92  28.17  n/a   0.000
*
    ADD [  0030+  0029]   0030  1  5.0    5.84    0.02  6.50  27.01  n/a   0.000
*
    ADD [  0030+  0052]   0030  3  5.0    6.18    0.02  6.08  25.73  n/a   0.000
*
===============================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
```

```
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\ec576dd3-4a1f-4781-b4e5-5ffdb0821d9d\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\ec576dd3-4a1f-4781-b4e5-5ffdb0821d9d\scenari


DATE: 10-21-2025                          TIME: 02:41:26

USER:


COMMENTS: ____________________________________________________________


  ***********************************************
  ** SIMULATION : 3. CHICAGO [5 YR] [3 HR]      **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.00  1.25   4.52 0.11   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.00  1.25   4.52 0.11   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.00  1.25   4.52 0.11   0.000
```

```
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.00    0.00  0.00    0.00  n/a    0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0011  1  5.0    0.25    0.00  1.25    4.52 0.11    0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:              0058  1  5.0    0.25    0.00  3.25    0.60  n/a    0.000
*
    ADD [  0024+  0026]   0029  3  0.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    ADD [  0029+  0028]   0029  1  0.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    ADD [  0029+  0058]   0029  3  5.0    0.25    0.00  3.25    0.60  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0012  1  5.0    0.13    0.00  1.25    5.07 0.12    0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                  10.0
    [ Ptot= 42.51 mm ]
*
 ** CALIB NASHYD          0013  1  5.0    0.21    0.00  1.17    5.09 0.12    0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]   0052  3  5.0    0.34    0.01  1.17    5.08  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD        0004  1  5.0    0.37    0.11  1.00   41.29 0.97    0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0017  1  5.0    0.37    0.01  1.42   41.30  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD        0005  1  5.0    0.37    0.11  1.00   41.29 0.97    0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0018  1  5.0    0.37    0.01  1.42   41.30  n/a    0.000
*
    ADD [  0017+  0018]   0054  3  0.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    ADD [  0017+  0018]   0053  3  5.0    0.74    0.02  1.42   41.30  n/a    0.000
```

```
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.36  1.00  40.09 0.94   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.02  1.42  41.30  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.38  1.00  40.53  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    2.03    0.04  2.17  40.47  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.11  1.00  41.29 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.40    0.01  1.67  41.31  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.13  1.00  41.29 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.46    0.01  1.42  41.31  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.12  1.00  41.29 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0016  1  5.0    0.41    0.01  1.50  41.30  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.86    0.02  1.50  41.31  n/a   0.000
*
    ADD [  0050+  0016]  0050  1  5.0    1.27    0.04  1.50  41.30  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  0.0    0.00    0.00  0.00  41.31  n/a   0.000
*
    ADD [  0051+  0016]  0051  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 42.51 mm ]
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    0.53  1.00  35.18 0.83   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.04  1.50  41.30  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.30    0.08  1.67  40.79  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.59    0.59  1.00  38.49  n/a   0.000
```

```
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    0.59  1.00  38.49  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0020  1  5.0    5.59    0.02  6.50  33.62  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.02  6.50  33.62  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    5.84    0.02  6.50  32.22  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.18    0.02  6.50  30.74  n/a   0.000
*
================================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```

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```
                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\34c81e12-8ff4-405f-8e9b-f009ceca7513\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\34c81e12-8ff4-405f-8e9b-f009ceca7513\scenari


DATE: 10-21-2025                           TIME: 02:41:21

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 4. CHICAGO [5 YR] [6 HR]      **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                10.0
```

```
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.00  2.17    6.52 0.13    0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.00  2.17    6.52 0.13    0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.00    0.00  0.00    0.00  n/a    0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.00  2.17    6.52 0.13    0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.22    0.00  2.83    0.20  n/a    0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0011  1  5.0    0.25    0.00  2.17    6.52 0.13    0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:              0058  1  5.0    0.25    0.00  6.17    1.07  n/a    0.000
*
    ADD [  0024+  0026]   0029  3  0.0    0.00    0.00  0.00    0.00  n/a    0.000
*
    ADD [  0029+  0028]   0029  1  5.0    0.22    0.00  2.83    0.20  n/a    0.000
*
    ADD [  0029+  0058]   0029  3  5.0    0.47    0.00  2.83    0.66  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0012  1  5.0    0.13    0.00  2.17    7.23 0.15    0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                  10.0
    [ Ptot= 49.04 mm ]
*
 ** CALIB NASHYD          0013  1  5.0    0.21    0.00  2.17    7.20 0.15    0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
```

```
*
    ADD [  0012+  0013]  0052  3  5.0    0.34    0.01  2.17   7.21  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0004  1  5.0    0.37    0.11  2.00  47.80 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0017  1  5.0    0.37    0.01  2.42  47.81  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0005  1  5.0    0.37    0.11  2.00  47.80 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0018  1  5.0    0.37    0.01  2.42  47.81  n/a   0.000
*
    ADD [  0017+  0018]  0054  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0017+  0018]  0053  3  5.0    0.74    0.02  2.42  47.81  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.36  2.00  46.55 0.95   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.02  2.42  47.81  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.39  2.00  47.00  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    2.03    0.04  3.17  46.95  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.11  2.00  47.79 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.40    0.01  2.67  47.80  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.13  2.00  47.80 0.97   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.46    0.02  2.42  47.80  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.12  2.00  47.79 0.97   0.000
```

```
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:            0016  1  5.0    0.41    0.01  2.50  47.80  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.86    0.02  2.50  47.80  n/a   0.000
*
    ADD [  0050+  0016]  0050  1  5.0    1.27    0.04  2.50  47.80  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  0.0    0.00    0.00  0.00  47.80  n/a   0.000
*
    ADD [  0051+  0016]  0051  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 49.04 mm ]
*
 *  CALIB STANDHYD      0006  1  5.0    2.29    0.53  2.00  41.26 0.84   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.04  2.50  47.80  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.30    0.08  2.67  47.27  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.59    0.60  2.00  44.80  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    0.60  2.00  44.80  n/a   0.000
*
 ** Reservoir
    OUTFLOW:            0020  1  5.0    5.59    0.03  8.08  39.94  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.03  8.08  39.94  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    6.06    0.03  8.08  36.88  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.40    0.03  8.08  35.32  n/a   0.000
*
===============================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```
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```
                   *****  S U M M A R Y   O U T P U T  *****

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
```

```
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\c518bd5f-2a6d-4476-9621-11b42a134b48\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\c518bd5f-2a6d-4476-9621-11b42a134b48\scenari


DATE: 10-21-2025                            TIME: 02:41:26

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 5. CHICAGO [100 YR] [3 HR]    **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.00  1.17  15.51 0.22   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.01  1.17  15.51 0.22   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.12    0.01  1.25   6.82  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.01  1.17  15.51 0.22   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.22    0.01  1.17   9.84  n/a   0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD          0011  1  5.0    0.25    0.01  1.17  15.51 0.22   0.000
```

```
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:                0058  1  5.0    0.25    0.00  3.42   0.81  n/a   0.000
*
    ADD [  0024+  0026]     0029  3  5.0    0.12    0.01  1.25   6.82  n/a   0.000
*
    ADD [  0029+  0028]     0029  1  5.0    0.35    0.02  1.25   8.77  n/a   0.000
*
    ADD [  0029+  0058]     0029  3  5.0    0.60    0.02  1.25   5.45  n/a   0.000
*
    CHIC STORM                     10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD            0012  1  5.0    0.13    0.01  1.17  16.78 0.23   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                     10.0
    [ Ptot= 71.66 mm ]
*
 ** CALIB NASHYD            0013  1  5.0    0.21    0.01  1.17  16.55 0.23   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]     0052  3  5.0    0.34    0.02  1.17  16.64  n/a   0.000
*
    CHIC STORM                     10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD          0004  1  5.0    0.37    0.18  1.00  70.39 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0017  1  5.0    0.37    0.01  1.58  70.39  n/a   0.000
*
    CHIC STORM                     10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD          0005  1  5.0    0.37    0.18  1.00  70.39 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:                0018  1  5.0    0.37    0.01  1.58  70.39  n/a   0.000
*
    ADD [  0017+  0018]     0054  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0017+  0018]     0053  3  5.0    0.74    0.03  1.58  70.39  n/a   0.000
*
    CHIC STORM                     10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD          0007  1  5.0    1.29    0.63  1.00  69.00 0.96   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]     0056  3  5.0    0.74    0.03  1.58  70.39  n/a   0.000
*
    ADD [  0056+  0007]     0056  1  5.0    2.03    0.66  1.00  69.51  n/a   0.000
*
```

```
 ** Reservoir
    OUTFLOW:              0057  1  5.0     2.03     0.05  2.58  69.45  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD        0001  1  5.0     0.40     0.20  1.00  70.39 0.98    0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0014  1  5.0     0.35     0.01  1.25  70.21  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD        0002  1  5.0     0.46     0.23  1.00  70.39 0.98    0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0015  1  5.0     0.46     0.02  1.50  69.94  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD        0003  1  5.0     0.41     0.20  1.00  70.39 0.98    0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:              0016  1  5.0     0.36     0.01  1.17  73.05  n/a    0.000
*
    ADD [  0014+  0015]   0050  3  5.0     0.81     0.03  1.50  70.06  n/a    0.000
*
    ADD [  0050+  0016]   0050  1  5.0     1.18     0.04  1.50  70.98  n/a    0.000
*
    ADD [  0014+  0015]   0051  3  5.0     0.04     0.02  1.17  70.20  n/a    0.000
*
    ADD [  0051+  0016]   0051  1  5.0     0.09     0.09  1.17  71.66  n/a    0.000
*
    CHIC STORM                  10.0
    [ Ptot= 71.66 mm ]
*
 *  CALIB STANDHYD        0006  1  5.0     2.29     1.00  1.00  62.73 0.88    0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]   0019  3  5.0     1.27     0.13  1.17  71.03  n/a    0.000
*
    ADD [  0019+  0057]   0019  1  5.0     3.30     0.18  1.17  70.05  n/a    0.000
*
    ADD [  0019+  0006]   0019  3  5.0     5.59     1.08  1.00  67.05  n/a    0.000
*
    ADD [  0019+  0059]   0062  3  5.0     5.59     1.08  1.00  67.05  n/a    0.000
*
 ** Reservoir
    OUTFLOW:              0020  1  5.0     5.59     0.03  8.92  62.18  n/a    0.000
*
    ADD [  0021+  0022]   0030  3  5.0     5.59     0.03  8.92  62.18  n/a    0.000
*
    ADD [  0030+  0029]   0030  1  5.0     6.19     0.04  1.25  56.73  n/a    0.000
*
    ADD [  0030+  0052]   0030  3  5.0     6.52     0.05  1.25  54.65  n/a    0.000
```

```
*
================================================================================
============================


      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\fde41089-4391-4386-81b6-715fcdbc3f50\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\fde41089-4391-4386-81b6-715fcdbc3f50\scenari


DATE: 10-21-2025                          TIME: 02:41:27

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 6. CHICAGO [100 YR] [6 HR]    **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0008  1  5.0    0.08    0.00  2.17  20.66 0.25   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW             0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
```

```
*
 ** CALIB NASHYD         0009  1  5.0    0.12    0.01  2.17  20.66 0.25   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :          0025  3  5.0    0.12    0.01  2.25   8.55  n/a   0.000
    UNDERDRAIN:          0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0010  1  5.0    0.22    0.01  2.17  20.66 0.25   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :          0027  3  5.0    0.22    0.01  2.17  12.27  n/a   0.000
    UNDERDRAIN:          0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0011  1  5.0    0.25    0.02  2.17  20.66 0.25   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:             0058  1  5.0    0.25    0.00  6.33   1.47  n/a   0.000
*
    ADD [  0024+  0026]  0029  3  5.0    0.12    0.01  2.25   8.55  n/a   0.000
*
    ADD [  0029+  0028]  0029  1  5.0    0.35    0.02  2.25  10.95  n/a   0.000
*
    ADD [  0029+  0058]  0029  3  5.0    0.60    0.02  2.25   7.00  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0012  1  5.0    0.13    0.01  2.17  22.20 0.27   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 ** CALIB NASHYD         0013  1  5.0    0.21    0.01  2.17  21.86 0.27   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]  0052  3  5.0    0.34    0.02  2.17  21.99  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0004  1  5.0    0.37    0.18  2.00  81.02 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0017  1  5.0    0.37    0.01  2.50  80.58  n/a   0.000
```

```
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0005  1  5.0    0.37    0.18  2.00  81.02 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0018  1  5.0    0.37    0.01  2.50  80.58  n/a   0.000
*
    ADD [  0017+  0018]  0054  3  5.0    0.00    0.01  2.50  80.58  n/a   0.000
*
    ADD [  0017+  0018]  0053  3  5.0    0.73    0.03  2.50  80.58  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.63  2.00  79.60 0.97   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.04  2.50  80.58  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.66  2.00  79.95  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    2.03    0.05  3.50  79.90  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.20  2.00  81.02 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.35    0.01  2.17  82.30  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.23  2.00  81.03 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.46    0.02  2.42  80.53  n/a   0.000
*
    CHIC STORM                  10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.20  2.00  81.02 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0016  1  5.0    0.37    0.01  2.17  81.87  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.81    0.03  2.42  81.29  n/a   0.000
*
    ADD [  0050+  0016]  0050  1  5.0    1.18    0.04  2.42  81.47  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  5.0    0.05    0.05  2.17  82.13  n/a   0.000
*
```

```
    ADD [  0051+  0016]  0051  1  5.0    0.09    0.10  2.17  82.02  n/a   0.000
*
    CHIC STORM                 10.0
    [ Ptot= 82.32 mm ]
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    1.01  2.00  72.98 0.89   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.15  2.17  81.51  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.30    0.19  2.17  80.52  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.59    1.09  2.00  77.43  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    1.09  2.00  77.43  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0020  1  5.0    5.59    0.03 10.58  72.56  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.03 10.58  72.56  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    6.19    0.04  2.25  66.25  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.52    0.06  2.25  63.96  n/a   0.000
*
 FINISH

================================================================================
============================

================================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                    *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\1f6fca22-3f48-4f19-9535-8a79a44c9824\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\1f6fca22-3f48-4f19-9535-8a79a44c9824\scenari


DATE: 10-21-2025                           TIME: 02:41:21
```

```
USER:

COMMENTS: ____________________________________________________________

  ************************************************
  ** SIMULATION : 7. Historical Aug 4 1988      **
  ************************************************

  W/E COMMAND              HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                   min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.01  2.08  19.78 0.25   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.01  2.08  19.78 0.25   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.12    0.01  2.08   9.30  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.02  2.08  19.78 0.25   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.22    0.02  2.08  12.17  n/a   0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
```

```
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0011  1  5.0    0.25    0.02  2.08  19.78 0.25   0.000
    [CN=61.0         ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:             0058  1  5.0    0.25    0.00  5.92   1.52  n/a   0.000
*
    ADD [  0024+  0026]  0029  3  5.0    0.12    0.01  2.08   9.30  n/a   0.000
*
    ADD [  0029+  0028]  0029  1  5.0    0.35    0.03  2.08  11.15  n/a   0.000
*
    ADD [  0029+  0058]  0029  3  5.0    0.60    0.03  2.08   7.14  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0012  1  5.0    0.13    0.01  2.08  21.27 0.26   0.000
    [CN=62.7         ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 ** CALIB NASHYD         0013  1  5.0    0.21    0.02  2.08  20.95 0.26   0.000
    [CN=61.6         ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]  0052  3  5.0    0.34    0.03  2.08  21.07  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0004  1  5.0    0.37    0.16  2.00  79.27 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0017  1  5.0    0.34    0.01  2.08  81.31  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0005  1  5.0    0.37    0.16  2.00  79.27 0.98   0.000
    [I%=99.0:S%= 1.00]
*
```

```
 ** Reservoir
    OUTFLOW:             0018  1  5.0    0.34    0.01  2.08  81.31  n/a   0.000
*
    ADD [  0017+  0018]  0054  3  5.0    0.06    0.17  2.00  81.31  n/a   0.000
*
    ADD [  0017+  0018]  0053  3  5.0    0.67    0.03  2.08  81.31  n/a   0.000
*
    READ STORM                    5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.54  2.00  77.85 0.97   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.20  2.00  81.31  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.74  2.00  79.11  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    1.92    0.05  2.08  81.65  n/a   0.000
*
    READ STORM                    5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.17  2.00  79.27 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.32    0.01  2.00  80.30  n/a   0.000
*
    READ STORM                    5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.20  2.00  79.27 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.37    0.02  2.00  90.65  n/a   0.000
*
    READ STORM                    5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.17  2.00  79.27 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0016  1  5.0    0.35    0.01  2.00  80.77  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.70    0.03  2.00  85.85  n/a   0.000
```

```
*
    ADD [  0050+  0016]  0050  1  5.0    1.04    0.04  2.00  84.17  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  5.0    0.16    0.42  2.00  86.07  n/a   0.000
*
    ADD [  0051+  0016]  0051  1  5.0    0.22    0.58  2.00  84.56  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 80.57 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\09eafe89-7e1a-4df3-a422-195407
    remark: Historical Aug 4 1988
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    0.81  2.00  71.29 0.88   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.63  2.00  84.24  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.18    0.68  2.00  82.68  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.48    1.48  2.00  77.91  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    1.60  2.00  77.99  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0020  1  5.0    5.59    0.03  9.50  73.12  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.03  9.50  73.12  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    6.19    0.05  2.08  66.77  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.52    0.08  2.08  64.41  n/a   0.000
*
================================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO    TTTTT  TTTTT  H   H  Y   Y  M   M   OOO     TM
       O   O     T      T    H   H   Y Y   MM MM  O   O
       O   O     T      T    H   H    Y    M   M  O   O
        OOO      T      T    H   H    Y    M   M   OOO
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                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\566b43e5-e1aa-4aff-94bf-e3fe2b738921\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\566b43e5-e1aa-4aff-94bf-e3fe2b738921\scenari
```

```
DATE: 10-21-2025                           TIME: 02:41:24

USER:


COMMENTS: ____________________________________________________________


  ************************************************
  ** SIMULATION : 8. Historical July 1 1979     **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD          0008  1  5.0    0.08    0.01  1.67  21.51 0.26   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW              0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD          0009  1  5.0    0.12    0.01  1.67  21.51 0.26   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0025  3  5.0    0.12    0.01  1.67  13.50  n/a   0.000
    UNDERDRAIN:           0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD          0010  1  5.0    0.22    0.02  1.67  21.51 0.26   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :           0027  3  5.0    0.22    0.02  1.67  16.17  n/a   0.000
    UNDERDRAIN:           0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
```

```
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD         0011  1  5.0    0.25    0.02  1.67  21.51 0.26   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:             0058  1  5.0    0.25    0.00  3.33   0.83  n/a   0.000
*
    ADD [  0024+  0026]  0029  3  5.0    0.12    0.01  1.67  13.50  n/a   0.000
*
    ADD [  0029+  0028]  0029  1  5.0    0.35    0.03  1.67  15.23  n/a   0.000
*
    ADD [  0029+  0058]  0029  3  5.0    0.60    0.03  1.67   9.23  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD         0012  1  5.0    0.13    0.01  1.67  23.09 0.27   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 ** CALIB NASHYD         0013  1  5.0    0.21    0.02  1.67  22.73 0.27   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]  0052  3  5.0    0.34    0.03  1.67  22.87  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0004  1  5.0    0.37    0.11  1.50  82.69 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0017  1  5.0    0.30    0.01  1.58  85.15  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
```

```
 *  CALIB STANDHYD       0005  1  5.0    0.37    0.11  1.50  82.69 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0018  1  5.0    0.30    0.01  1.58  85.15  n/a   0.000
*
    ADD [  0017+  0018]  0054  3  5.0    0.13    0.12  1.58  85.15  n/a   0.000
*
    ADD [  0017+  0018]  0053  3  5.0    0.61    0.03  1.58  85.15  n/a   0.000
*
    READ STORM                   5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.38  1.50  81.26 0.97   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.15  1.58  85.15  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.42  1.58  82.67  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    1.71    0.05  1.67  84.77  n/a   0.000
*
    READ STORM                   5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.12  1.50  82.69 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.27    0.01  1.50  88.84  n/a   0.000
*
    READ STORM                   5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.14  1.50  82.69 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.38    0.02  1.58  83.74  n/a   0.000
*
    READ STORM                   5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.12  1.50  82.69 0.98   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
```

```
    OUTFLOW:              0016  1  5.0    0.29    0.01  1.50  88.75  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.65    0.03  1.58  85.86  n/a   0.000
*
    ADD [  0050+  0016]  0050  1  5.0    0.94    0.04  1.58  86.76  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  5.0    0.21    0.15  1.58  86.81  n/a   0.000
*
    ADD [  0051+  0016]  0051  1  5.0    0.33    0.27  1.50  87.50  n/a   0.000
*
    READ STORM                  5.0
    [ Ptot= 83.99 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\5174b7bd-8459-4409-b860-634d86
    remark: Historical July 1 1979
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    0.61  1.50  74.59 0.89   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.31  1.50  86.95  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    2.98    0.36  1.50  85.70  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.27    0.97  1.50  80.86  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    1.16  1.67  81.09  n/a   0.000
*
 ** Reservoir
    OUTFLOW:              0020  1  5.0    5.52    0.04  6.83  76.21  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.06  6.83  76.21  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    6.19    0.06  6.83  69.76  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.52    0.08  1.67  67.33  n/a   0.000
*
================================================================================
============================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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```

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```
                   *****  S U M M A R Y   O U T P U T  *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
```

```
  Output  filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\461190ab-ebee-4ee7-adf4-a9a048ec4757\scenari
  Summary filename: C:\Users\hymo\AppData\Local\Civica\VH5\c182f2f7-27a5-48b7-
a29b-2f5977d7e46f\461190ab-ebee-4ee7-adf4-a9a048ec4757\scenari


DATE: 10-21-2025                           TIME: 02:41:23

USER:


COMMENTS: ____________________________________________________________


  ***********************************************
  ** SIMULATION : 9. 25mm4hrChicago            **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.
Qbase
                                  min     ha   '  cms   hrs     mm           cms

      START @  0.00 hrs
      --------------------
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0008  1  5.0    0.08    0.00  2.17   0.81 0.03   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Rain Garden
    OVERFLOW             0023  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0009  1  5.0    0.12    0.00  2.17   0.82 0.03   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Swale
    OVERFLOW  :          0025  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
    UNDERDRAIN:          0025  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0010  1  5.0    0.22    0.00  2.17   0.82 0.03   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
```

```
*
 ** Swale
    OVERFLOW  :          0027  3  5.0    0.00    0.00  0.00   0.00  n/a   0.000
    UNDERDRAIN:          0027  4  5.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0011  1  5.0    0.25    0.00  2.17   0.82 0.03   0.000
    [CN=61.0          ]
    [ N = 3.0:Tp 0.17]
*
 ** Reservoir
    OUTFLOW:             0058  1  5.0    0.25    0.00  4.17   0.40  n/a   0.000
*
    ADD [  0024+  0026]  0029  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0029+  0028]  0029  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0029+  0058]  0029  3  5.0    0.25    0.00  4.17   0.40  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0012  1  5.0    0.13    0.00  2.00   1.01 0.04   0.000
    [CN=62.7          ]
    [ N = 3.0:Tp 0.17]
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 ** CALIB NASHYD         0013  1  5.0    0.21    0.00  1.92   1.07 0.04   0.000
    [CN=61.6          ]
    [ N = 3.0:Tp 0.17]
*
    ADD [  0012+  0013]  0052  3  5.0    0.34    0.00  2.00   1.04  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0004  1  5.0    0.37    0.05  1.50  23.83 0.95   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0017  1  5.0    0.37    0.01  1.83  23.85  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
```

```
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0005  1  5.0    0.37    0.05  1.50  23.83 0.95   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0018  1  5.0    0.37    0.01  1.83  23.85  n/a   0.000
*
    ADD [  0017+  0018]  0054  3  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    ADD [  0017+  0018]  0053  3  5.0    0.74    0.02  1.83  23.85  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0007  1  5.0    1.29    0.17  1.50  22.81 0.91   0.000
    [I%=96.0:S%= 2.00]
*
    ADD [  0053+  0054]  0056  3  5.0    0.74    0.02  1.83  23.85  n/a   0.000
*
    ADD [  0056+  0007]  0056  1  5.0    2.03    0.19  1.50  23.19  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0057  1  5.0    2.03    0.03  2.33  23.13  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0001  1  5.0    0.40    0.05  1.50  23.83 0.95   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0014  1  5.0    0.40    0.01  1.92  23.84  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0002  1  5.0    0.46    0.06  1.50  23.83 0.95   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0015  1  5.0    0.46    0.01  1.83  23.85  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
```

```
 *  CALIB STANDHYD       0003  1  5.0    0.41    0.06  1.50  23.83 0.95   0.000
    [I%=99.0:S%= 1.00]
*
 ** Reservoir
    OUTFLOW:             0016  1  5.0    0.41    0.01  1.83  23.84  n/a   0.000
*
    ADD [  0014+  0015]  0050  3  5.0    0.86    0.02  1.83  23.85  n/a   0.000
*
    ADD [  0050+  0016]  0050  1  5.0    1.27    0.03  1.83  23.84  n/a   0.000
*
    ADD [  0014+  0015]  0051  3  0.0    0.00    0.00  0.00  23.85  n/a   0.000
*
    ADD [  0051+  0016]  0051  1  0.0    0.00    0.00  0.00   0.00  n/a   0.000
*
    READ STORM                 10.0
    [ Ptot= 25.00 mm ]
    fname : C:\Users\hymo\AppData\Local\Temp\a2d9a963-eb87-442e-96b2-
35ded61c14c6\e9c0c91c-67a5-4dfb-b889-37391f
    remark: 25mm4hrChicago
*
 *  CALIB STANDHYD       0006  1  5.0    2.29    0.24  1.50  19.28 0.77   0.000
    [I%=73.0:S%= 2.00]
*
    ADD [  0050+  0051]  0019  3  5.0    1.27    0.03  1.83  23.84  n/a   0.000
*
    ADD [  0019+  0057]  0019  1  5.0    3.30    0.06  2.00  23.40  n/a   0.000
*
    ADD [  0019+  0006]  0019  3  5.0    5.59    0.29  1.50  21.71  n/a   0.000
*
    ADD [  0019+  0059]  0062  3  5.0    5.59    0.29  1.50  21.71  n/a   0.000
*
 ** Reservoir
    OUTFLOW:             0020  1  5.0    5.59    0.02  5.17  16.85  n/a   0.000
*
    ADD [  0021+  0022]  0030  3  5.0    5.59    0.02  5.17  16.85  n/a   0.000
*
    ADD [  0030+  0029]  0030  1  5.0    5.84    0.02  5.17  16.15  n/a   0.000
*
    ADD [  0030+  0052]  0030  3  5.0    6.18    0.02  5.17  15.32  n/a   0.000
*
```

Appendix I: Guelph Permeameter Test Results

SoilMoisture
Soil Hydrology Instruments for Research Since 1955

Guelph Permeameter

Input (green) · Result (yellow)

Single Head Method - Feb 27, 2024

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir):	2.18
Enter water Head Height ("H" in cm):	5
Enter the Borehole Radius ("a" in cm):	6
Enter the soil texture-structure category (enter one of the below numbers):	2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): **0.0100**

* "R" = three values in a row with matching Δh/Δt

Res Type	2.18
H	5
a	6
H/a	0.833
a*	0.04
C0.01	0.524
C0.04	0.538
C0.12	0.489
C0.36	0.489
C	0.538
R	0.010
Q	4E-04
pi	3.142

α^* = 0.04 cm^{-1}

C = 0.537554

Q = 0.000363

K_{fs} = 1.95E-07 cm/sec; 1.17E-05 cm/min; 1.95E-09 m/sec; 4.60E-06 inch/min; 7.66E-08 inch/sec

Φ_m = 4.87E-06 cm^2/min

Single Head Method - Nov 28, 2024

Reservoir Cross-sectional area in cm^2 (enter "35.22" for Combined and "2.16" for Inner reservoir):	2.18
Enter water Head Height ("H" in cm):	25
Enter the Borehole Radius ("a" in cm):	6
Enter the soil texture-structure category (enter one of the below numbers):	2

1. Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.
2. Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.
3. Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.
4. Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macropors, etc

Steady State Rate of Water Level Change ("R" in cm/min): **0.0333**

* "R" = three values in a row with matching Δh/Δt

Res Type	2.18
H	25
a	6
H/a	4.16667
a*	0.04
C0.01	1.37818
C0.04	1.46966
C0.12	1.48715
C0.36	1.48715
C	1.46966
R	0.033
Q	0.00121
pi	3.1415

α^* = 0.04 cm^{-1}

C = 1.469659

Q = 0.00121

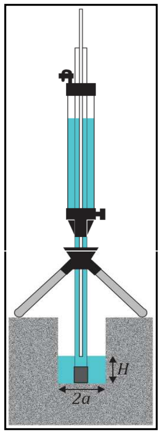
K_{fs} = 2.22E-07 cm/sec; 1.33E-05 cm/min; 2.22E-09 m/ses; 5.24E-06 inch/min; 8.73E-08 inch/sec

Φ_m = 5.54E-06 cm^2/min

Average

K_{fs} = 2.08E-07 cm/sec; 1.25E-05 cm/min; 2.08E-09 m/s; 4.92E-06 inch/min; 8.20E-08 inch/sec

Φ_m = 5.20E-06 cm^2/min



Calculation formulas related to shape factor (C). Where H_1 is the first water head height (cm), H_2 is the second water head height (cm), a is borehole radius (cm) and α^* is microscopic capillary length factor which is decided according to the soil texture-structure category. For one-head method, only C_1 needs to be calculated while for two-head method, C_1 and C_2 are calculated (Zang et al., 1998).

Soil Texture-Structure Category	$\alpha^*(cm^{-1})$	Shape Factor
Compacted, Structure-less, clayey or silty materials such as landfill caps and liners, lacustrine or marine sediments, etc.	0.01	$C_1 = \left(\frac{H_2/a}{2.081 + 0.121(H_2/a)}\right)^{0.672}$
Soils which are both fine textured (clayey or silty) and unstructured; may also include some fine sands.	0.04	$C_1 = \left(\frac{H_1/a}{1.992 + 0.091(H_1/a)}\right)^{0.683}$ $C_2 = \left(\frac{H_2/a}{1.992 + 0.091(H_2/a)}\right)^{0.683}$
Most structured soils from clays through loams; also includes unstructured medium and fine sands. The category most frequently applicable for agricultural soils.	0.12	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$
Coarse and gravely sands; may also include some highly structured soils with large and/or numerous cracks, macro pores, etc.	0.36	$C_1 = \left(\frac{H_1/a}{2.074 + 0.093(H_1/a)}\right)^{0.754}$ $C_2 = \left(\frac{H_2/a}{2.074 + 0.093(H_2/a)}\right)^{0.754}$

Calculation formulas related to one-head and two-head methods. Where R is steady-state rate of fall of water in reservoir (cm/s), K_{fs} is Soil saturated hydraulic conductivity (cm/s), Φ_m is Soil matric flux potential (cm^2/s), a^* is Macroscopic capillary length parameter (from Table 2), a is Borehole radius (cm), H_1 is the first head of water established in borehole (cm) , H_2 is the second head of water established in borehole (cm) and C is Shape factor (from Table 2).

One Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$	$K_{fs} = \frac{C_1 \times Q_1}{2\pi H_1^2 + \pi a^2 C_1 + 2\pi\left(\frac{H_1}{a^*}\right)}$ $\Phi_m = \frac{C_1 \times Q_1}{(2\pi H_1^2 + \pi a^2 C_1)a^* + 2\pi H_1}$
One Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$	
Two Head, Combined Reservoir	$Q_1 = \bar{R}_1 \times 35.22$ $Q_2 = \bar{R}_2 \times 35.22$	$G_1 = \frac{H_2 C_1}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_2 = \frac{H_1 C_2}{\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $K_{fs} = G_2Q_2 - G_1Q_1$ $G_3 = \frac{(2H_2^2 + a^2C_2)C_1}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $G_4 = \frac{(2H_1^2 + a^2C_1)C_2}{2\pi(2H_1H_2(H_2 - H_1) + a^2(H_1C_2 - H_2C_1))}$ $\Phi_m = G_3Q_1 - G_4Q_2$
Two Head, Inner Reservoir	$Q_1 = \bar{R}_1 \times 2.16$ $Q_2 = \bar{R}_2 \times 2.16$	

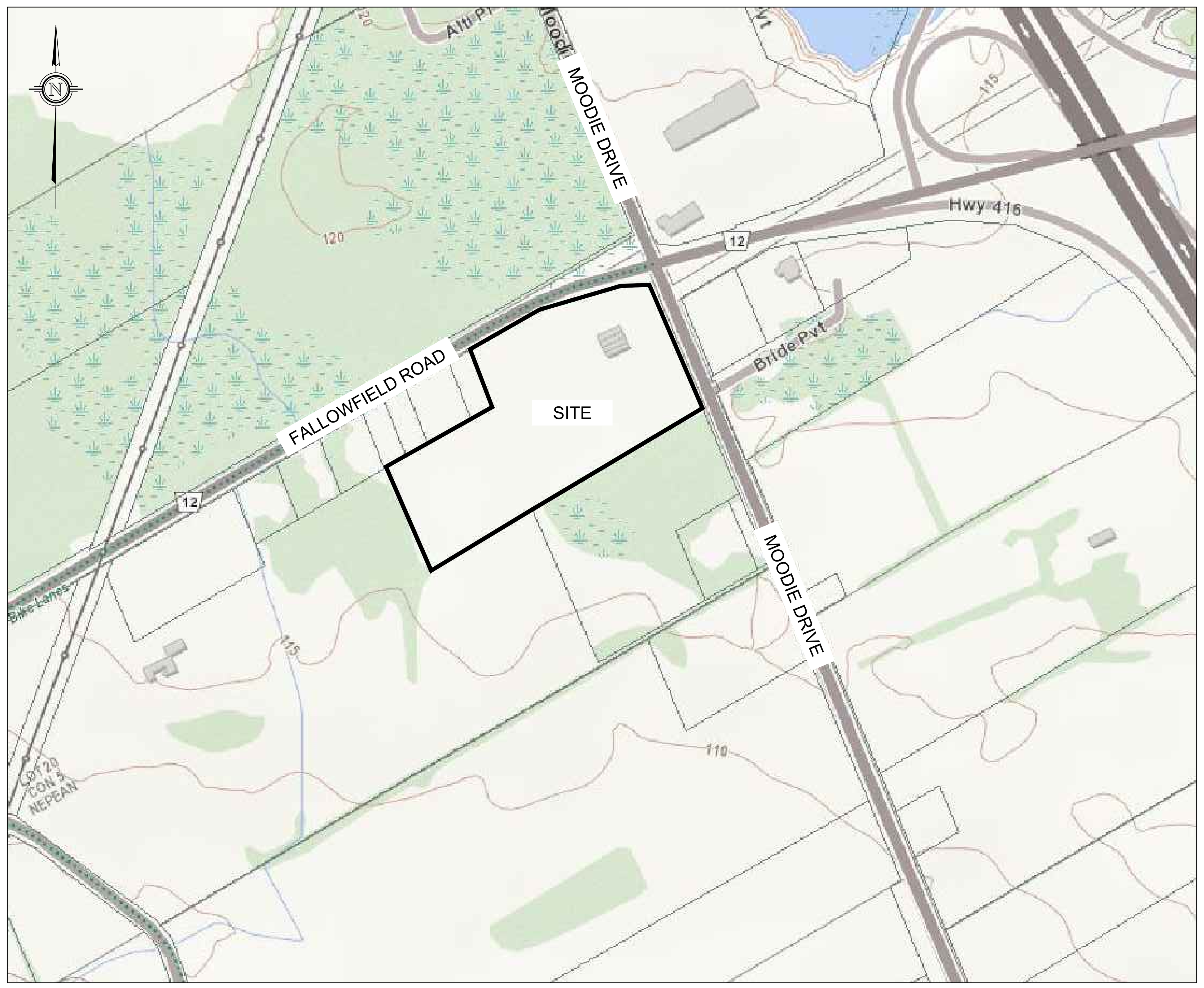
Appendix J: Civil Drawings

221099-CP	COVER PAGE
221099-PRE	PRE-DEVELOPMENT DRAWING
221099-NOTES	NOTES
221099-GR1,2,3,4	PROPOSED GRADING PLANS 1-4
221099-SVC1,2,3,4	PROPOSED SERVICING PLANS 1-4
221099-POST	POST DEVELOPMENT DRAWING
221099-ESC	EROSION AND SEDIMENT CONTROL PLAN
221099-DET1,2	DETAILS SHEETS 1-2

1000198532 Ontario Inc.

PROPOSED WAREHOUSING

2726-2732 MOODIE DRIVE, OTTAWA, ONTARIO



KEY PLAN
NOT TO SCALE

DRAWING TABLE LIST	
DRAWING NUMBER	DRAWING TITLE
221099–CP	COVER PAGE
221099–PRE	PRE–DEVELOPMENT
221099–NOTES	NOTES
221099–GR1	PROPOSED GRADING PLAN 1
221099–GR2	PROPOSED GRADING PLAN 2
221099–GR3	PROPOSED GRADING PLAN 3
221099–GR4	PROPOSED GRADING PLAN 4
221099–SVC 1	PROPOSED SERVICING PLAN 1
221099–SVC 2	PROPOSED SERVICING PLAN 2
221099–SVC 3	PROPOSED SERVICING PLAN 3
221099–SVC 4	PROPOSED SERVICING PLAN 4
221099–POST	POST DEVELOPMENT
221099–ESC	EROSION SEDIMENT CONTROL PLAN
221099–DET1	DETAILS 1
221099–DET2	DETAILS 2

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KOLLAARD ASSOCIATES INCORPORATED

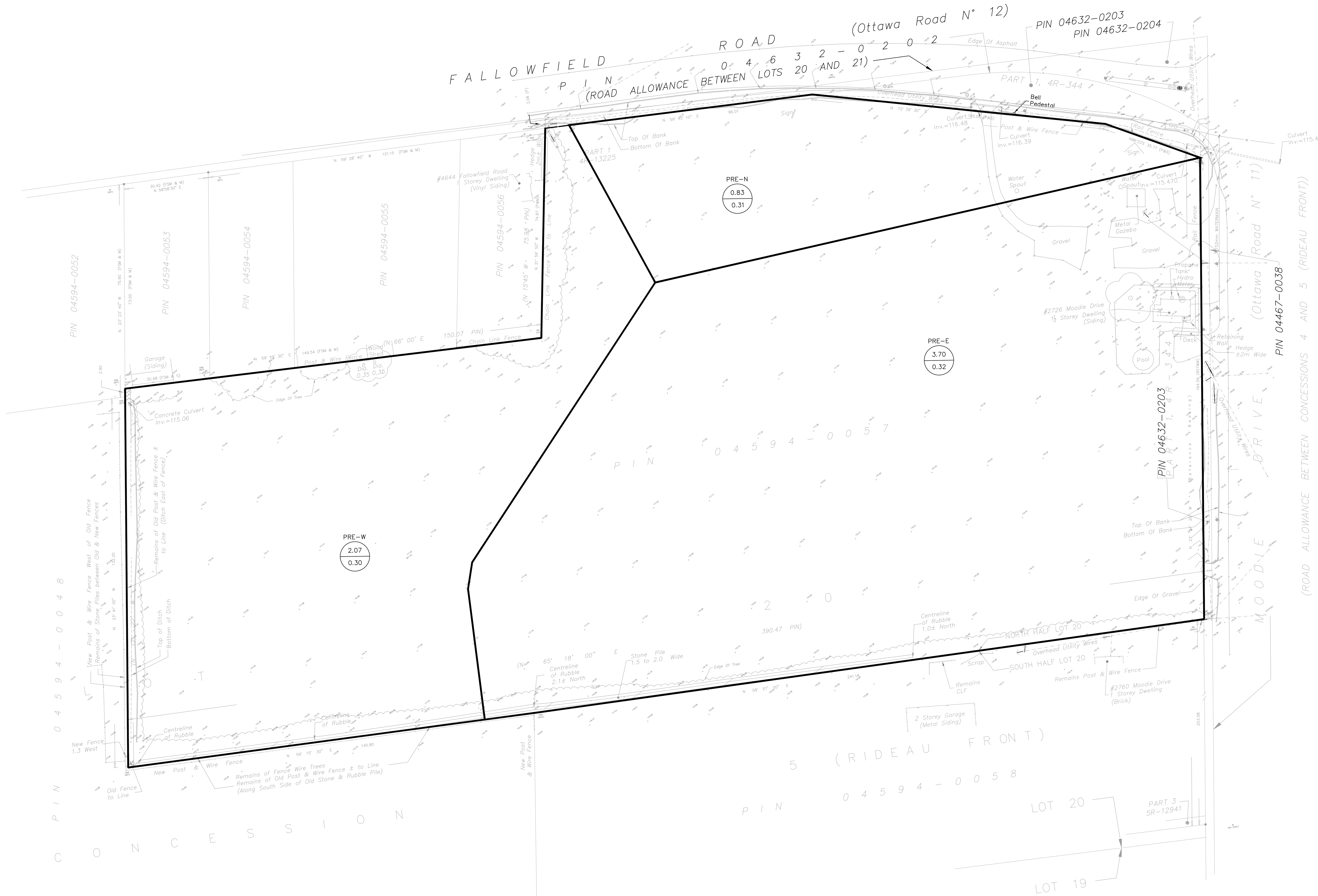
No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

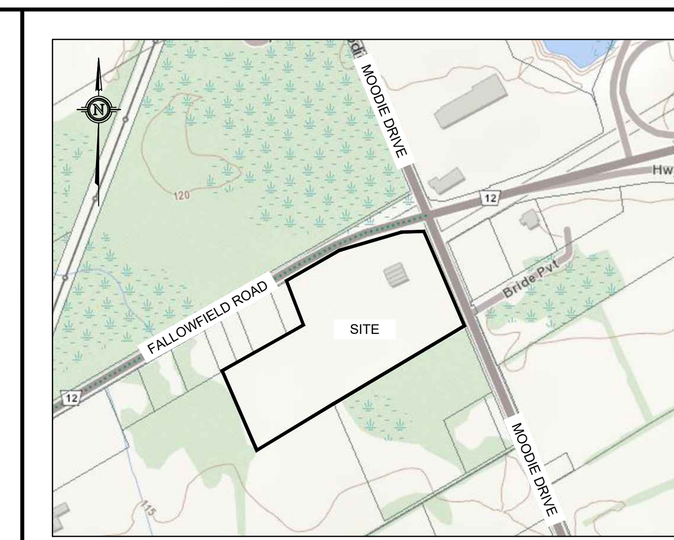
Kollaard Associates
Engineers
BOX 189
210 PRESCOTT STREET
KEMPTVILLE, ONTARIO
K0G 1J0
FACSIMILE (613) 258–0475
(613) 860–0923

DESIGN	
DRAWN	JR
CHECKED	ARK
APPROVED	SD

PROJECT No.	221099
DATE	2025.10.24
DRAWING No.	221099-CP

ARCH D





KEY PLAN
NOT TO SCALE

0 25 50
1:750 METRES

LEGEND

- EXISTING ELEVATION
- EXISTING EDGE OF GRAVEL
- EXISTING CENTERLINE OF FLOW
- EXISTING TOP OF SLOPE
- PROPERTY BOUNDARY
- CONTROLLED CATCHMENT AREA
- CA-2 — CATCHMENT LABEL
- 1.143 — CATCHMENT AREA (HECTARES)
- 0.74 — C - RUN-OFF COEFFICIENT
- PRE-DEVELOPMENT OVERLAND DRAINAGE ARROW

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NOTES:
1. ALL DIMENSIONS ARE IN METRES, UNLESS OTHERWISE SPECIFIED; ALL ELEVATIONS ARE IN METRES.
2. THIS IS NOT A LEGAL SURVEY.
3. EXISTING SERVICES INFORMATION SHOWN ARE BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
4. CLIENT IS RESPONSIBLE FOR ACQUIRING ALL NECESSARY PERMITS.
5. CONTRACTOR TO VERIFY THAT APPROPRIATE PERMITS HAVE BEEN ACQUIRED PRIOR TO ANY CONSTRUCTION.
6. CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF UTILITIES.
7. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
8. THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL ALL APPROVALS HAVE BEEN GRANTED.
9. INSPECTION OF ROUGH GRADE BY KOLLAARD ASSOCIATES INC. AND CITY OF OTTAWA MUST BE CONDUCTED PRIOR TO PLACEMENT OF TOPSOIL OR SOD.
10. HYDRO SERVICE TO BE INSTALLED ACCORDING TO THE SPECIFICATIONS OF SERVICE PROVIDER AND THE MECHANICAL ENGINEER.
11. ALL MATERIALS AND CONSTRUCTION TO BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS AND ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS
12. ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES, INC.
13. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #221099.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

CONSULTANTS

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BOX 189
210 PRESCOTT STREET
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(613) 860-0923

DESIGN	SD
DRAWN	ABD
CHECKED	SD
APPROVED	SD

STAMP
LICENSED PROFESSIONAL ENGINEER
OCT.24,2025
S.E. deWit
100079612
PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726–2732 MOODIE DRIVE, OTTAWA, ON	SCALE	AS_NOTED
DRAWING	PRE-DEVELOPMENT PLAN	DRAWING No.	221099-PRE

ARCH D

TOPOGRAPHIC INFORMATION AND PROJECT ORIENTATION WERE PROVIDED BY FAIRHALL MOFFATT & WOODLAND LIMITED ONTARIO LAND SURVEYORS.

SEE TOPOGRAPHIC SURVEY OF PART OF LOT 20 CONCESSION 5 (RIDEAU FRONT) GEOGRAPHIC TOWNSHIP OF NEPEAN CITY OF OTTAWA COMPLETED BY FAIRHALL MOFFATT & WOODLAND LIMITED DATED 2021/04/07 FOR REFERENCES.

CONSTRUCTION NOTES:

1. ALL DIMENSIONS ARE IN METRES; ALL ELEVATIONS ARE IN METRES AND ARE GEODETIC.
2. TBM = TOP OF WESTERNMOST OTTAWA TRAFFIC CONTROL ACCESS COVER IN MEDIAN OF FALLOWFIELD ROAD AND MOOODIE DRIVE ELEVATION= 117.81.
3. THIS IS NOT A LEGAL SURVEY. BOUNDARY INFORMATION WAS DERIVED FROM FAIRHALL, MOFFATT & WOODLAND LIMITED TOPOGRAPHIC SURVEY OF PART OF LOT 20, CONCESSION 5 (RIDEAU FRONT), GEOGRAPHIC TOWNSHIP OF NEPEAN, CITY OF OTTAWA, FROM APRIL 11, 2021.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATION AND PROTECTION OF UTILITIES.
5. FINISHED GRADE AROUND BUILDING TO BE AS SHOWN.
6. MAXIMUM ALLOWABLE SLOPE ON SITE IS 1.5H:1V WITH RIPRAP PROTECTION AND 3H:1V ELSEWHERE.
7. ALL DIMENSIONS TO BE VERIFIED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION.
8. ANY CHANGES MADE TO THIS PLAN MUST BE VERIFIED AND APPROVED BY KOLLAARD ASSOCIATES INC.
9. CLIENT IS RESPONSIBLE FOR ACQUIRING ALL NECESSARY PERMITS. THIS DRAWING IS NOT FOR CONSTRUCTION UNTIL A BUILDING PERMIT HAS BEEN GRANTED.
10. THE PROPOSED GRADES HAVE BEEN SET AND VERIFIED FOR SITE GRADING IN ACCORDANCE WITH THE GEOTECHNICAL REPORT PREPARED BY KOLLAARD ASSOCIATES.
11. THE UNDERSIDE OF FOOTING ELEVATION HAS BEEN SET TO INSURE A MAXIMUM SEPARATION FROM THE UNDERLYING BEDROCK OF LESS THAN 2.8 METRES.
12. KOLLAARD ASSOCIATES SHOULD BE RETAINED TO PROVIDE RECOMMENDATIONS WITH RESPECT TO THE SUB-GRADE CONDITIONS PRIOR TO FOOTING INSTALLATION.
13. THE OWNER AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL SUCH AS, AND NOT LIMITED TO INSTALLING FILTER SOCKS ACROSS MANHOLE/CATCHBASIN LIDS TO PREVENT SEDIMENTS FROM ENTERING STRUCTURES AND INSTALL AND MAINTAIN A LIGHT DUTY SILT FENCE BARRIER AS REQUIRED.
14. REFERENCE TO KOLLAARD FILE #221099 FOR STORM WATER MANAGEMENT DESIGN (2025-OCT-24), KOLLAARD FILE #221099 FOR SERVICING BRIEF REPORT (2025-OCT-24) AND GEOTECHNICAL REPORT FILE #221099 (2025-OCT-24).

WATERMAIN NOTES:

1. CONTRACTOR TO SUPPLY AND INSTALL WATER SERVICE. CITY TO DISINFECT THE WATER SERVICE BETWEEN LOT LINE AND MUNICIPAL WATERMAIN.
2. SPECIFICATIONS:

ITEM	SPEC. No.	City Std Dwg No.	REFERENCE
WATERMAIN BEDDING AND BACKFILL OPSD	802.010/802.031	W17 (trench detail)	
CATHODIC PROTECTION OPSD	1109.010	W40	
PRESSURE TESTING AWWA	C-605-5		
CHLORINATION AWWA	C-651-05		
WATERMAIN	PVC DR18 / 150mm Ø	(CLASS 150)	
WATER SERVICE LATERALS	PEX AWWA C-904 SDR9 / 50mm Ø		
ON-SITE FIRE WATERMAIN	PVC DR18 / 200mm Ø	(CLASS 150)	

3. WATERMAIN SHALL BE MINIMUM 2.4m DEPTH BELOW GRADE UNLESS OTHERWISE INDICATED. WHERE LESS THAN 2.4m COVER, THERMAL INSULATION IS TO BE PROVIDED AS PER CITY STD DWG W22 (In shallow trenches), W23 (At open structures).
4. A MINIMUM OF 0.5m VERTICAL CLEARANCE IS REQUIRED BETWEEN THE WATERMAINS AND ALL UTILITIES AND SEWERS. IN LOCATIONS WHERE THIS IS NOT ACHIEVABLE, MUST FOLLOW PROCEDURE F-6-1 SEC. 5.2 OF THE ONTARIO DRINKING WATER RESOURCES ACT.
5. METALLIC WARNING TAPE SHALL BE USED OVER ALL WATERMAINS.
6. INSTALL AND TEST TRACER WIRE FOR ALL PROPOSED WATERMAIN IN ACCORDANCE WITH THE CITY OF OTTAWA DESIGN STANDARDS AS SPECIFIED IN SECTION 8.28.
7. EXISTING WATERMAIN INFORMATION SHOWN ON FALLOWFIELD ROAD AND MOODIE DRIVE IS BASED ON BEST CURRENT INFORMATION. CONTRACTOR TO VERIFY EXACT LOCATION OF WATERMAIN AND REPORT ANY DISCREPANCIES TO KOLLAARD ASSOCIATES INC.
8. WATER SHUTOFF VALVE TO BE LOCATED AT THE PROPERTY LINES AS SHOWN.
9. CONNECTIONS AT ELBOWS AND TEEs IN WATER MAINS SHOULD BE MADE WITH THE USE OF JOINT RESTRAINERS DESIGNED FOR WATERMAIN APPLICATION. JOINT AND PIPE RESTRAINERS SHOULD MEET THE REQUIREMENTS OF AWWA C900, C905 AND C907 AND ASTM F1674-11. JOINT RETRAINERS SHOULD BE INSTALLED AS PER MANUFACTURERS RECOMMENDATIONS.
10. ALL CONNECTORS, RODS AND VALVE BOLTS SHALL BE STAINLESS STEEL.
11. VALVES ARE TO BE OPERATED BY CITY OF OTTAWA STAFF ONLY.
12. NO CONNECTION TO EXISTING WATER NETWORK SHALL BE COMPLETED UNTIL A WATER PERMIT IS OBTAINED FROM THE CITY OF OTTAWA AND CITY OF OTTAWA FORCES ARE ON HAND TO MAKE THE CONNECTION.

SEWER NOTES:

1. SUPPLY AND CONSTRUCT ALL SEWERS AND APPURTENANCES IN ACCORDANCE WITH THE CITY OF OTTAWA STANDARDS AND SPECIFICATIONS AND ONTARIO PROVINCIAL STANDARDS FOR ROADS AND PUBLIC WORKS.
2. SPECIFICATIONS:

ITEM	SPEC. No.	CITY STD DWG No.
CATCH BASIN (600mm x 600mm)	OPSD 705.010	S2
STORM/SANITARY MANHOLE (1200Ø)	OPSD 701.010	
STORM/SANITARY MANHOLE (1500Ø)	OPSD 701.011	
STORM/SANITARY MANHOLE (1800Ø)	OPSD 701.012	
SEWER SERVICE CONNECTION		S11 & S11.1
SANITARY BENCHING	OPSD 701.021	
CATCH BASIN & MANHOLE ADJUSTMENTS	OPSD 704.010	
STORM MANHOLE FRAME & COVER	OPSD 401.010	S24.1 & S25
CATCH BASIN FRAME & COVER	OPSD 400.020	S19, S22 & S23
SEWER TRENCH		S6 & S7
SANITARY MANHOLE FRAME & COVER	OPSD 401.030	S24 & S25

SEWER TRENCH:
SITE SERVICES EXCAVATION, BEDDING & BACKFILL AS PER THE RECOMMENDATIONS OF THE GEOTECHNICAL INVESTIGATION PREPARE BY KOLLAARD ASSOCIATES INC.

3. INSULATE ALL STORM PIPES THAT HAVE LESS THAN 1.5m COVER AND ALL SANITARY PIPES THAT HAVE LESS THAN 2.1m COVER WITH THERMAL INSULATION. PROVIDE 150mm CLEARANCE BETWEEN PIPE AND INSULATION.
4. PIPE BEDDING, COVER AND BACKFILL ARE TO BE COMPACTED TO AT LEAST 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
5. FLEXIBLE CONNECTIONS ARE REQUIRED FOR CONNECTION PIPES TO MANHOLES (FOR EXAMPLE KOR-N-SEAL, PSX: POSITIVE SEAL AND DURASEAL). SANITARY RUBBER GASKET TYPE JOINTS SHALL CONFORM TO CSA (B-182.2,3,4).
6. THE OWNER SHALL REQUIRE THAT THE SITE SERVICING CONTRACTOR PERFORM FIELD TESTS FOR QUALITY CONTROL OF ALL SANITARY SEWERS. LEAKAGE TESTING SHALL BE COMPLETED IN ACCORDANCE WITH OPSS 410.07.16, 410.07.16.04 AND 407.07.24. DYE TESTING IS TO BE COMPLETED ON ALL SANITARY SERVICES TO CONFIRM PROPER CONNECTION TO THE SANITARY SEWER MAIN. THE FIELD TESTS SHALL BE PERFORMED IN THE PRESENCE OF A CERTIFIED PROFESSIONAL ENGINEER WHO SHALL SUBMIT A CERTIFIED COPY OF THE TEST RESULTS.
7. STORM MANHOLES AND CBMHS ARE TO HAVE 300mm SUMPS (AS PER SUMP DETAIL ON OPSD 701.010), UNLESS OTHERWISE INDICATED.
8. BUILDING CONTRACTOR TO PROVIDE TEMPORARY ADDITIONAL GRANULAR BACKFILL ABOVE SHALLOW CULVERTS AND STORM SEWERS TO SUPPORT HEAVY CONSTRUCTION EQUIPMENT.
9. CONTRACTOR TO TELEVISE (CCTV) ALL PROPOSED SEWERS, 200mmØ OR GREATER PRIOR TO BASE COURSE ASPHALT. UPON COMPLETION OF CONTRACT, THE CONTRACTOR IS RESPONSIBLE TO FLUSH AND CLEAN ALL SEWERS & APPURTENANCES TO MUNICIPAL SATISFACTION.
10. WHERE THE SANITARY SEWER CROSSES ABOVE THE WATERMAIN, THE CONTRACTOR IS TO PROVIDE A MINIMUM OF 0.50m VERTICAL SEPARATION, ADEQUATE STRUCTURAL SUPPORT OF THE SEWER TO PREVENT SETTLING AND EXCESSIVE JOINT DEFLECTION AND ENSURE THAT THE LENGTH OF THE WATER PIPE BE CENTERED AT THE POINT OF CROSSING SO THAT THE JOINTS ARE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE SEWER.

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13. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #221099.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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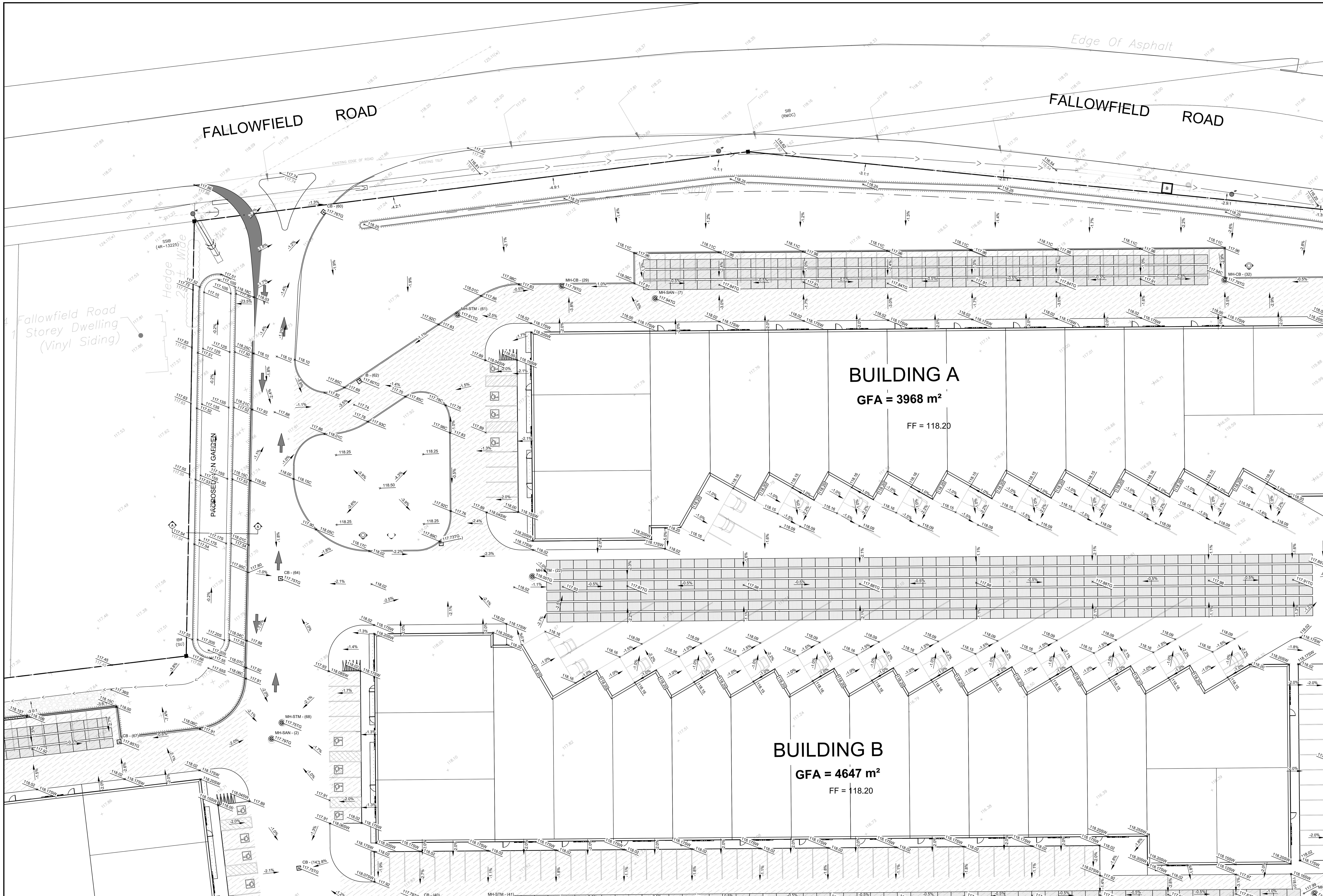
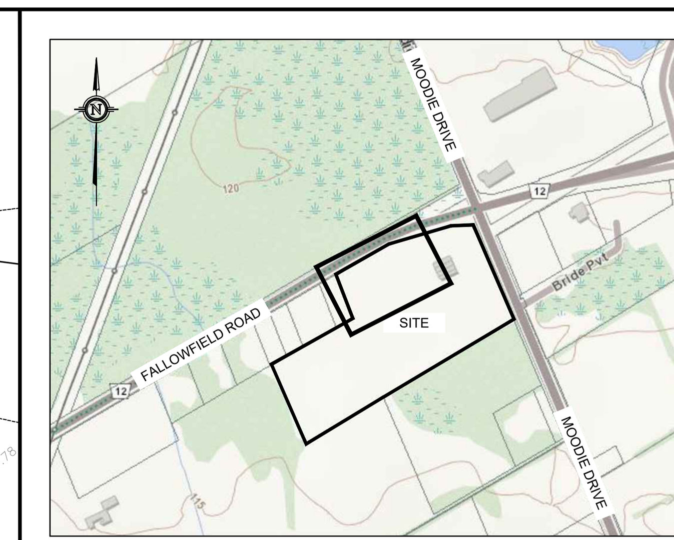
DRAWN	JR
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	NOTES
PROJECT No.	221099
DATE	2025.10.24
SCALE	
DRAWING No.	221099-NOTES

ARCH D





KEY PLAN

NOT TO SCALE

0 10 20

1:300 METRES

LEGEND

74.50	EXISTING ELEVATION
97.25 / 74.50	PROPOSED ELEVATION EXISTING ELEVATION
97.25	PROPOSED ELEVATION
97.25TG	PROPOSED TOP OF GRATE ELEVATION
97.25SW	PROPOSED SIDEWALK ELEVATION
97.25S	PROPOSED SWALE ELEVATION
97.25C	PROPOSED CURB ELEVATION
1.0%	PROPOSED DRAINAGE SLOPE & ARROW
	PROPOSED MANHOLE STRUCTURE
	PROPOSED CATCHBASIN
	PROPOSED WATER VAVLE
	PROPOSED FIRE HYDRANT
	EXISTING FENCELINE
OHW	EXISTING OVERHEAD WIRES
	EXISTING BOTTOM OF SLOPE
	EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
	PROPERTY BOUNDARY
	PROPOSED TOP OF SLOPE
	PROPOSED BOTTOM OF SLOPE
	PROPOSED CENTERLINE OF FLOW
	PROPOSED RETAINING WALL
	PROPOSED LIGHT PAVEMENT STRUCTURE *(HEAVY PAVEMENT STRUCTURE ELSEWHERE WITHIN ASPHALT AREA) (PLEASE REFER TO 221099-DET FOR PAVEMENT STRUCTURE DETAILS)*
	PROPOSED RIPRAP (AS PER OPSS 1004 (R-50)

TOPOGRAPHIC INFORMATION AND PROJECT ORIENTATION WERE PROVIDED BY FAIRHALL MOFFATT & WOODLAND LIMITED ONTARIO LAND SURVEYORS.

SEE TOPOGRAPHIC SURVEY OF PART OF LOT 20 CONCESSION 5 (RIDEAU FRONT) GEOGRAPHIC TOWNSHIP OF NEPEAN CITY OF OTTAWA COMPLETED BY FAIRHALL MOFFATT & WOODLAND LIMITED DATED 2021/04/07 FOR REFERENCES.

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No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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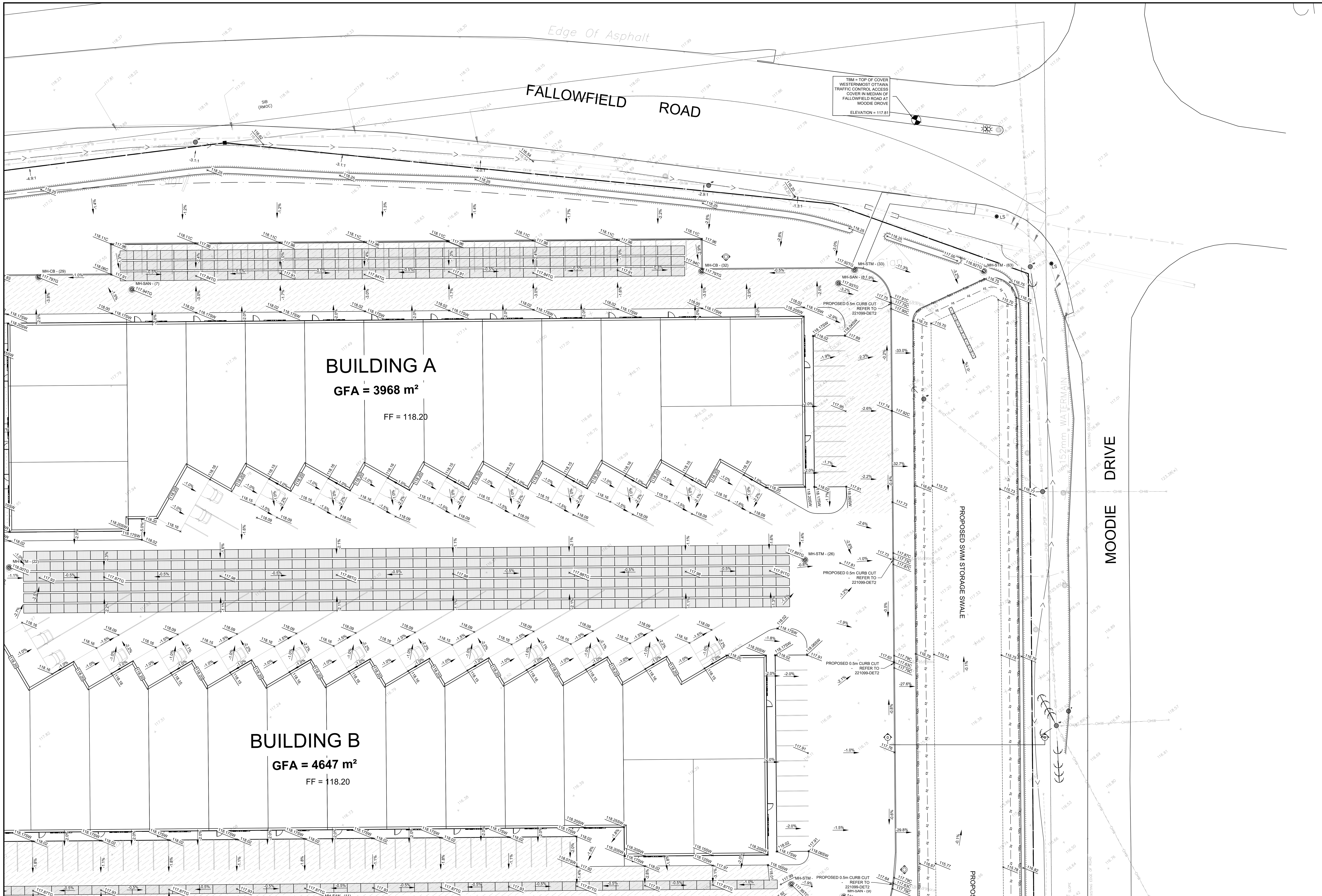
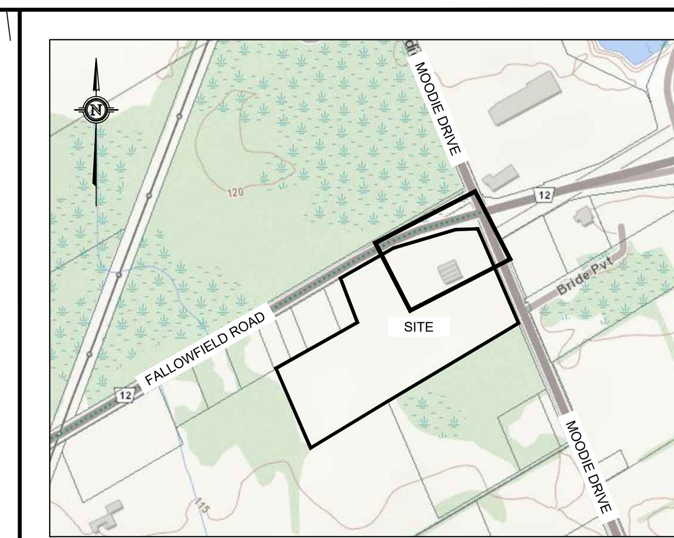
DRAWN	ABD/JR
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON	SCALE	AS_NOTED
DRAWING	PROPOSED GRADING PLAN 1	DRAWING No.	221099-GR-1

ARCH D





KEY PLAN

NOT TO SCALE

0 10 20
1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED ELEVATION EXISTING ELEVATION
- PROPOSED ELEVATION
- PROPOSED TOP OF GRATE ELEVATION
- PROPOSED SIDEWALK ELEVATION
- PROPOSED SWALE ELEVATION
- PROPOSED CURB ELEVATION
- PROPOSED DRAINAGE SLOPE & ARROW
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
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- PROPOSED RIPRAP (AS PER OPSS 1004 (R-50)

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0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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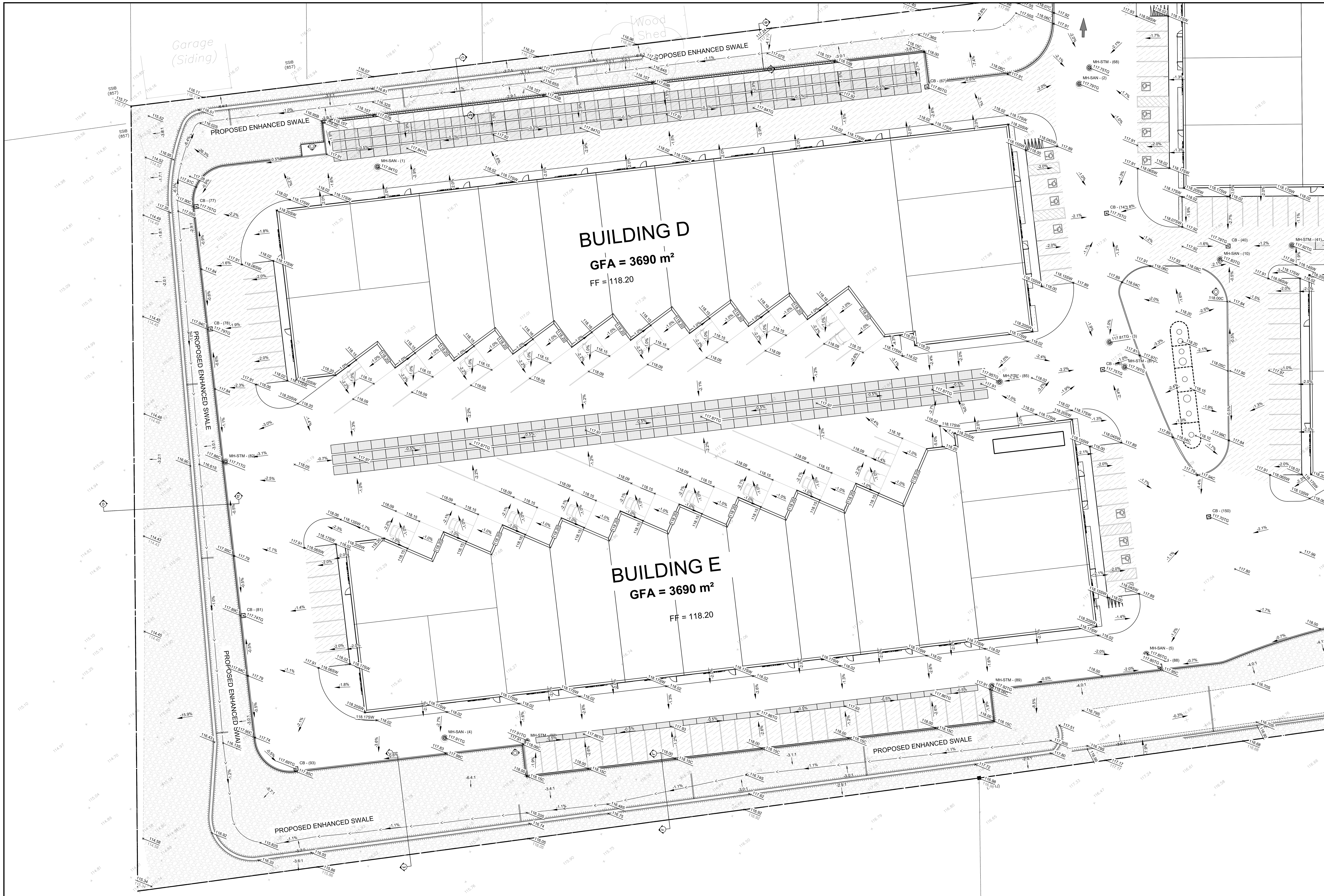
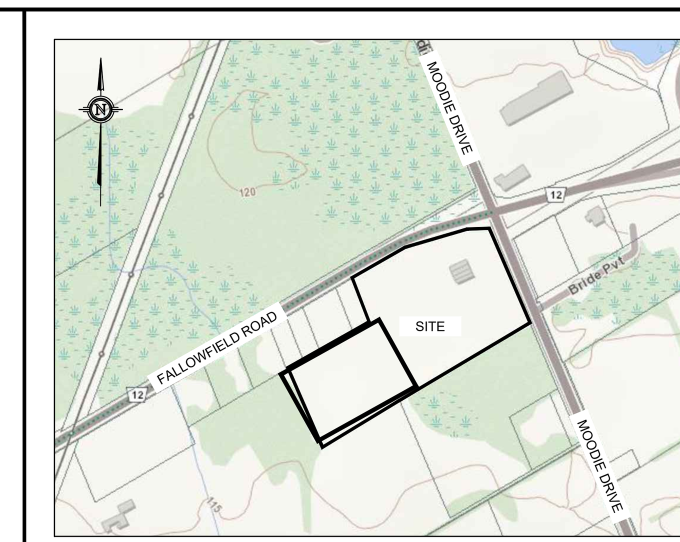
DRAWN	ABD/JR
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON	SCALE	AS_NOTED
DRAWING	PROPOSED GRADING PLAN 2	DRAWING No.	221099-GR-2

ARCH D





KEY PLAN

NOT TO SCALE

0 — 10 — 20
1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED ELEVATION / EXISTING ELEVATION (97.25 / 74.50)
- PROPOSED ELEVATION (97.25)
- PROPOSED TOP OF GRATE ELEVATION (97.25TG)
- PROPOSED SIDEWALK ELEVATION (97.25SW)
- PROPOSED SWALE ELEVATION (97.25S)
- PROPOSED CURB ELEVATION (97.25C)
- PROPOSED DRAINAGE SLOPE & ARROW (1.0%)
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
- EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
- PROPERTY BOUNDARY
- PROPOSED TOP OF SLOPE
- PROPOSED BOTTOM OF SLOPE
- PROPOSED CENTERLINE OF FLOW
- PROPOSED RETAINING WALL
- PROPOSED LIGHT PAVEMENT STRUCTURE *(HEAVY PAVEMENT STRUCTURE ELSEWHERE WITHIN ASPHALT AREA) (PLEASE REFER TO 221099-DET FOR PAVEMENT STRUCTURE DETAILS)*
- PROPOSED RIPRAP (AS PER OPSS 1004 (R-50)

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No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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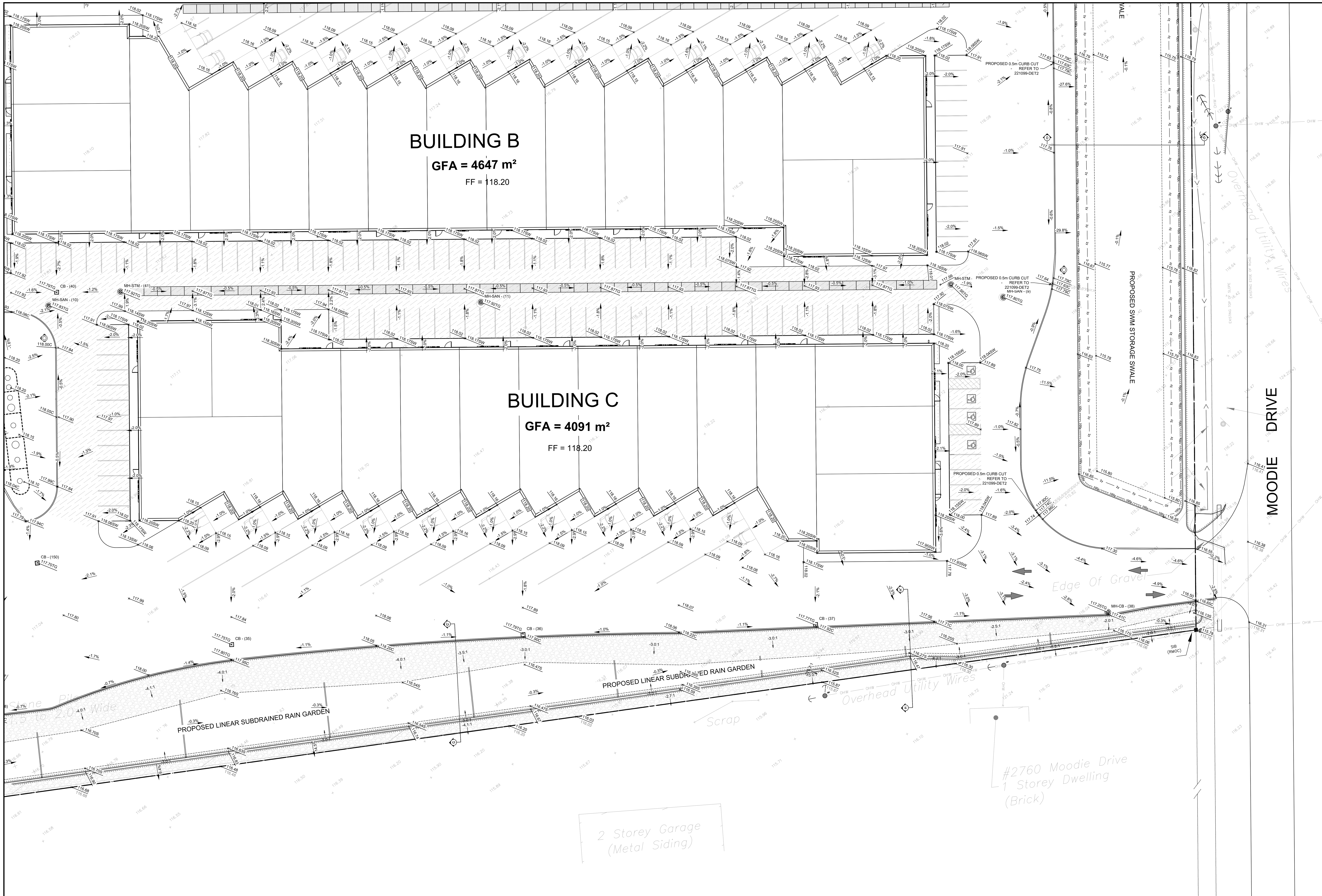
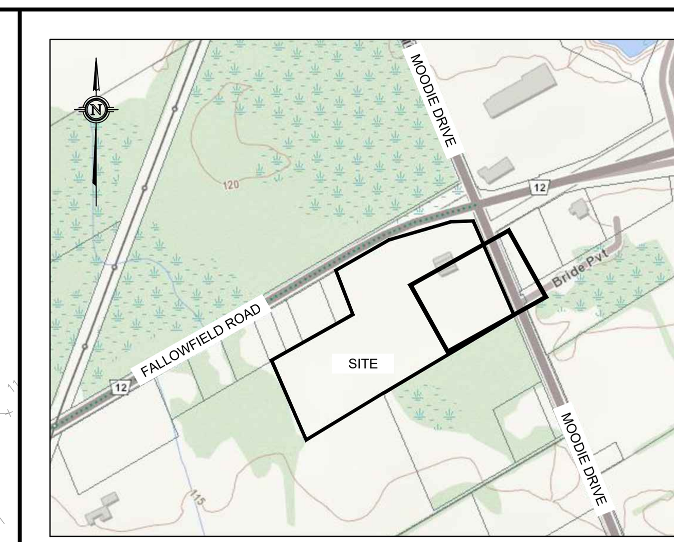
DESIGN	JR
DRAWN	ABD/JR
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726–2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	PROPOSED GRADING PLAN 3
PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-GR-3

ARCH D





KEY PLAN

NOT TO SCALE

0 — 10 — 20
1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED ELEVATION / EXISTING ELEVATION
- PROPOSED ELEVATION
- PROPOSED TOP OF GRATE ELEVATION
- PROPOSED SIDEWALK ELEVATION
- PROPOSED SWALE ELEVATION
- PROPOSED CURB ELEVATION
- PROPOSED DRAINAGE SLOPE & ARROW
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
- EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
- PROPERTY BOUNDARY
- PROPOSED TOP OF SLOPE
- PROPOSED BOTTOM OF SLOPE
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13. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #221099.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

CONSULTANTS

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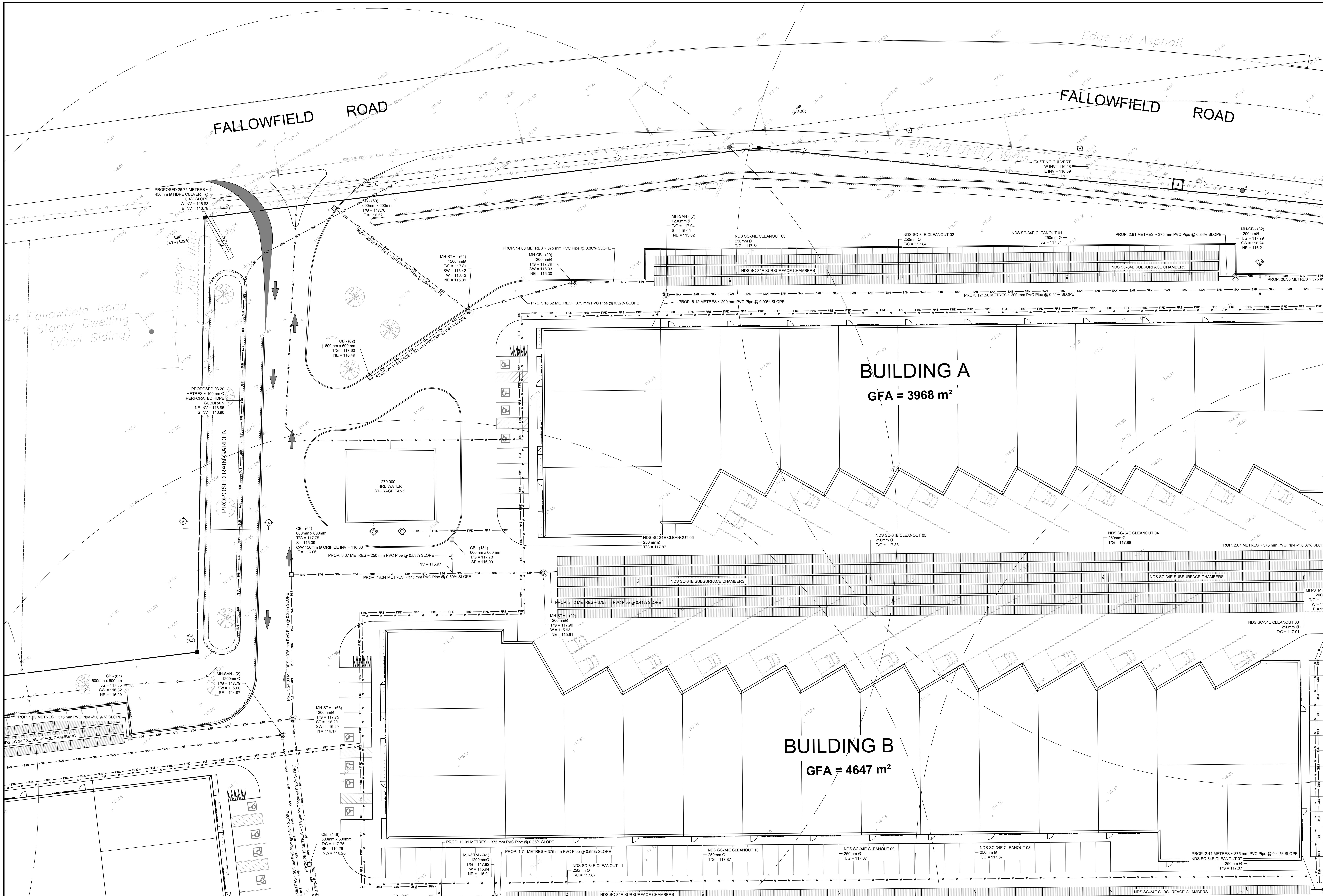
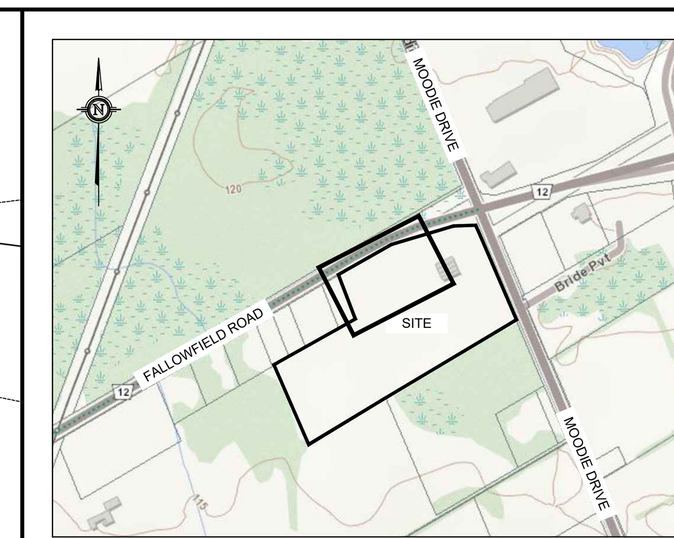
JR	ABD/JR	ARK	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726–2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	PROPOSED GRADING PLAN 4
PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-GR-4

ARCH D





KEY PLAN
NOT TO SCALE

1:300 METRES

LEGEND

EXISTING ELEVATION	
PROPOSED MANHOLE STRUCTURE	
PROPOSED CATCHBASIN	
PROPOSED WATER VAVLE	
PROPOSED FIRE HYDRANT	
EXISTING FENCELINE	
EXISTING OVERHEAD WIRES	
EXISTING BOTTOM OF SLOPE	
EXISTING CENTERLINE OF SWALE / FLOW DIRECTION	
PROPERTY BOUNDARY	
PROPOSED TOP OF SLOPE	
PROPOSED BOTTOM OF SLOPE	
PROPOSED CENTERLINE OF FLOW	
PROPOSED RETAINING WALL	
PROPOSED STORM PIPE	
PROPOSED SANITARY PIPE	
PROPOSED WATERMAIN	
SUBDRAIN	

TOPOGRAPHIC INFORMATION AND PROJECT ORIENTATION WERE PROVIDED BY FAIRHALL MOFFATT & WOODLAND LIMITED ONTARIO LAND SURVEYORS.

SEE TOPOGRAPHIC SURVEY OF PART OF LOT 20 CONCESSION 5 (RIDEAU FRONT) GEOGRAPHIC TOWNSHIP OF NEPEAN CITY OF OTTAWA COMPLETED BY FAIRHALL MOFFATT & WOODLAND LIMITED DATED 2021/04/07 FOR REFERENCES.

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0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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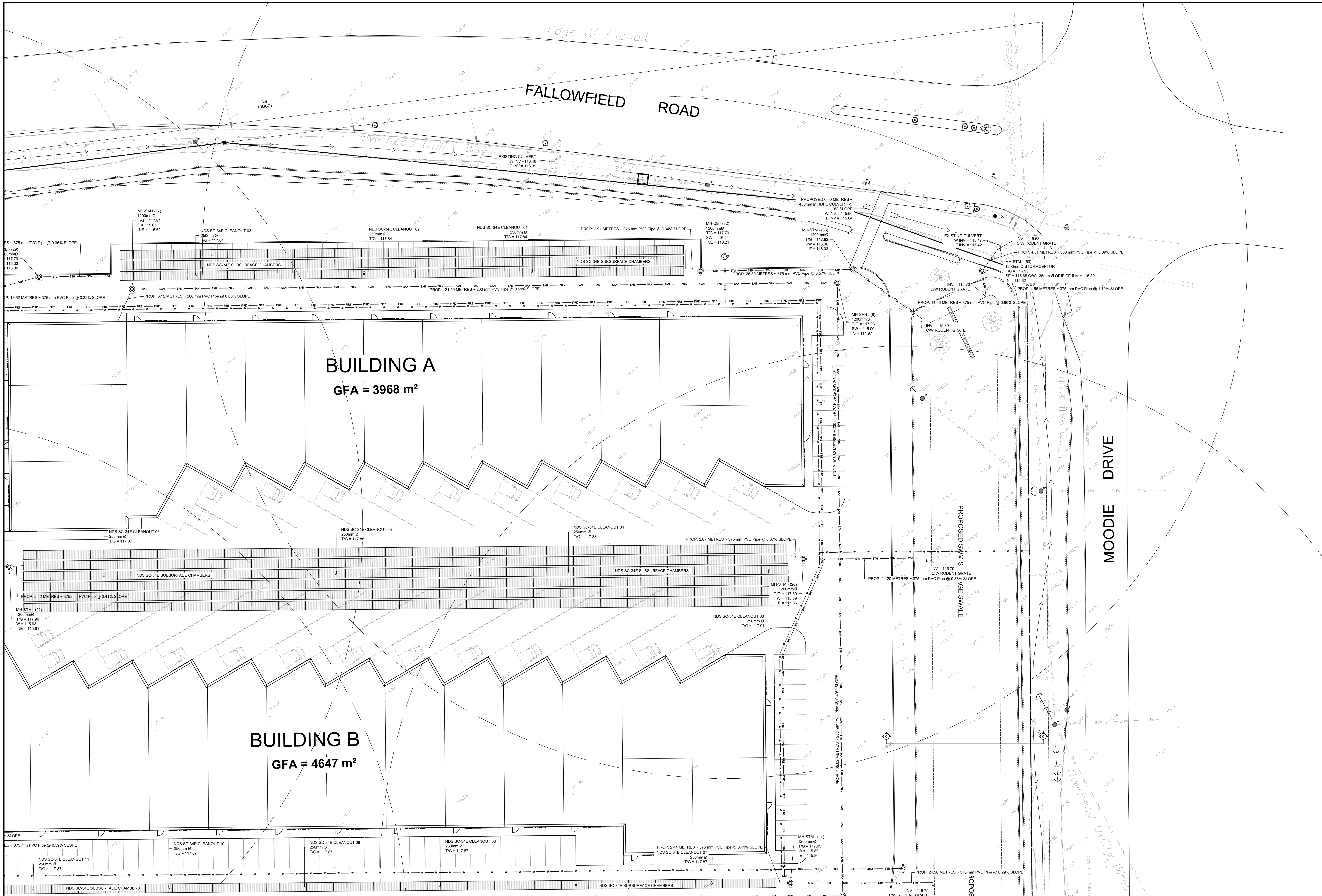
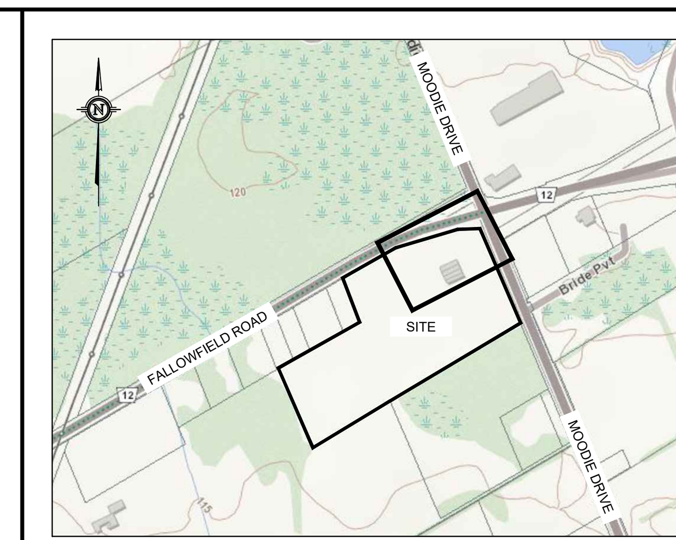
DRAWN	JR
CHECKED	ABD
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	SITE SERVICING PLAN – 1
PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-SVC-1

ARCH D





KEY PLAN

NOT TO SCALE

0 10 20
1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
- EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
- PROPERTY BOUNDARY
- PROPOSED TOP OF SLOPE
- PROPOSED BOTTOM OF SLOPE
- PROPOSED CENTERLINE OF FLOW
- PROPOSED RETAINING WALL
- PROPOSED STORM PIPE
- PROPOSED SANITARY PIPE
- PROPOSED WATERMAIN
- SUBDRAIN

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0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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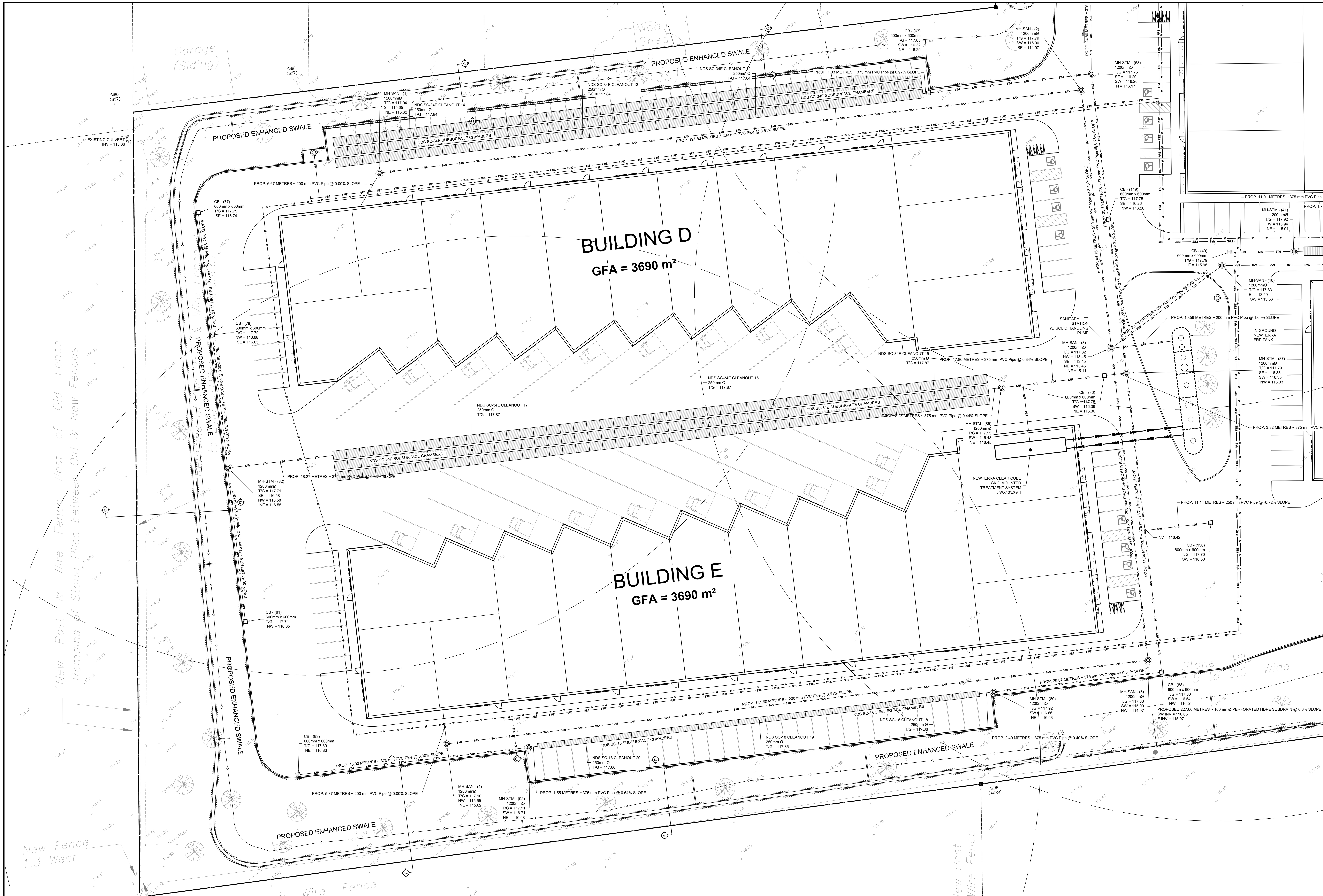
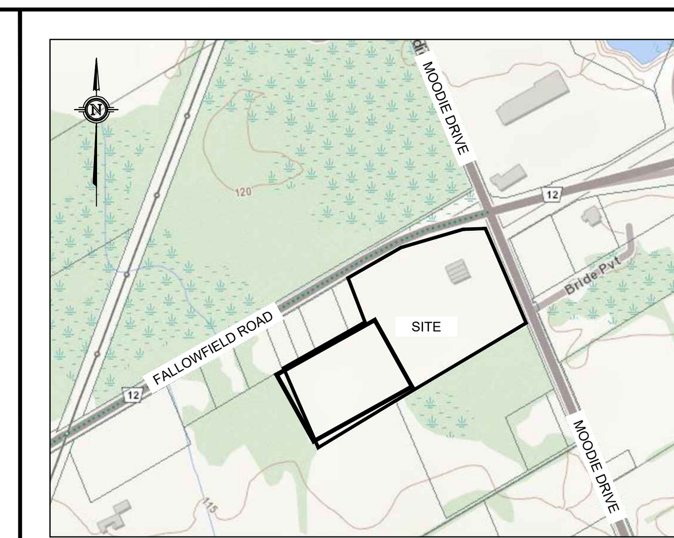
DESIGN	ARK
DRAWN	JR
CHECKED	ABD
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	SITE SERVICING PLAN - 2
PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-SVC-2

ARCH D





KEY PLAN

NOT TO SCALE

1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
- EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
- PROPERTY BOUNDARY
- PROPOSED TOP OF SLOPE
- PROPOSED BOTTOM OF SLOPE
- PROPOSED CENTERLINE OF FLOW
- PROPOSED RETAINING WALL
- PROPOSED STORM PIPE
- PROPOSED SANITARY PIPE
- PROPOSED WATERMAIN
- SUBDRAIN

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0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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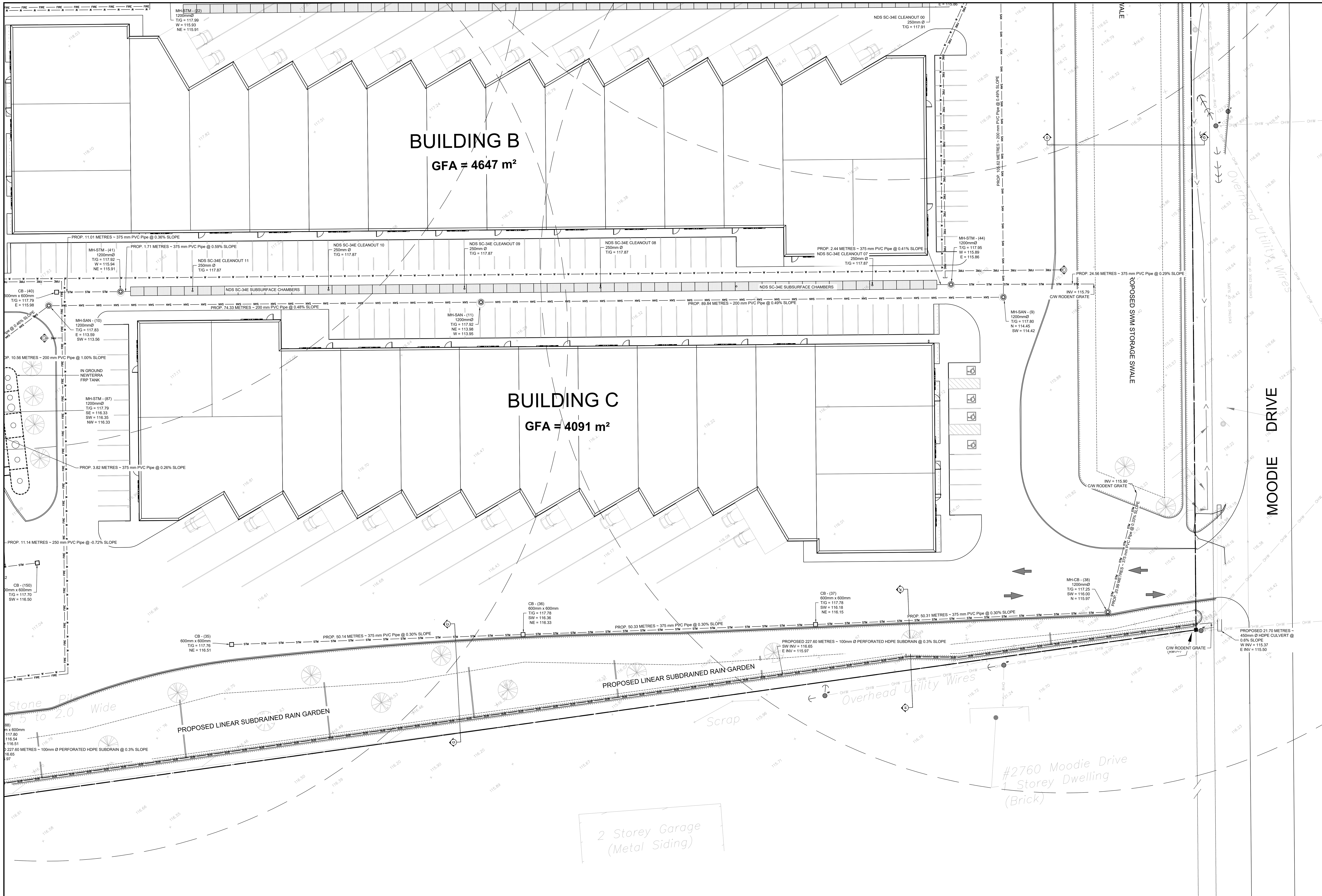
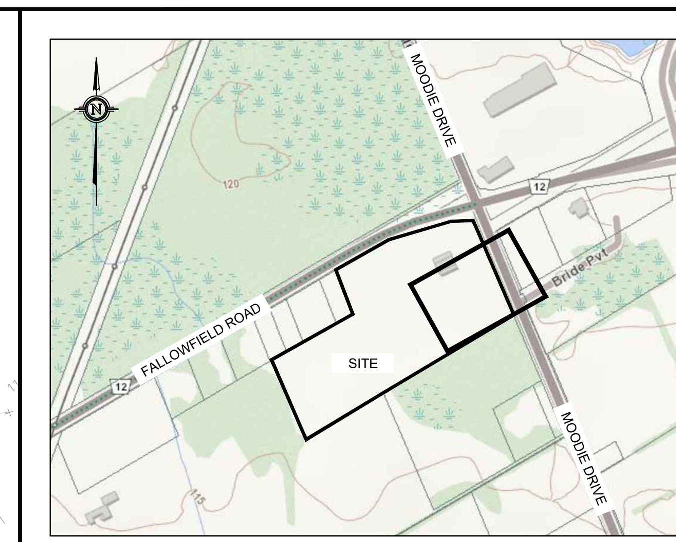
DESIGN	ARK
DRAWN	JR
CHECKED	ABD
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON	SCALE	AS_NOTED
DRAWING	SITE SERVICING PLAN - 3	DRAWING No.	221099-SVC-3

ARCH D





KEY PLAN
NOT TO SCALE

0 10 20
1:300 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED WATER VAVLE
- PROPOSED FIRE HYDRANT
- EXISTING FENCELINE
- EXISTING OVERHEAD WIRES
- EXISTING BOTTOM OF SLOPE
- EXISTING CENTERLINE OF SWALE / FLOW DIRECTION
- PROPERTY BOUNDARY
- PROPOSED TOP OF SLOPE
- PROPOSED BOTTOM OF SLOPE
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APPROVED	SD

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CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	SITE SERVICING PLAN - 4

PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-SVC-4

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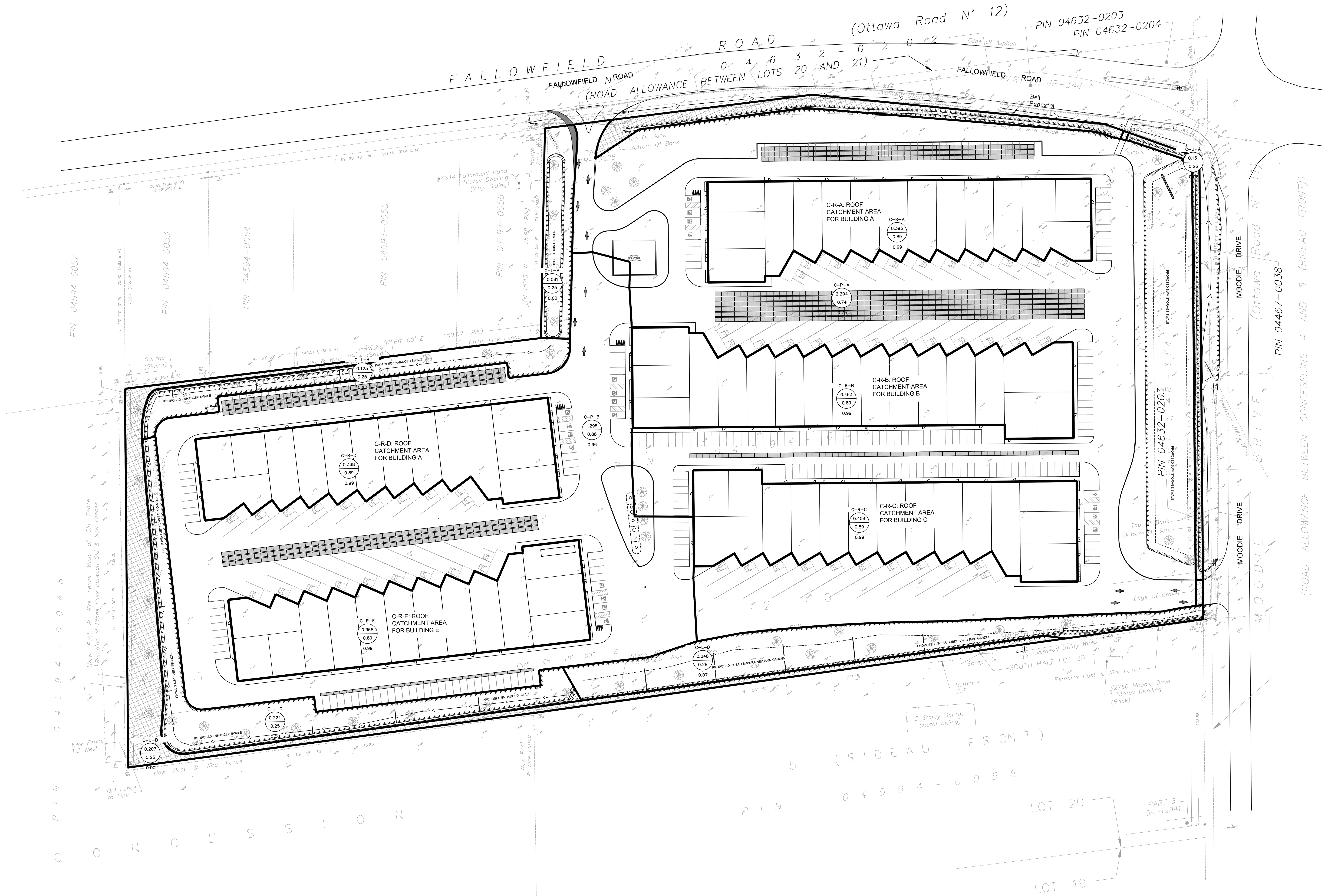

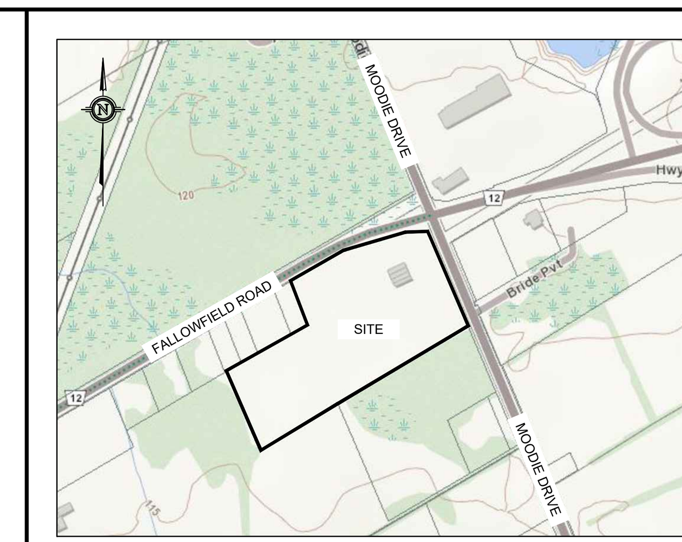

KEY PLAN

NOT TO SCALE

0 25 50
1:750 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED REAR YARD CATCHBASIN
- EXISTING EDGE OF GRAVEL
- EXISTING CENTERLINE OF FLOW
- EXISTING TOP OF SLOPE
- PROPERTY BOUNDARY
- CONTROLLED CATCHMENT AREA
- UNCONTROLLED CATCHMENT AREA
- CA-2 — CATCHMENT LABEL
- 1.143 — CATCHMENT AREA (HECTARES)
- 0.74 — C - RUN-OFF COEFFICIENT
- 0.76 — IMPERVIOUS RATIO

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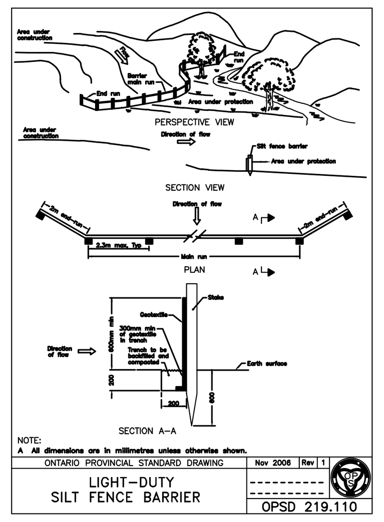
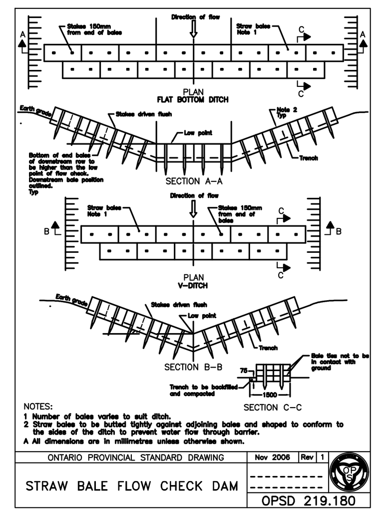
DESIGN	SD
DRAWN	ABD
CHECKED	SD
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726–2732 MOODIE DRIVE, OTTAWA, ON	SCALE	AS_NOTED
DRAWING	POST DEVELOPMENT PLAN	DRAWING No.	221099-POST

ARCH D



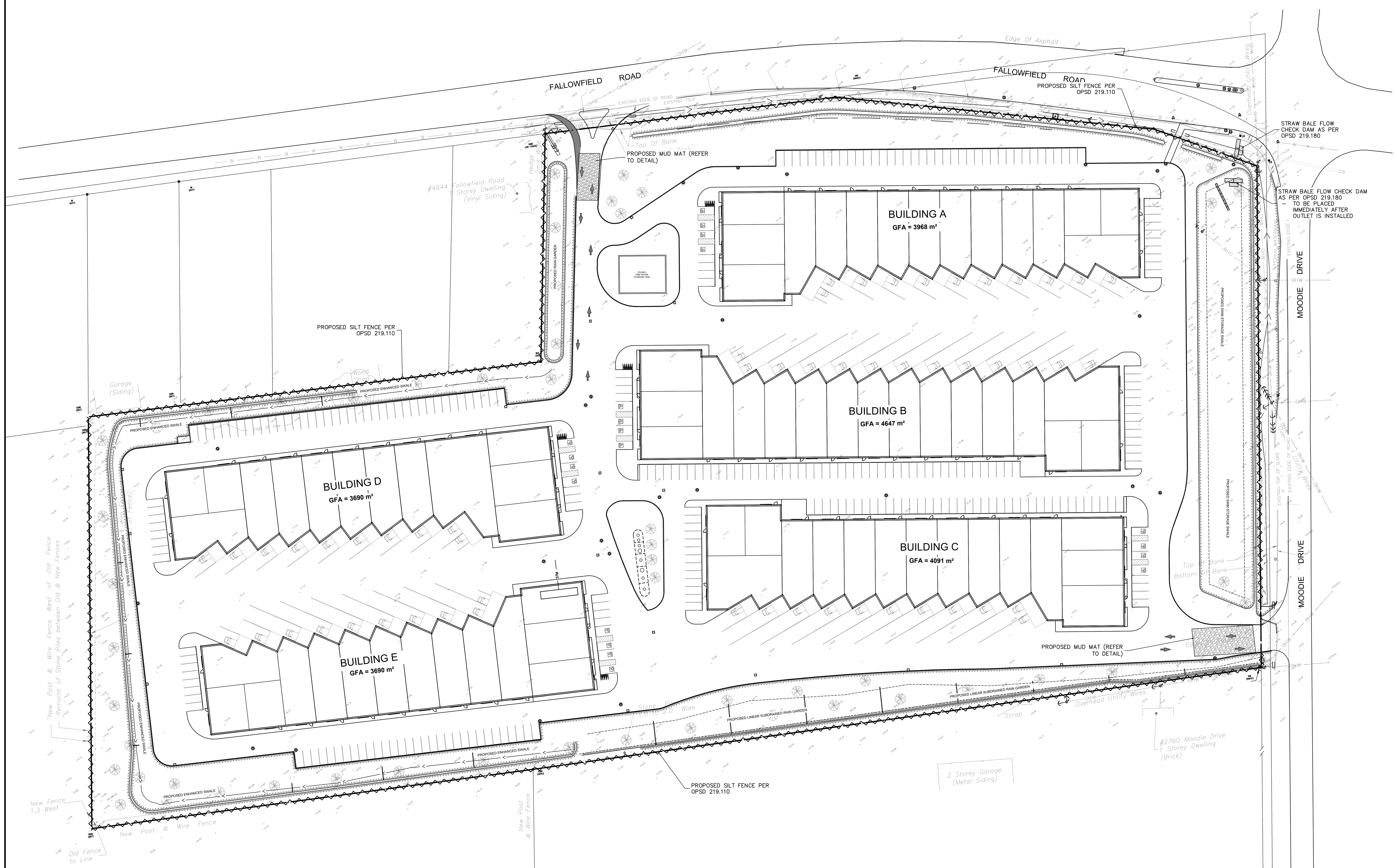


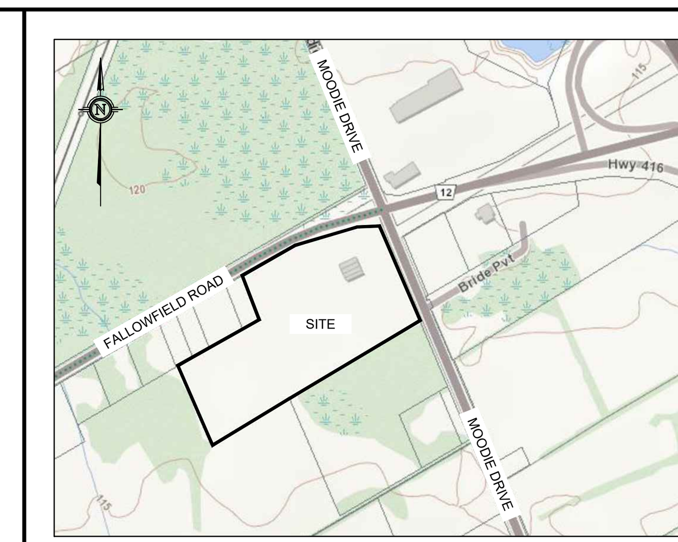
EROSION AND SEDIMENT CONTROL NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT BEST MANAGEMENT PRACTICES, TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE RECEIVING WATERCOURSE, DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. THE CONTRACTOR AGREES TO PREPARE AND IMPLEMENT AN EROSION AND SEDIMENT CONTROL PLAN AT LEAST EQUAL TO THE STATED MINIMUM REQUIREMENTS AND TO THE SATISFACTION OF THE CITY OF OTTAWA, APPROPRIATE TO THE SITE CONDITIONS, PRIOR TO UNDERTAKING ANY SITE ALTERATIONS (FILLING, GRADING, REMOVAL OF VEGETATION, ETC.) AND DURING ALL PHASES OF SITE PREPARATION AND CONSTRUCTION IN ACCORDANCE WITH THE CURRENT BEST MANAGEMENT PRACTICES FOR EROSION AND SEDIMENT CONTROL.
3. ALL EROSION CONTROL MEASURES ARE TO BE IN PLACE PRIOR TO STARTING CONSTRUCTION AND REMAIN IN PLACE UNTIL SITE WORKS ARE COMPLETE.
4. THE CONTRACTOR IS RESPONSIBLE FOR INSPECTION AND MAINTENANCE OF THE EROSION CONTROL MEASURES DURING CONSTRUCTION. INSPECTION IS TO BE CARRIED OUT ON A WEEKLY BASIS AND AFTER SIGNIFICANT RAINFALL OR SNOWMELT EVENT. THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF THE MEASURES ONCE DEVELOPMENT IS COMPLETE AND THE VEGETATION IS ESTABLISHED
5. THE CONTRACTOR IS TO ENSURE THAT THE SITE ACCESS POINTS AND STREETS ADJACENT TO THE ACCESS POINTS ARE MAINTAINED AND KEPT CLEAN OF CONSTRUCTION MATERIALS SUCH AS, BUT NOT LIMITED TO MUD, DIRT, CLAY AND GRANULARS ON A DAILY BASIS OR AS NECESSARY, TO THE SATISFACTION OF THE CITY OF OTTAWA. A MUD MAT IS TO BE UTILIZED AT ANY LOCATION WHERE THE SITE IS ACCESSED FOR CONSTRUCTION.
6. EVERY EFFORT WILL BE MADE TO ENSURE THAT ALL DISTURBED AREAS ARE TOPSOILED AND SEEDED AS SOON AS REASONABLY POSSIBLE.
7. THE SEDIMENT AND EROSION CONTROL PLAN IS A LIVING DOCUMENT WHICH MAY BE AMENDED BY ONSITE REQUIREMENTS AT THE APPROVAL OF THE MUNICIPALITY AND THE CONSERVATION AUTHORITY.

MINIMUM EROSION AND SEDIMENT CONTROL PLAN REQUIREMENTS:

- TIME THE DEMOLITION AND EXCAVATION ACTIVITIES SO THAT THEY OCCUR NO SOONER THAN IS NECESSARY FOR SUBSEQUENT CONSTRUCTION ACTIVITIES.
- LANDSCAPE THE SITE AS SOON AS PRACTICALLY POSSIBLE.
- USE SILT FENCES AROUND ANY STOCKPILES OF SOIL.
- PRIOR TO CONSTRUCTION, SILT FENCE BARRIERS (OPSD 219.110) WILL BE PLACED AS SHOWN ON THE DRAWING.
- IF CONSTRUCTION IS PHASED, SILT FENCES TO BE PLACED AROUND ACTIVE CONSTRUCTION ZONES
- THE SILT FENCE SHOULD BE REMOVED ONLY WHEN THE SITE IS STABILIZED.





KEY PLAN

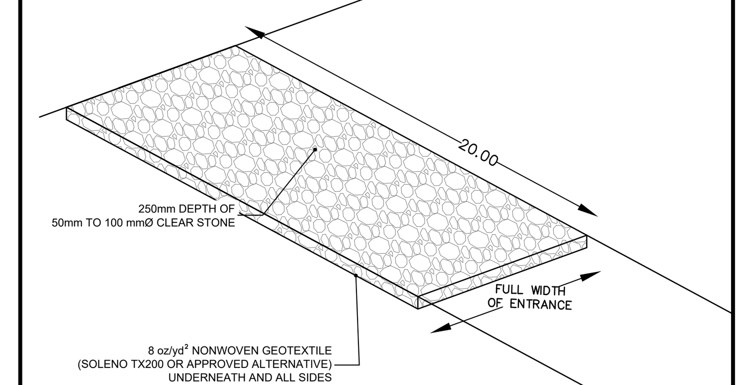
NOT TO SCALE

0 25 50

1:750 METRES

LEGEND

- EXISTING ELEVATION
- PROPOSED MANHOLE STRUCTURE
- PROPOSED CATCHBASIN
- PROPOSED REAR YARD CATCHBASIN
- PROPERTY BOUNDARY
- SILT FENCE
- STRAW BALE FLOW CHECK DAM



MUD MAT DETAIL

SCALE = N.T.S.

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13. THIS DRAWING IS PART OF KOLLAARD ASSOCIATES DESIGN REPORT #221099.

No.	REVISION	DATE	BY
0	ISSUED FOR SITE PLAN CONTROL APPROVAL	2025.10.24	SD

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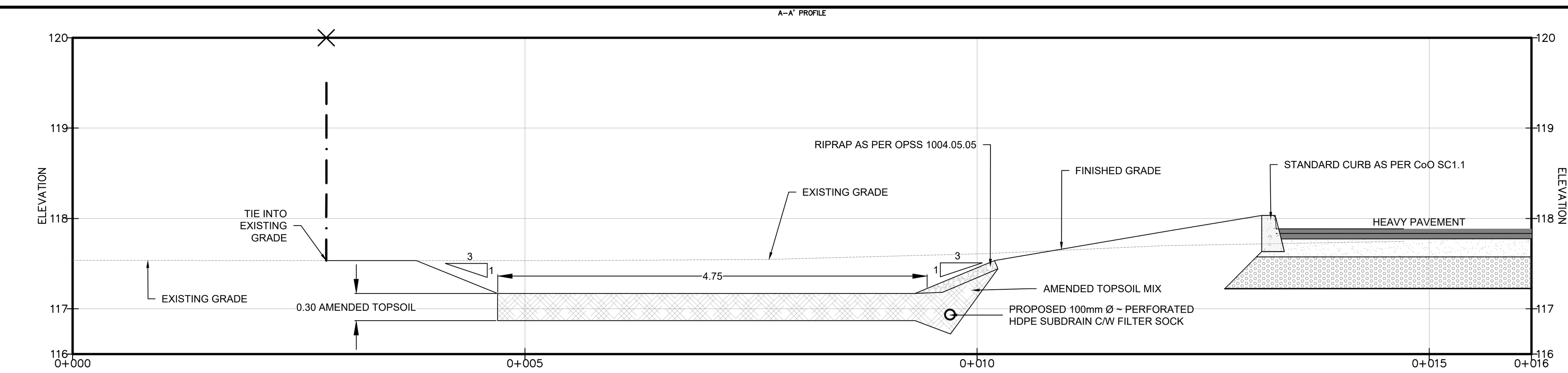
DESIGN	
DRAWN	ABD
CHECKED	ARK
APPROVED	SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24.2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

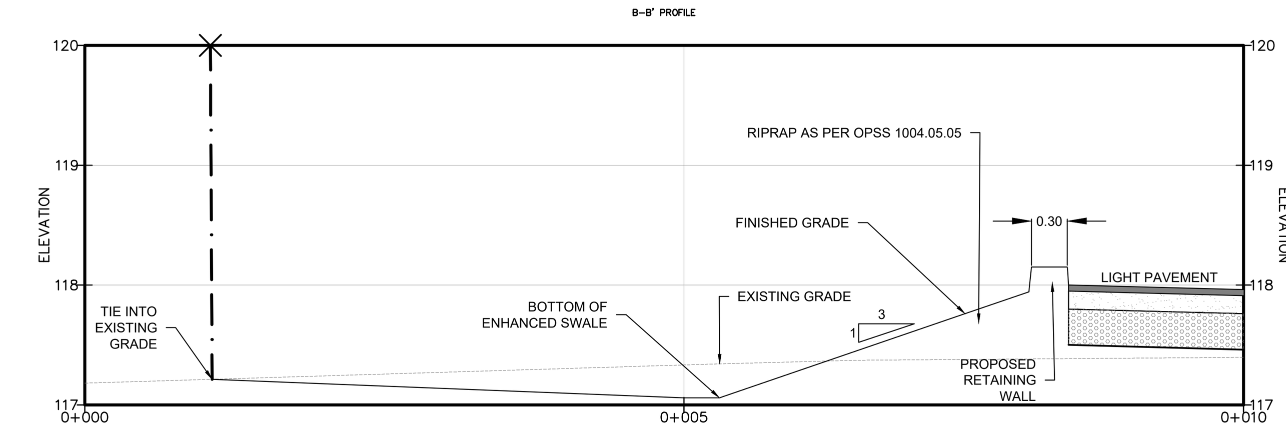
CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	EROSION SEDIMENT CONTROL PLAN

PROJECT No.	221099
DATE	2025.10.24
SCALE	AS_NOTED
DRAWING No.	221099-ESC



RAIN GARDEN CROSS-SECTION A–A'

SCALE = 1:50



ENHANCED SWALE CROSS-SECTION B–B'

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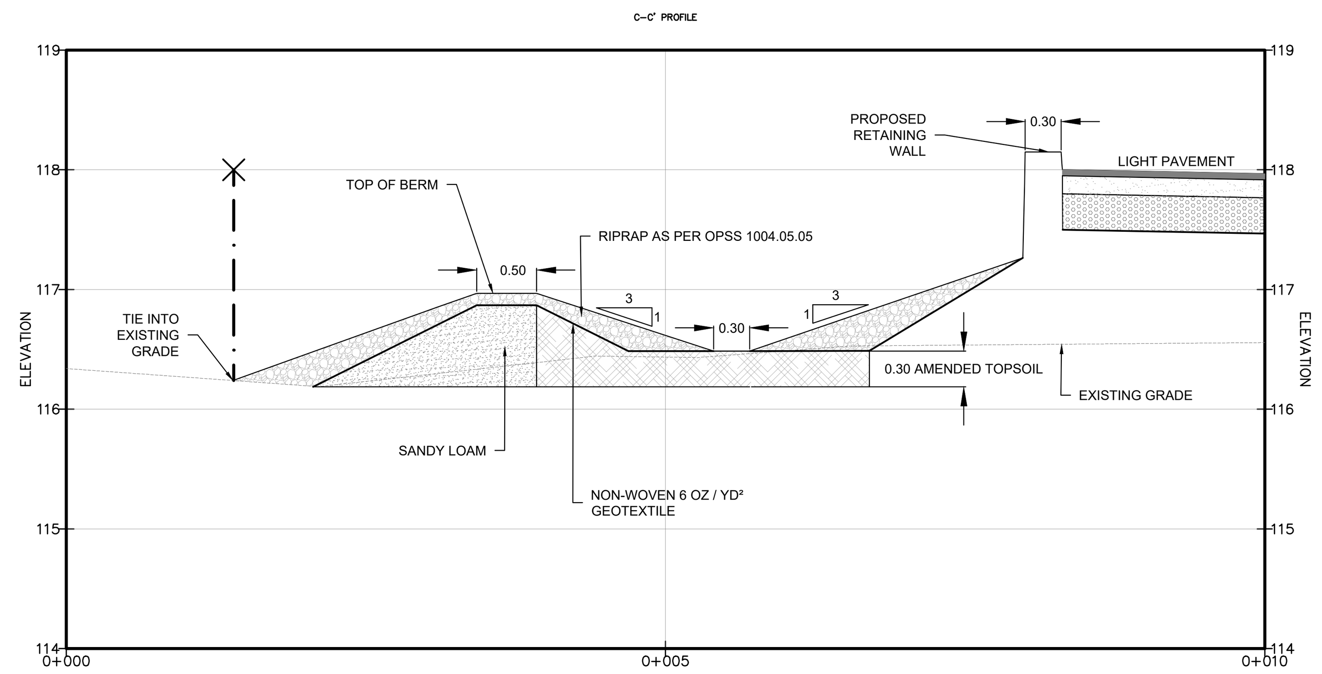

ENHANCED SWALE CROSS-SECTION C–C'

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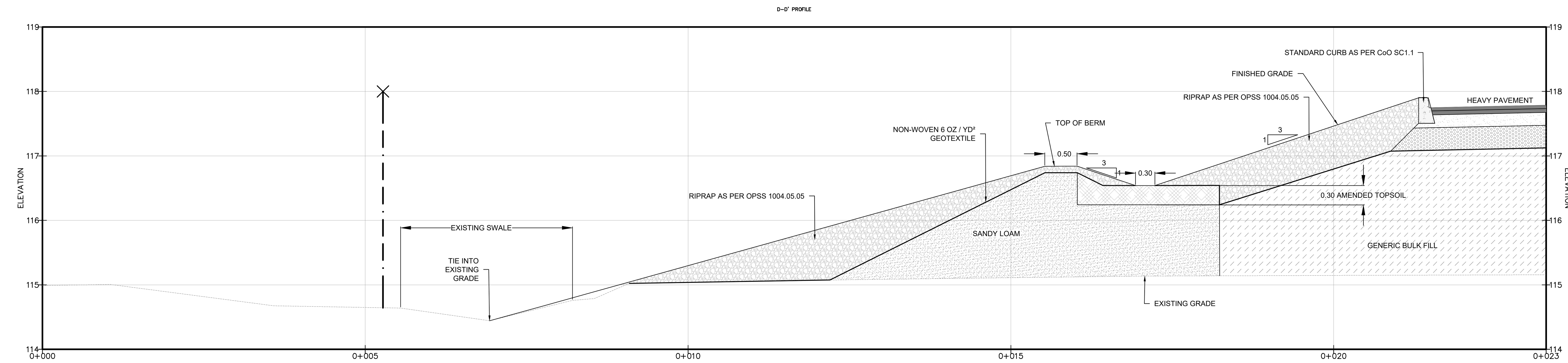

ENHANCED SWALE CROSS-SECTION D–D'

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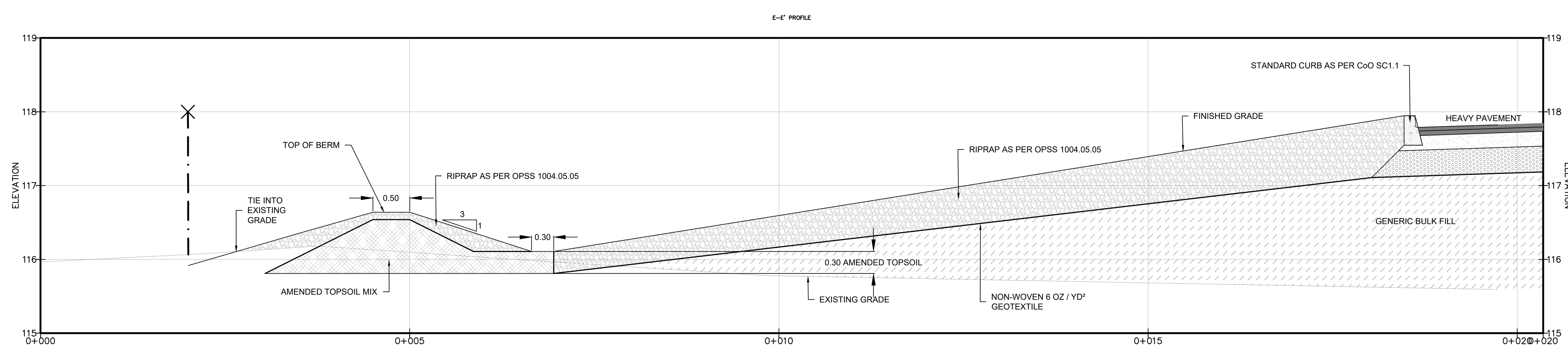

ENHANCED SWALE CROSS-SECTION E–E'

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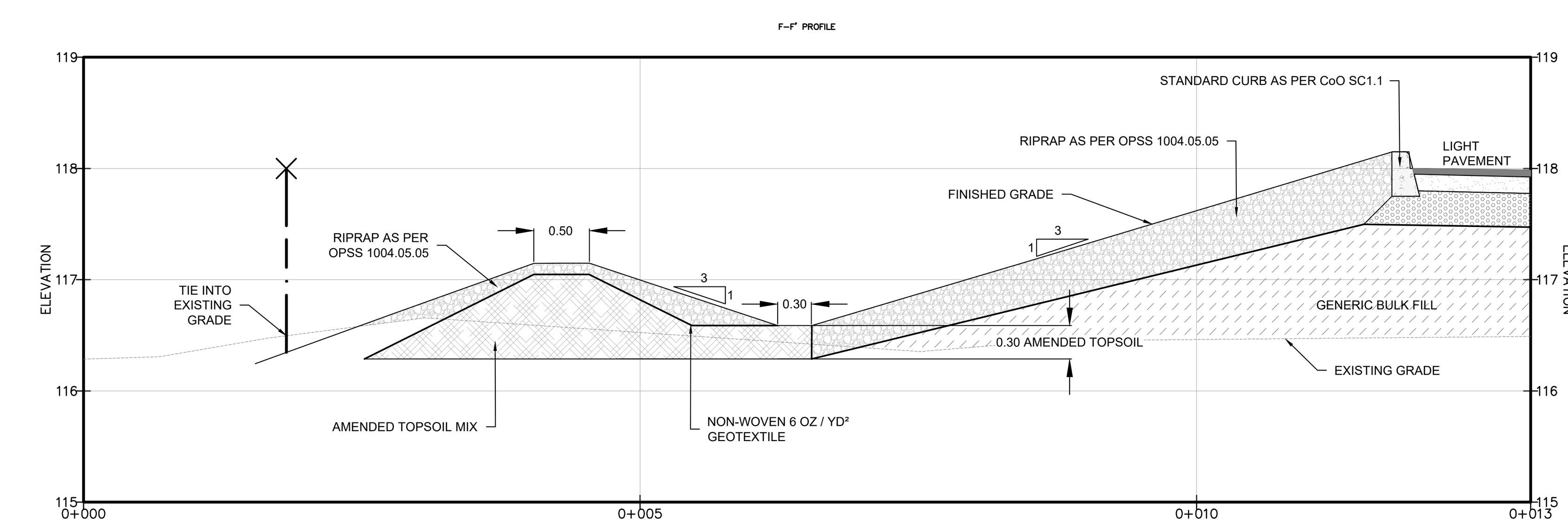
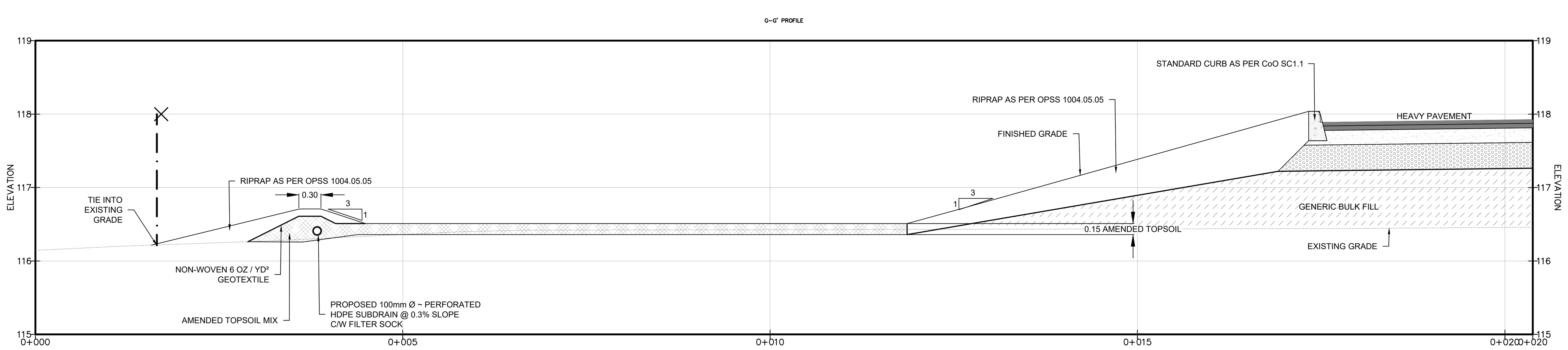


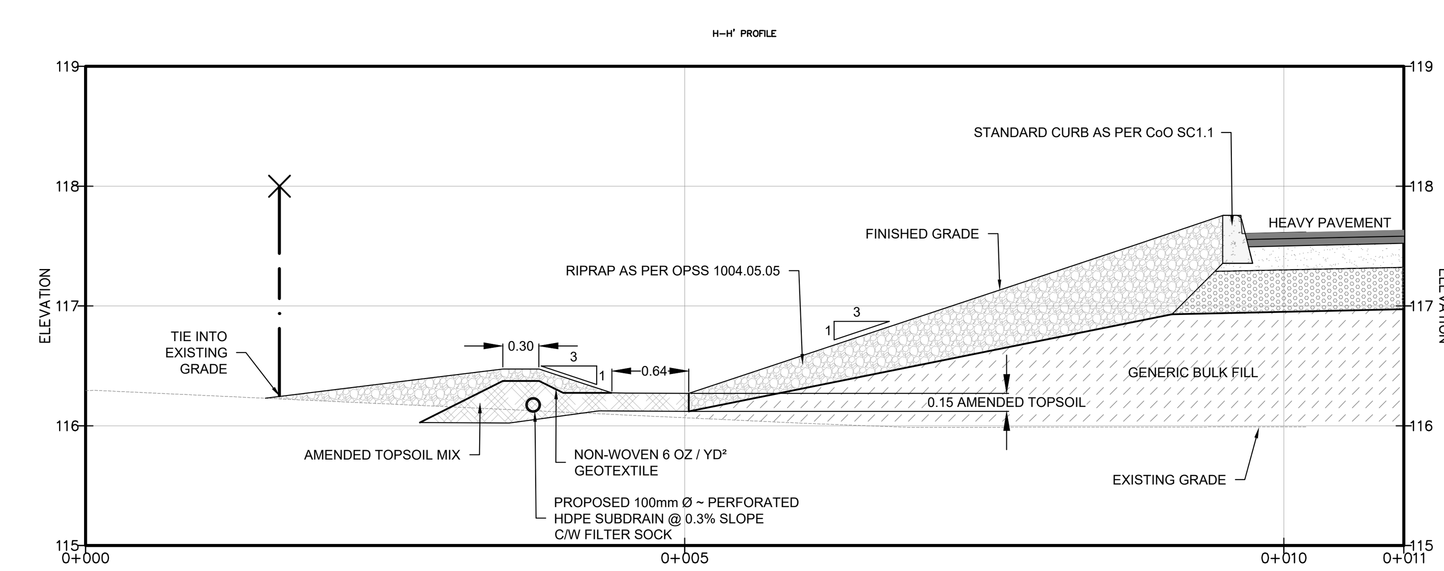
ENHANCED SWALE CROSS-SECTION F–F'

SCALE = 1:50



LINEAR SUBDRAINED RAIN GARDEN CROSS-SECTION G–G'

SCALE = 1:50



LINEAR SUBDRAINED RAIN GARDEN CROSS-SECTION H–H'

SCALE = 1:50

0 2 4
1:50 METRES

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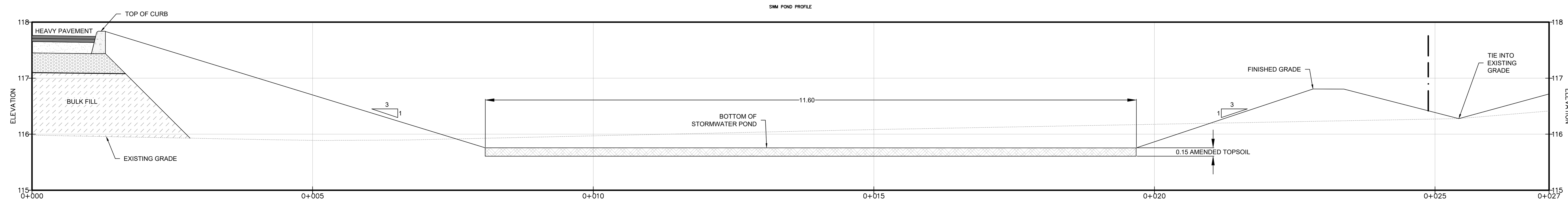
DRAWN: ABD/JR
CHECKED: ARK
APPROVED: SD

STAMP: LICENSED PROFESSIONAL ENGINEER — OCT.24,2025 — S.E. deWit — 100079612 — PROVINCE OF ONTARIO

CLIENT NAME	1000198532 ONTARIO INC.
PROJECT NAME	PROPOSED WAREHOUSING
PROJECT LOCATION	2726–2732 MOODIE DRIVE, OTTAWA, ON
DRAWING	DETAILS 1

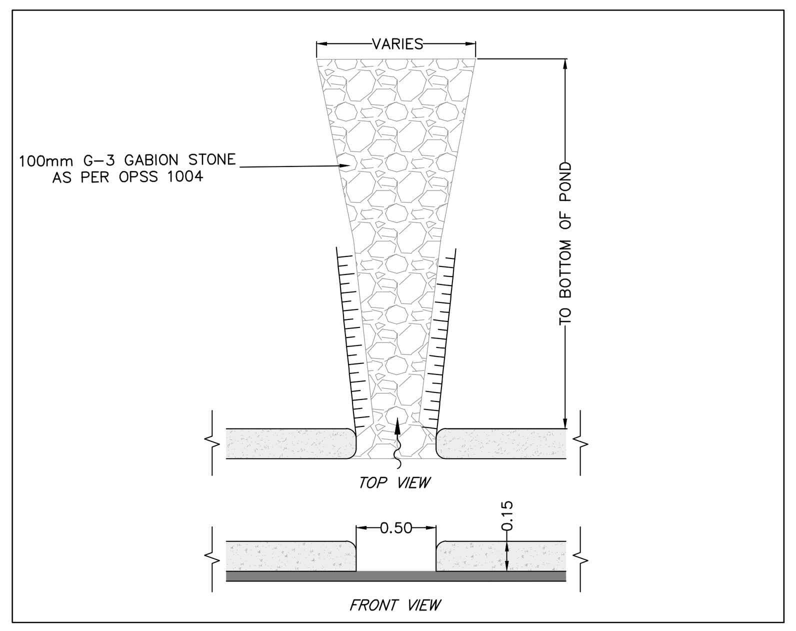
PROJECT No.	221099
DATE	2025.10.24
SCALE	
DRAWING No.	221099-DET1

ARCH D



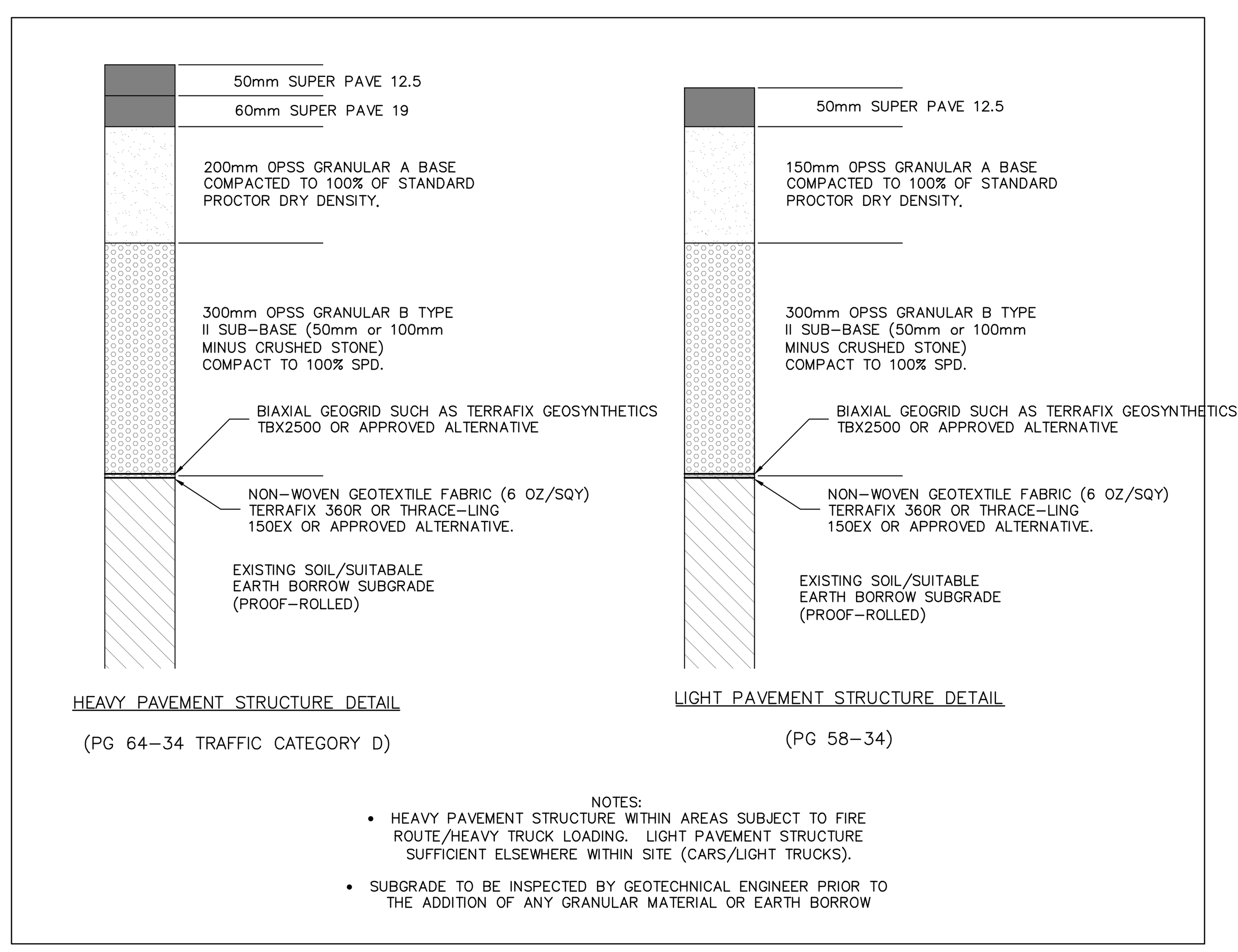
SWM STORAGE SWALE CROSS-SECTION I-I'

SCALE = 1:50



CURB CUT DETAIL

SCALE = 1:50



PAVEMENT STRUCTURE DETAILS

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DESIGN	ARK
DRAWN	ABD/JR
CHECKED	ARK
APPROVED	SD

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CLIENT NAME	1000198532 ONTARIO INC.	PROJECT No.	221099
PROJECT NAME	PROPOSED WAREHOUSING	DATE	2025.10.24
PROJECT LOCATION	2726-2732 MOODIE DRIVE, OTTAWA, ON	SCALE	
DRAWING	DETAILS 2	DRAWING No.	221099-DET2

ARCH D