

**FUNCTIONAL SERVICING &
STORMWATER
MANAGEMENT REPORT**

425 UNION STREET

**MUNICIPALITY OF MEAFORD
GREY COUNTY**

PREPARED FOR:

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1.0 Introduction

C.F. Crozier and Associates (Crozier) was retained by 2774476 Ontario Inc. to prepare a Functional Servicing and Stormwater Management Report to support the Draft Plan Application for the proposed development located at 425 Union Street in the Municipality of Meaford, Grey County (the "Site"). The Site is made up of three separate lots. The largest lot is legally described as Lots 421 – 425, RP 16R8356 parts 1 to 3 and 16R9139 part 1. The two smaller lots are legally described as Lot 425, RP 16R6036 part 5 and part 6. Refer to Figure 1 for the Site Location.

The Subject Lands are located in the regulated jurisdiction of the Grey Sauble Conservation Authority (GSCA) and are subject to development and site alteration policies.

The Site is proposed to be developed into a mixed-residential subdivision including 83 units of various types fronting onto public and private roadways. Units will consist of a mix of 49 single detached and 34 semi-detached units. The proposed 20 m wide public roadway (Street A) will run east to west, connecting Union Street and Centre Street through the proposed development. Private 7.5 m wide streets (Block 70 and 71) will branch off Street A providing access to the proposed lots. Refer to Figure 2 for the Draft Plan of Subdivision prepared by Travis and Associates, dated October 2022. The proposed public roadways and associated servicing will be consistent with the Municipality of Meaford's Engineering Standards for a residential roadway. The proposed private roadway will feature a slightly modified cross-section, compared to the Municipality's standards, which is described in more detail in subsequent sections of the report.

External documents/plans were reviewed over the course of completing this engineering report. As such, the servicing and design considerations contained herein are assisted by the following:

- Geotechnical Investigation - Proposed Residential Development, Union Street Property, Meaford, Ontario prepared by DS Consultants LTD., dated May 2021.
- Municipal Staff Report No. CAO2020-23 – Meaford WWTP Servicing Allocation prepared by the Municipality of Meaford, dated November 30, 2020.
- Municipality of Meaford: Engineering Standards prepared by the Municipality of Meaford, dated April 2019.
- Annual Drinking Water System Compliance Report prepared by the Municipality of Meaford, dated 2019.
- Meaford Water Pollution Control Plant Annual Report prepared by the Municipality of Meaford, dated 2019.
- Municipality of Meaford Master Plan Water and Wastewater Servicing Volume 1 and 2 prepared by Ainley Group, dated April 2015.

2.0 Road Network

The Draft Plan incorporates a variety of ownership such that a portion of the road network will be municipally owned, while the remainder will be under private ownership. As shown in the Draft Plan, the proposed Street A, connecting Union Street to Centre Street, will be municipally owned. The remaining roads shown on the Draft Plan as Block 70 and 71 will be private.

The municipal road will be built according to the Municipality of Meaford Engineering Standards. The private condominium road will consist of a 6.5m asphalt platform complete with mountable curb and gutter, a 1.5m wide concrete sidewalk and service corridors. Refer to Figure 3 and 4 for the proposed cross-section for the public and private roadways, respectively. The proposed servicing of the private roads are described further in the following sections, and is consistent with the approved approach towards condominium roads in other local municipalities such as Collingwood or the Town of The Blue Mountains. The private road cross-section is typically included as part of the executed development agreement with the Municipality.

3.0 Water Servicing

Potable water for the Site will be supplied by the Municipality of Meaford Water Treatment Plant and associated water distribution system.

3.1 Existing Water Servicing

Potable water is provided by way of the Meaford Water Treatment Plant (WTP), located at Sykes Street and Alberly Court in Meaford. Source water is drawn from the Georgian Bay and treated to the Safe Drinking Water Act (SDWA) standards and the plant has a rated capacity of 26,848 m³/day. According to the 2019 Meaford WTP Summary Report prepared by the Municipality of Meaford, the plant provides an average daily treated water flow of 1,523 m³/day.

As described in the Meaford Water and Waste Water Servicing Master Plan (Ainley, 2015), the Subject Site is located in Pressure Zone 3 which is serviced by the existing St. Vincent Street Booster Pumping Station. The St. Vincent Booster Pumping Station was constructed in 2010, and according to the Water and Waste Water Servicing Master Plan, provides adequate pressure during existing and full build-out conditions.

The existing water distribution infrastructure at or near the Site includes the following:

- An existing 200 mm diameter watermain on Union Street.
- An existing 150 mm diameter watermain on Centre Street.
- An existing 200 mm diameter watermain within an easement through the site, between Union Street and Centre Street.

Refer to the As-Constructed Drawings in Appendix A.

3.2 Proposed Domestic Water Demand

The proposed development will be serviced in accordance with the recommendations of the Municipality of Meaford Water & Wastewater Servicing Master Plan prepared by Ainley Group, dated April 2015. Water demands for the residential development were determined in accordance with the design parameters identified in Table 7 on page 32 of Section 5.5 of the Master Plan prepared by Ainley Group, and previous correspondence with Ainley on other developments in Meaford. Peak factors were determined in accordance with Table 3-1 of MECP Design for Drinking-Water Systems, 2008. The design figures used to estimate domestic water demand include:

- Average Residential Flow Rate 300 L/cap/day
- Max Day/Peak Hour Factors 2.75/4.13

- Population Density 2.4 Persons Per Unit

It is estimated that the maximum water demands for the proposed development are as follows:

- Average Day 0.69 L/sec
- Max Day 1.90 L/sec
- Peak Hour 2.86 L/sec

Refer to Appendix B for potable water servicing demand calculations.

3.3 Proposed Fire Flow Demand

The proposed development includes both single detached units and semi-detached units. The preliminary fire flows to service the development, based on both the Fire Underwriter Survey (FUS) and Ontario Building Code (OBC) methods, are summarized in the table below:

Unit Type	Fire Flow (FUS)	Fire Flow (OBC)
Single Detached	83.3 L/s	45 L/s
Semi-Detached	116.7 L/s	45 L/s

It should be noted that the fire flow calculated for the semi-detached unit in Table 1 was based on the assumption that there would not be a fire wall built between the units. If fire walls were constructed, the fire flow per FUS would be reduced to 83.3 L/s. Refer to Appendix B for fire flow demand calculations.

3.3.1 Hydrant Flow Test

A hydrant flow test was completed by Vipond on October 3rd 2022 on Centre Street and Union Street. The results are summarized in the tables below and can also be found in **Appendix C**:

Test #	Residual Pressure (PSI)	Pitot Pressure (PSI)	Discharge (U.S.GPM)	Discharge (L/s)
1	24	22	418	26.4
2	19	9	503	31.7
3	4	4	671	42.3

Table 3: Centre Street Hydrant Flow Test Results

Test #	Residual Pressure (PSI)	Pitot Pressure (PSI)	Discharge (U.S.GPM)	Discharge (L/s)
1	26	21	408	25.7
2	18	10	533	33.6
3	12	4	671	42.3

The results of the hydrant flow test indicate that the fire flows available at the site are not sufficient under existing conditions to meet the requirements of the proposed development. As noted in Section 3.1, the St. Vincent Street Booster Pumping Station is sized to meet the pressure requirements for Pressure Zone 3 under existing and full-build out conditions. The Meaford Water and Waste Water Master Plan (Ainley, 2015) indicates that there are areas of low pressure in Pressure Zone 3, which are primarily due to undersized pipes.

The above water demand/fire flow calculations and hydrant flow test results will be provided to Municipality to incorporate into the Municipality-wide water model to confirm the external improvements required to increase fire flows at the site.

3.4 Proposed Water Servicing

Since there is existing 200mm PVC SDR 18 watermain on Union Street and a 150mm PVC SDR 18 watermain on Centre Street, the proposed servicing strategy is to connect the two watermains through the proposed development following the profile of the Street A (public roadway). The watermain will be constructed within the roadway per Municipality standards for a typical road section. The existing 200mm diameter watermain that runs through the Site will be removed and plugged at the watermain on Union Street and Centre Street. Refer to Figure 5 for the Preliminary Water Distribution Plan. As noted in Section 3.3.1, the Municipality's existing water distribution system does not provide sufficient fire flows in the area and external improvements to undersized pipes may be required as part of the development in order to meet minimum fire flow requirements. The extent of improvements will be confirmed through the Municipality's water model and the design of these improvements will be a condition of Draft Plan Approval.

Based on the expected water demand and the size of existing watermain adjacent to the Site, the proposed internal watermain along the public Street A is expected to be a 200 mm diameter pipe with a 150mm diameter watermain along the private Streets B and C. The Municipality has indicated that the water distribution network within both public and private roadways will be assumed by the Municipality, including all mains and the service connections up to and including the curb stops. An easement in the name of the Municipality will be registered along the alignment of the watermain through the private roadways.

Actual watermain sizes will be confirmed during detailed design, following the updates to the Municipality's water model. The individual units will be serviced with a 19 mm diameter Type "K" copper water service or approved equivalent per the Municipality's Engineering Standards. Fire protection for the residential units will be provided by fire hydrants spaced as per Municipality Standards.

4.0 Sanitary Servicing

4.1 Existing Services

4.1.1 Water Pollution Control Plant (WPCP)

Sanitary servicing for the development will be achieved via connection to the Municipality of Meaford Water Pollution Control Plant (WPCP) and sanitary sewer system. The Municipality of Meaford WPCP has been in service since 1970 with multiple upgrades throughout its service life. In 2007, the Municipality completed a Schedule C Municipal Class Environmental Assessment (Class EA) for potential expansion of the WPCP, which was triggered by a capacity analysis that identified the plant capacity was over 80%. The Class EA identified a combination of alternatives, which are listed below:

- Expand the existing plant on-site and purchase the immediately adjacent property for buffer/flexibility.
- Optimize plant operation.
- Reduce inflow and infiltration (I&I) and improve water conservation.

The Municipality did not have sufficient funds to proceed with the expansion of the WPCP and a consultant was retained to re-evaluate the design population calculated in the Class EA. The re-evaluation identified that a 20% expansion would add approximately 605 residential units of capacity. The Municipality proceeded with the initiation of an addendum to the 2007 Class EA in 2015; however, sewage flow at the WPCP had decreased to approximately 56% capacity, partially due to a reduction in I&I in the Municipality's sanitary sewers. Since there appeared to be sufficient capacity in the WPCP, the Municipality did not proceed with the addendum to the 2007 Class EA.

The 2019 Annual Report for the WPCP identified that the average daily flow was 2,941 m³/day, which is equivalent to 75% of the plant's total capacity (3,910 m³/day). A Staff Report was presented to Council on November 30th, 2020 which recommended two plans be developed:

1. An inflow/infiltration strategy that will consider priority investment in infrastructure that optimizes the operation of the WPCP and the creation of additional capacity.
2. An uncommitted sewage reserve capacity implementation plan to address future development.

Within the Staff Report it was also noted that the Meaford Official Plan provides allocation framework which generally restricts development phases to approximately 30 units per phase where practical. Refer to the full staff report in Appendix D.

4.1.2 Existing Sanitary Sewer System

According to the Gates of Kent As-Constructed drawings in Appendix A, an existing 200mm diameter sanitary sewer is located at the intersection of Russett Drive and Union Street, approximately 250m north of Street A. Based on the sewer design sheets completed for Gates of Kent, the existing sanitary sewer on Union Street has a residual capacity of approximately 15.7 L/s. Refer to Appendix E for the full sewer design sheet.

Downstream of Union Street, sanitary flow is conveyed via gravity sewer to Sewage Pumping Station (SPS) #1 located on Denmark Street. From SPS #1 sanitary flow is conveyed directly to the WPCP via forcemain.

4.2 Design Sanitary Flow

The proposed development will be serviced in accordance with the recommendations of the Municipality of Meaford Water & Wastewater Servicing Master Plan prepared by Ainley Group, dated April 2015. Sanitary flow rates for the residential development were determined in accordance with the design parameters identified in the Master Plan prepared by Ainley Group, which included the following design figures:

- Average Residential Flow Rate 300 L/cap/day
- Infiltration 0.23 L/s/ha
- Persons Per Residential Unit 2.4

Based on these values it is estimated that peak sanitary flow from the Site will be 4.07 L/s. Refer to Appendix E for sanitary design calculations.

Since the Site was designated as an Urban Living Area in the Municipality of Meaford Official Plan (2014) and the relatively low flows from the proposed development, it is assumed that there will be sufficient capacity in the existing municipal sanitary sewer system. A Municipality-wide sanitary sewer model is held by Ainley Group and will be updated during detailed design to confirm that the downstream infrastructure has sufficient capacity to convey the peak flow rates produced by the proposed development.

4.3 Proposed Sanitary Servicing

The Site will be serviced by extending sanitary sewer from the current limits at the intersection of Russett Drive and Union Street. Based on the As-Constructed drawings for Union Street in Appendix A, the downstream invert of the existing sanitary sewer is approximately 209.05 masl, which is sufficiently deep to service the Site via gravity sewer. Refer to Figure 6 for the Preliminary Sanitary Service Plan.

The internal sanitary sewer will follow the centreline of the internal roadway network per Municipal standards for a typical road section. A 200mm diameter sanitary sewer is proposed, which at a minimum slope of 0.5% has a capacity of 23 L/s and is adequate to convey the relatively low peak sanitary flows calculated in the previous section. Refer to the pipe capacity table included in Appendix E.

Sanitary maintenance holes will be installed with spacing and specification consistent with Town standards. The proposed 200mm diameter internal sanitary sewer will be designed with sufficient slope to provide cleansing velocity within the sewer to reduce maintenance issues post construction. The sanitary system (sewer and structures) will be designed to protect against infiltration, installed with waterproof membranes and watertight pipe seals per the Municipality's Engineering Standards (Std DWG 13). A preliminary sanitary sewer design sheet with proposed inverts and slopes is enclosed in Appendix E.

As noted in Section 3.1.1, the Meaford Official Plan provides allocation framework which generally restricts development phases to approximately 30 units per phase where practical. Therefore, it is anticipated that the proposed development may be required to proceed as three (3) phases.

5.0 Stormwater Management

The management of stormwater and drainage for the proposed development must comply with the policies and standards of the various agencies including the Municipality of Meaford, Grey Sauble Conservation Authority (GSCA), and Ministry of the Environment, Conservation and Parks (MECP).

The stormwater management criteria for the development of the Site are listed below.

- Water Quality Control:
 - “Enhanced Protection” of 80% TSS Removal for 90% of the annual runoff volume given that Georgian Bay is the ultimate receiver.
- Water Quantity Control:
 - The proposed SWM design must control post development flows to pre-development levels for all storms up to and including the 100-year generated by the Site (on-site ‘post-to-pre’ control).
- Erosion Control:
 - Erosion control for the 25mm storm event.
- Development Standard:
 - Urban cross section complete with curb & gutter;
 - Lot grading at 2% optimum; and,
 - Minor and major drainage system to convey frequent and infrequent rainfall/runoff events, respectively.
 - Minimum 0.3m separation between seasonal high groundwater and underside of basement.

5.1 Existing Drainage

The Site lies within the Meaford Creek watershed (ultimately draining north-east to Georgian Bay). The site previously consisted of cultivated agricultural lands but was recently cleared and stripped in 2020. Based on Grey County Soil Mapping (1979) the on-site soils are classified as Brighton Sand (BRS) with good drainage characteristics. DS Consultants prepared a report on Geotechnical Investigation for the Site dated May 2021. The subsurface soil conditions summarized in the report identify soil layers of silty sand, gravelly sand, and sandy silt fill with gravel and rock fragments. The sandy soils encountered during the geotechnical investigation support the well-draining soil characteristics identified for the Site.

Based on the topographic survey completed by Patten & Thomsen Limited in January 2021 and field reconnaissance completed by our office, the Site can be broken down into two major drainage catchments which have separate outlets and are identified in Table 4 below.

Table 4: Pre-Development Drainage Summary

Catchment ID	Catchment Area (ha)	Land Use	Catchment Slope	Outlet
101	2.97	Agricultural	1% - 2%	Northeast Corner of Site
102	2.25	Agricultural	1% - 2%	700mm diameter CSP Culvert crossing on Union Street

Catchment 101 consists of the northern portion of the Site which drains via sheet flow towards a low-lying area at the north-east corner of the Site. Runoff from Catchment 101 drains towards Union Street through residential lands to the north of the Site and is ultimately collected by the roadside ditch on Union Street, which has been denoted as Outlet #2 on the Pre-Development Drainage Plan (Figure 7). Our office completed field reconnaissance and confirmed there was no defined channel/outlet at the north-east corner of the Site conveying runoff to Union Street.

Catchment 102 consists of the southern portion of the Site which drains via sheet flow towards a low-lying area at the south-east corner of the Site. Runoff from Catchment 102 drains towards Union Street through an existing drainage feature, regulated by the GSCA, and passes beneath Union Street via a 700mm diameter CSP culvert, which has been denoted as Outlet #1 on the Pre-Development Drainage Plan (Figure 7). The defined channel was identified in the topographic survey completed by Patten & Thomsen Limited and confirmed via field reconnaissance completed by our office. Subsequently, Outlet #1 was classified as a hazard by the GSCA and an Environmental Protection Block (Block 68) was added to the Draft Plan around the hazard.

It is also noted that there is a small portion of Catchment 101 that drains towards Centre Street under existing conditions; however, it has not been delineated in Figure 7 due to the relatively small size of the catchment and imperfect drainage patterns resulting from past agricultural uses and recent clearing activities. The outlet for the portion of Catchment 101 which drains towards the Centre Street ditch has been denoted as Outlet #3.

5.2 Proposed Drainage

Following the requirements of the Municipality of Meaford, the development will incorporate a drainage system consisting of storm sewer, catchbasins and lot drainage swales (minor system) and the use of the roadway and overland flow routes (major system). Both minor and major overland flow routes will direct site runoff from developed areas toward a proposed SWM facility. The proposed drainage system is reflected on Figure 8 which illustrates preliminary site grading, storm sewer alignment, overland flow routes and the proposed stormwater management (SWM) facility. Note final grading will be updated at the detailed design stage to refine considerations for cut / fill levels and proposed building designs as required.

The majority of the drainage from proposed developed areas of the Site will be directed to a SWM facility located on the south side of Street A at the intersection with Union Street. The SWM facility will receive runoff from approximately 3.63 ha of the development area. Major overland flows from the development area will be graded towards a roadway low point on Street A, adjacent to the SWM facility, where all flow will be directed into the pond (Block 67). Controlled stormwater will outlet at the south-west corner of the SWM facility through a storm pipe and channel which conveys stormwater to Outlet #1. The SWM Block (Block 67) is proposed to be under ownership of the Municipality. In the event the SWM facility outlet pipe becomes blocked, water levels will back up within the SWM facility and overtop the emergency spillway and be conveyed via the drainage channel to Outlet #1. Flow rates from the Regional Storm Event were modelled through the proposed drainage channel to confirm suitable freeboard was achieved within both the SWM facility and the drainage channel. Refer to Appendix F for the FlowMaster Model report confirming the available capacity within the drainage channel.

Drainage from the rear yards of some of the units fronting onto the private roadways Streets B and C will be directed to Outlet #1 or Outlet #2 via rear yard swales. An easement will be placed over the rear yard swales in favour of the condo corporation. The alignment and width of the easement will be subject to the final grading during detailed design and registered through the condominium registration process.

Two small post development catchments will also drain to the existing ditch on Centre Street; however, the flow rate from these catchments is minimal and should not require quantity/quality controls. The Centre Street ditch has been denoted as Outlet #3 on the Post-Development Drainage Plan (Figure 8). Refer to Table 5 below for a summary of the proposed drainage catchments.

Table 5: Post-Development Drainage Summary

Catchment ID	Catchment Area (ha)	Land Use	Outlet
201	3.63	Developed areas within the site, including all roadways	Outlet #1 via SWM Facility
202	0.71	Rear yards of units 1 – 20	Outlet #1 Uncontrolled
203	0.12	Unit 16	Outlet #3 Uncontrolled
204	0.12	Street A entrance from Centre Street	Outlet #3 Uncontrolled
205	0.55	Rear yards of units 25 – 42	Outlet #2 Uncontrolled
206	0.04	Street A entrance from Union Street	Outlet #1 Uncontrolled

5.3 Stormwater Quantity Control

Hydrologic modeling was prepared for the post-development site conditions using the stormwater management hydrologic computer program SWMHYMO (Sabourin, 1998). The 4-hour Chicago, 24-Hour SCS Type II and Regional Storm (Timmins) rainfall distributions were applied to the hydrologic model and were used throughout the analysis. Refer to Appendix F for full hydrologic calculations and models. The MTO Lookup Tool was utilized to determine the Intensity Duration Frequency Curves for Meaford, which were used in the calculations and are included in Appendix F. The pre- and post-development flows for Outlets #1 through #3 for the 24-hour SCS Distribution storm events are seen in Table 6. The Post development flows represent the peak flow rates at each outlet and include both the controlled flows from the SWM facility and the uncontrolled flows from rear yards.

Table 6: SWMHYMO Method – Outlet #1, #2 & #3 (24hr SCS Storm)

Return Period (Years)	Peak Flow Rates (m ³ /s)							
	Outlet #1			Outlet #2			Outlet #3	
	Pre (2.25 ha)	Post (4.38 ha)	Δ (Post-Pre)	Pre (2.97 ha)	Post (0.55 ha)	Δ (Post-Pre)	Pre (0.00 ha)	Post (0.24 ha)
2	0.023	0.020	-0.003	0.029	0.009	-0.020	N/A	0.007
5	0.046	0.036	-0.010	0.057	0.018	-0.039	N/A	0.017
10	0.061	0.046	-0.015	0.076	0.025	-0.051	N/A	0.020
25	0.086	0.064	-0.022	0.108	0.036	-0.072	N/A	0.027
50	0.104	0.078	-0.026	0.131	0.045	-0.086	N/A	0.031
100	0.129	0.096	-0.033	0.162	0.058	-0.104	N/A	0.037

Per the Municipality Engineering Standards, increases in the post-development runoff rates of any storm event should be controlled to the pre-development rates. Per Table 6, it can be demonstrated for the major 100-year storm event, peak flow rates to Outlets #1 and #2 decrease under post development conditions with a small increase at Outlet #3. However, it should be noted pre-development flows currently destined for Outlet #3 are currently underestimated, as there is a small amount of area within the Subject Site that appears to drain towards Centre Street under existing conditions which is described in Section 5.1.

Based on topography, it is evident that the runoff leaving the site at Outlet #3 is conveyed by roadside ditches along Centre Street towards the existing Gates of Kent subdivision. As part of the Gates of Kent development, a 750mm diameter storm sewer was installed within the roadside ditch on the west side of Centre Street with a ditch inlet catchbasin. The storm sewer design sheet for Gates of Kent indicates that the storm sewer has a residual capacity of 351.28 L/s, which is adequate for accepting the additional runoff (17 L/s under the 5-year storm event) from the subject lands under post-development conditions. Refer to Appendix G for the Gates of Kent Development storm sewer design sheet.

As previously noted, the increase in flows at Outlet #3 are negligible; however, a survey of the existing ditches / driveway culverts on Centre Street will be completed during detailed design to identify any deficiencies within the existing drainage system. Ditches will be re-graded and driveway culverts will be replaced as necessary to provide sufficient capacity for the increase in flow during the 25-year storm event. In addition, a culvert crossing will be installed on Centre Street to convey drainage from the site to the existing ditch inlet catchbasin located within the west ditch, adjacent to the Gates of Kent development. Any re-grading required within the ditches downstream, or culvert replacements, will be detailed on the civil drawings and completed as part of the proposed development.

The model input, full modelling results and output files are included in Appendix F. It is noted that post-development peak flows are less than predevelopment peak flows for all storm events, with the exception of the 2-year Chicago which has a slight exceedance for Outlet #1. However, the post-development peak flows are over-estimated as a result of modelling a higher percentage of directly connected impervious area for this catchment to provide model stability. The model also does not account for the flow attenuation within the rear yard swale that will occur during smaller storm events.

5.4 Stormwater Quality Control

It will be necessary to implement Best Management Practices (BMP's) to address site water quality requirements. A review of environmental constraints and site-specific conditions was completed, and it was concluded that an end-of-pipe wet pond for the proposed SWM facility is the preferred BMP. Lot level BMP's may also be implemented, subject to detailed grading design and soil/water table considerations. The selected BMP's incorporate erosion and sediment control measures to minimize adverse impacts on water quality and the natural environment.

Since Georgian Bay is the ultimate receiver of drainage from the subject lands, stormwater management facilities must be designed to meet the "enhanced protection" level. Enhanced protection provides an 80% long term suspended solids removal rate.

Based on the total site imperviousness (approximately 50%) contributing to the SWM facility, the water quality storage volume for a stormwater wet pond is 190 m³/ha (MOE, 2003). This is made up of 40 m³/ha extended detention volume and 150 m³/ha permanent pool volume. Therefore, minimum water quality volumes required are follows:

SWM Facility – 3.63 ha Drainage Area

- Permanent Pool 545 m³
- Extended Detention 145 m³

The minimum required permanent pool and extended detention volumes have been provided in the preliminary SWM Facility design presented herein. Refer to Figure 9 for the Stormwater Management Facility Figure.

Erosion control will be incorporated within the extended detention of the pond. Sizing was based on

providing a drawdown time of 24 hrs for the 25 mm rainfall event. Based on the preliminary hydrologic modeling conducted using SWMHYMO, a runoff volume of 7.79 mm was determined for the 25 mm storm event. This results in a required extended detention volume of 283 m³ for erosion control.

6.0 Erosion and Sediment Control

Erosion and sediment controls will be implemented prior to construction. The controls will consist of a combination of features, which will include the following:

- Silt Fencing

Silt fence will be installed where required to intercept sheet flow. Silt fence is typically specified around the perimeter of the site, and additional silt fencing is installed based on field decisions prior to, during and following construction.

- Mud Mat

Mud mats minimize tracking of material from the site to the surrounding roadways and is constructed of lifts of varying sizes of stone and granular material. All construction traffic for the development must cross over the mat to access the site. The mat will be maintained as required during construction to ensure optimal operating efficiency.

- Silts Sacs

Silt sacs will be installed on all proposed storm catchbasins within the Site post-civil servicing works. Silt sacs will capture sediment entering the roadways during house building construction. Silt sacs will be maintained during the building construction phase by the Contractor/Builder and cleaned out post heavy rainfall/snowmelt events.

- Dust Suppression

During construction, the Contractor will ensure that measures for dust suppression are provided as required, such as the application of water or lime.

7.0 Utilities

The proposed development will be serviced with natural gas, telephone, cable TV and hydro. All such utilities are currently available on the boundary roadways. Utilities have not been contacted at the time of this investigation. Circulation and coordination with the utilities will be undertaken to confirm capacity at the appropriate phase of design.

8.0 Street Lighting

The proposed development will feature urbanized roadways (public and private) with street lighting as per Section 10.1 of the Municipality's Engineering Standards. A photometric plan will be prepared during detailed design to demonstrate that the lighting requirements have been met with the placement of streetlights within the public and private roadways.

9.0 Conclusions and Recommendations

Based on the information offered in this report, we offer the following conclusions:

1. Access to the site will be provided by a public roadway (Street A), with connections to Union Street and Centre Street. Private roadways (Block 70 and 71) will branch from the public roadway.
2. A public watermain will be looped through the proposed development along Street A, with connections to the existing watermain on Union Street and Centre Street. A public watermain is also proposed to service the units on the private roadways (Block 70 and 71). The existing 200mm diameter watermain that is located through an easement on the Site will be removed and plugged at the watermain on Union Street and Centre Street.
3. Capacity is presently available in the Water Treatment Plant to service the proposed development.
4. An extension of the existing sanitary sewer located at the intersection between Union Street and Russett Drive is required to service the proposed development. The existing sanitary sewer is deep enough to service the Site via gravity sewer and has sufficient residual capacity.
5. An internal sanitary sewer system will follow the alignments of the proposed roadways and provide gravity servicing to all individual units.
6. The proposed development of the Site may proceed in three (3) phases, which is consistent with the framework within the Municipality of Meaford's Official Plan for allocating the remaining capacity at the WPCP.
7. Preliminary grading has indicated that a majority of the development will drain towards the internal roadway/storm sewer network and stormwater will be conveyed to the proposed SWM Facility. The remaining areas will maintain existing drainage patterns as much as possible. Final grading will be determined during detailed design.
8. A stormwater management facility is required to service the proposed development. The land set aside for the SWM facility is adequate to provide water quality and water quantity control of the urban drainage emanating from the subject lands.

Based on the above conclusions, we recommend the approval of the Planning Applications for 425 Union Street, from the perspective of functional servicing and stormwater management. Thank you.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



George Cooper, P. Eng.
Project Engineer

C.F. CROZIER & ASSOCIATES INC.

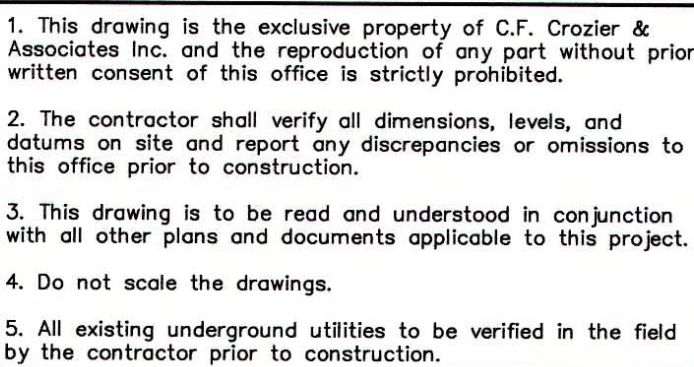
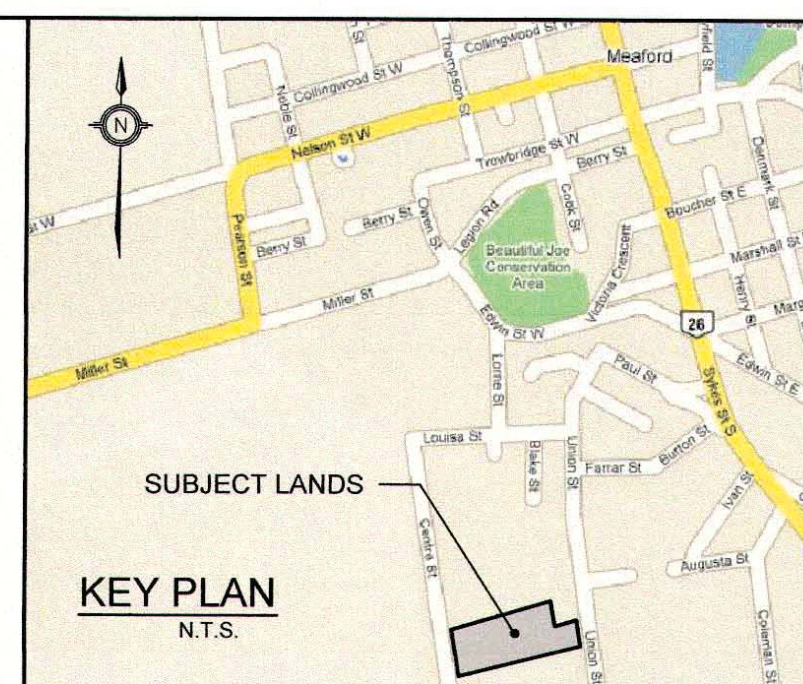
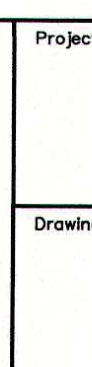


Rebecca Alexander, P.Eng.
Project Manager

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APPENDIX A

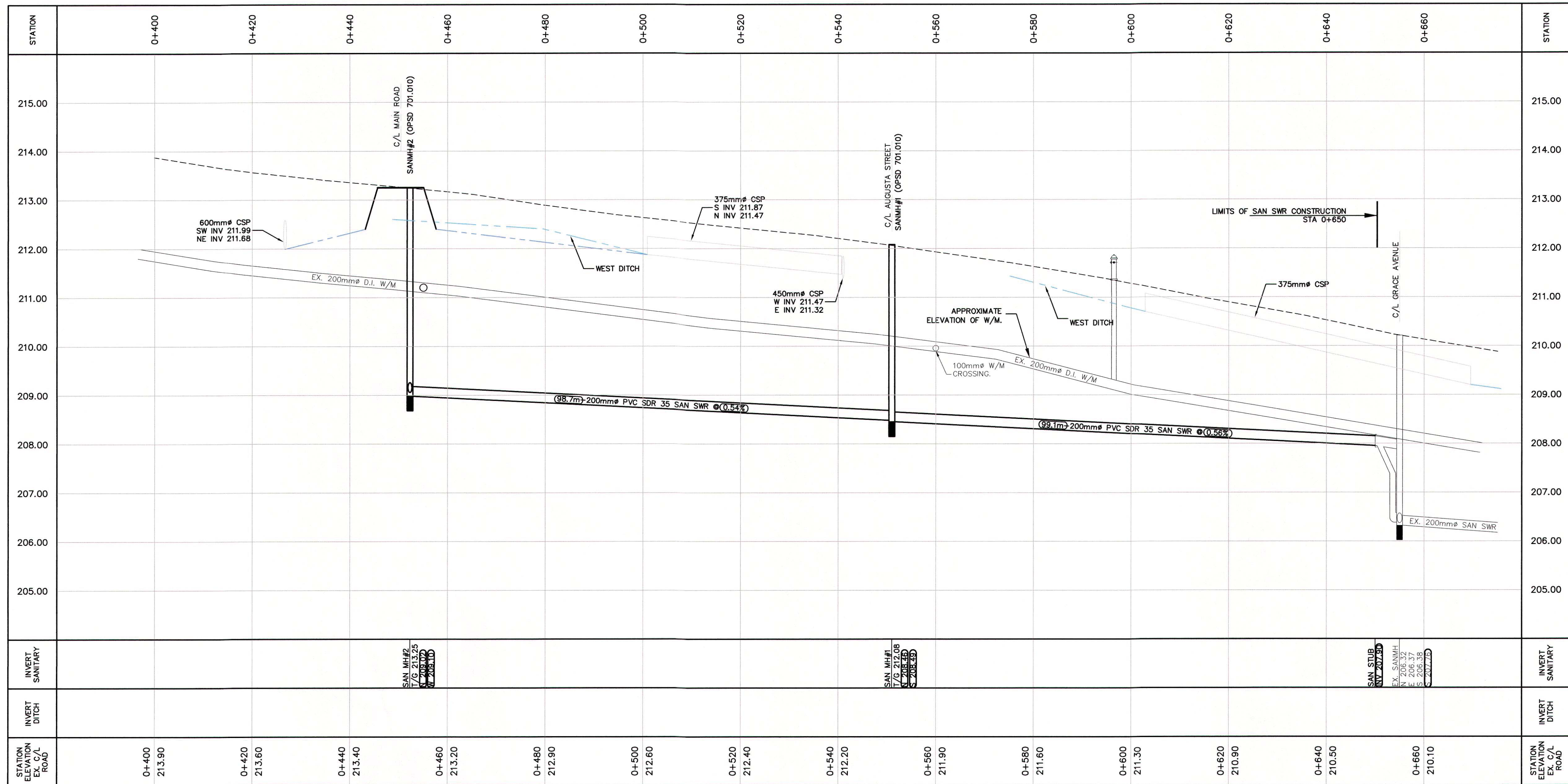
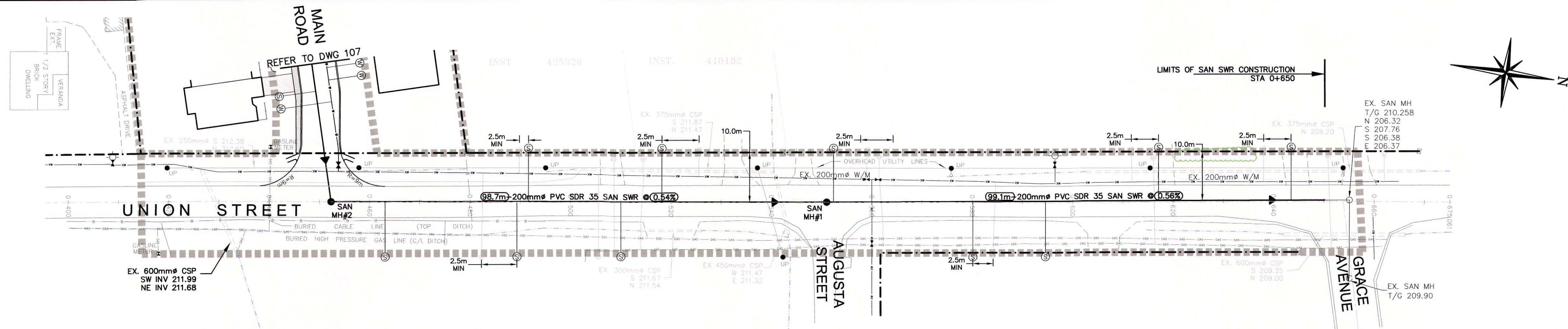
As-Constructed Drawings (Centre Street, Union Street & Associated Easements)

Engineer

CENTRE STREET PLAN & PROFILE
STA 0+000-0+300
AS-CONSTRUCTED



Drawn By W.A.	Check By K.A.M./I.T.M.	Project No. 183-2737
Scale 1:50 VER. 1:500 HOR.	Date 08/22/2007	Drawing No. 112 AC



- This drawing is the exclusive property of C.F. Crozier & Associates Inc. and the reproduction of any part without prior written consent of this office is strictly prohibited.
- The contractor shall verify all dimensions, levels, and returns on site and report any discrepancies or omissions to this office prior to construction.
- This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.
- Do not scale the drawings.
- All existing underground utilities to be verified in the field by the contractor prior to construction.

GEODETC BENCHMARK
GEODETC MONUMENT U. No. 28U110R, ELEV. 178.092m

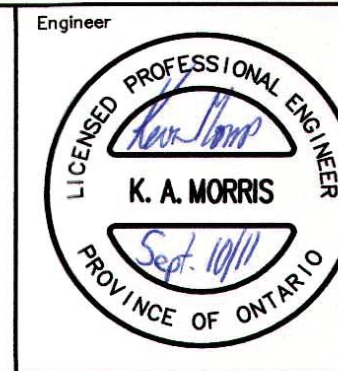
TEMPORARY BENCHMARKS
TBM#1 - TOP OF SIB LOCATED @ SW CORNER OF DEVELOPMENT PROPERTY ELEV. 215.182m
TBM#2 - TOP OF SIB LOCATED @ SW CORNER OF "OUT-LOT" PARCEL ADJACENT TO UNION STREET ELEV. 213.091m
TBM#3 - TOP OF SIB LOCATED @ SE CORNER OF DEVELOPMENT PROPERTY ELEV. 213.748m

CONSTRUCTION RECORD

THIS DRAWING HAS BEEN PREPARED BY "CROZIER & ASSOCIATES CONSULTING ENGINEERS" TO REFLECT CONSTRUCTION RECORD INFORMATION AND IS BELIEVED TO BE CORRECT. HOWEVER, THOSE RELYING ON THIS INFORMATION ARE ADVISED TO OBTAIN INDEPENDENT VERIFICATION AS TO ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.

No.	Issue / Revision	Date: MM/DD/YYYY
0	ISSUED FOR REVIEW, 1ST SUBMISSION	09/12/2007
1	ISSUED FOR 2ND SUBMISSION	12/04/2007
2	ISSUED FOR 3RD SUBMISSION	02/11/2008
3	ISSUED FOR APPROVAL	03/19/2008
4	AS-CONSTRUCTED DRAWINGS - PHASE 1	08/15/2011

Engineer



Project

GATES OF KENT CONDOMINIUMS
MUNICIPALITY OF MEAFORD

Drawing

UNION STREET PLAN & PROFILE
STA 0+400-0+680
AS-CONSTRUCTED

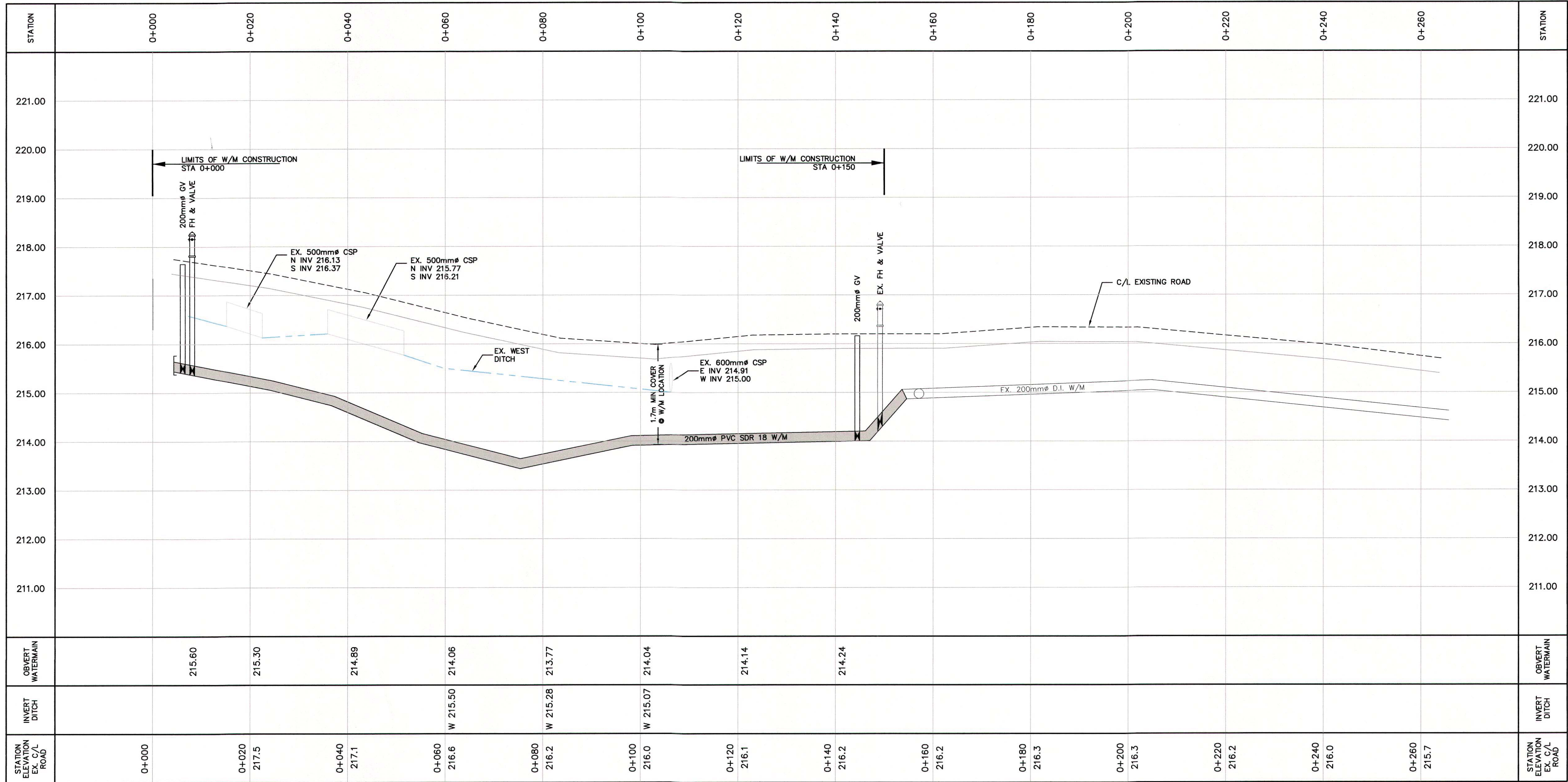
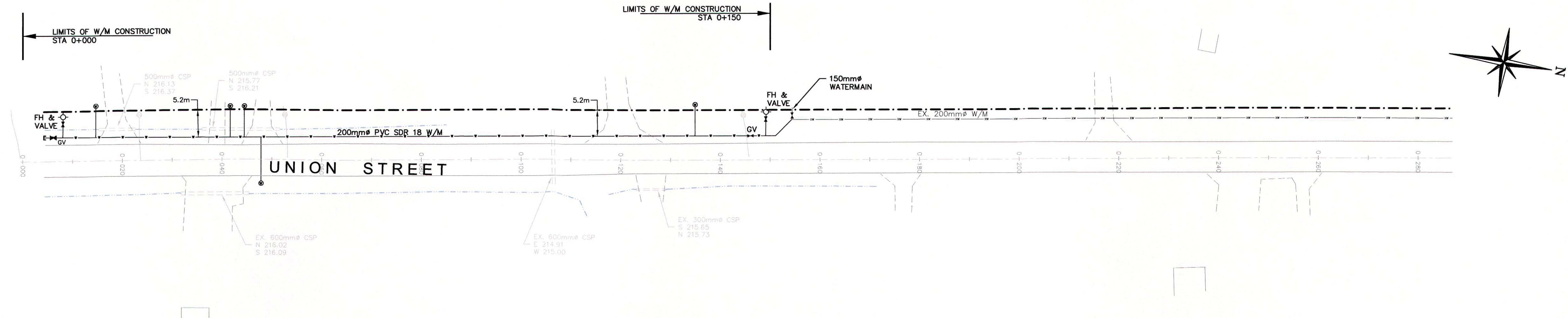


110 PINE STREET,
COLLINGWOOD, ON L9Y 2N9
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	W.A.	Check By	K.A.M./I.T.M.	Project No.	183-2737
Scale	1:50 VER. 1:500 HOR.	Date	08/22/2007	Drawing No.	111 AC

File Last Updated: Wed, 21 Sep 2011

Drawing: J:\100\183 - LANDX PROJECTS\2737 - GATES OF KENT\CAD\2737 AS CONSTRUCTED\2737_100-116 AS CONSTRUCTED.DWG, Layout Tab:110 AC

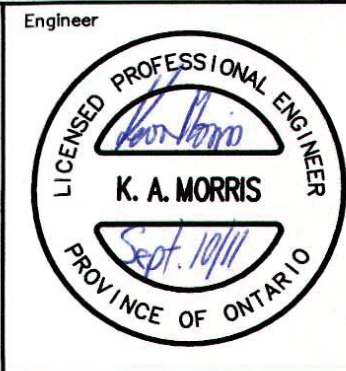


1. This drawing is the exclusive property of C.F. Crozier & Associates Inc. and the reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datum on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project. Do not scale the drawings.
4. Do not scale the drawings.
5. All existing underground utilities to be verified in the field by the contractor prior to construction.

GEODETIC BENCHMARK	
GEODETIC MONUMENT U. No. 28U110R,	ELEV. 178.092m
TEMPORARY BENCHMARKS	
TBM#1 - TOP OF SIB LOCATED @ SW CORNER OF DEVELOPMENT PROPERTY	ELEV. 215.182m
TBM#2 - TOP OF SIB LOCATED @ SW CORNER OF "CUT-OUT" PARCEL ADJACENT TO UNION STREET	ELEV. 213.091m
TBM#3 - TOP OF SIB LOCATED @ SE CORNER OF DEVELOPMENT PROPERTY	ELEV. 213.748m

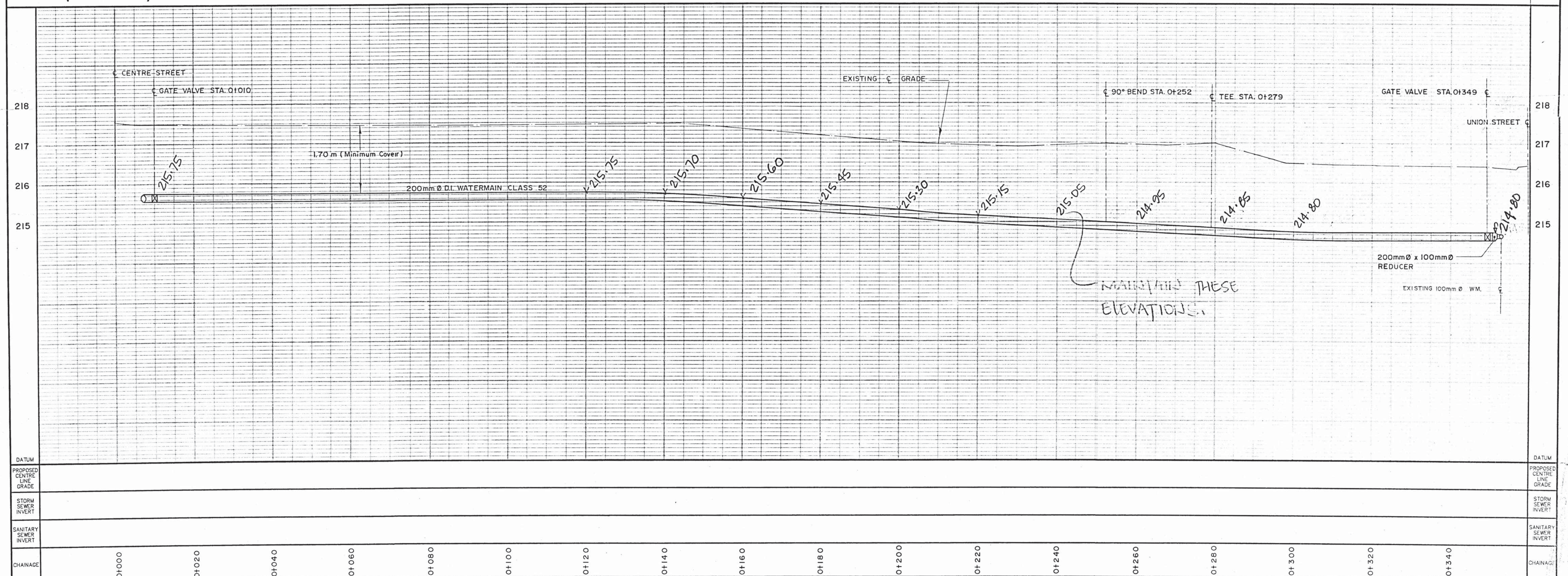
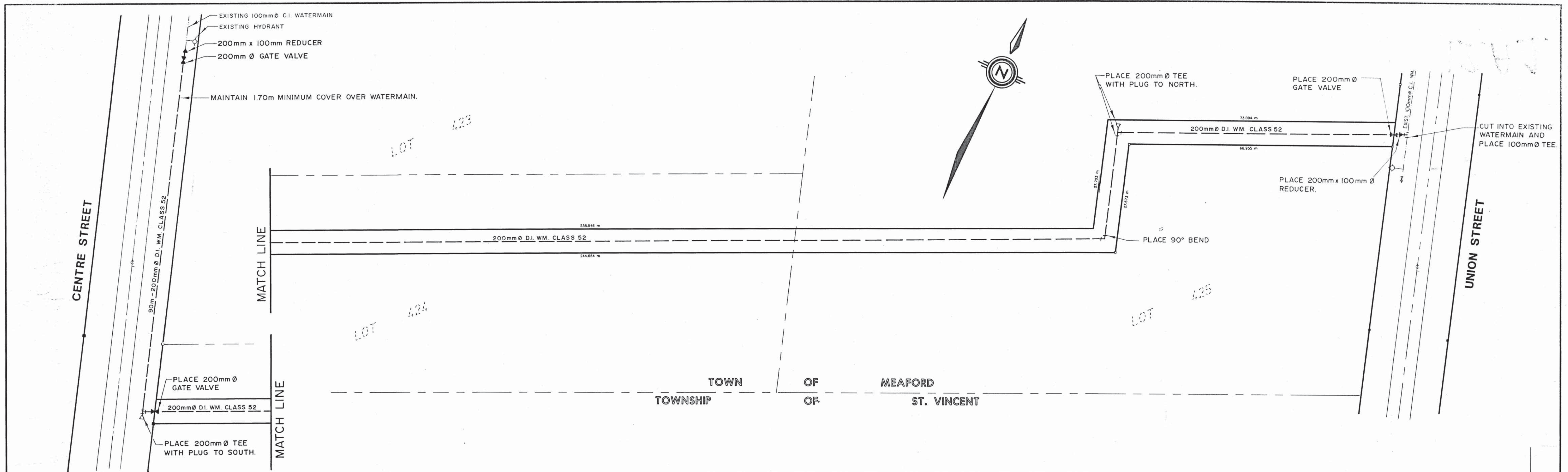
CONSTRUCTION RECORD	
THIS DRAWING HAS BEEN PREPARED BY "CROZIER & ASSOCIATES CONSULTING ENGINEERS" TO REFLECT CONSTRUCTION RECORD INFORMATION AND IS BELIEVED TO BE CORRECT. HOWEVER, THOSE RELYING ON THIS INFORMATION ARE ADVISED TO OBTAIN INDEPENDANT VERIFICATION AS TO ITS ACCURACY BEFORE APPLYING IT FOR ANY PURPOSE.	

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3	ISSUED FOR APPROVAL	03/19/2008
4	AS-CONSTRUCTED DRAWINGS - PHASE 1	08/15/2011



Project		GATES OF KENT CONDOMINIUMS MUNICIPALITY OF MEAFORD	
Drawing		UNION STREET PLAN & PROFILE STA 0+000-0+280 AS-CONSTRUCTED	

		110 PINE STREET, COLLINGWOOD, ON L9Y 2N9 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA	
Drawn By	W.A.	Check By	K.A.M./I.T.M.
Scale	1:50 VER. 1:500 HOR.	Date	08/22/2007
Project No.	183-2737		Drawing No.
		110 AC	



NOTES : 1. WATERMAIN BEDDING TO BE IN ACCORDANCE WITH O.P.S.D. 1102.01 2. INSTALLATION, DISINFECTING AND TESTING TO BE IN ACCORDANCE WITH O.P.S.S. 701		BENCH MARKS : THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE DONE TO THEM.		NO. DATE REVISION DESCRIPTION CHECKED		TOWN OF MEAFORD CENTRE ST. TO UNION ST. WATERMAIN MEAFORD P.U.C. PLAN & PROFILE		GAMSBY AND MANNEROW Limited CONSULTING PROFESSIONAL ENGINEERS GUELPH OWEN SOUND	
DRAWN BY : R.J.W. DESIGNED BY : J.V.D.		APPROVED BY : W.J.M. DATE : JULY 1991		PROJECT NO. : M-1298 SCALE : HORIZ. = 1:500 VERT. = 1:50		DRAWING NO. : 1			

APPENDIX B

Potable Water Demand and Fire Flow Demand Calculations

425 Union Street Development - Domestic Water Demand

Developed Site Area	5.21 ha
Number of Residential Units and Land Usage	
1) Single Residential	49 Units
2) Semi-Detached Residential	34 Units
Person Per Residential Unit	
1) Single Residential (Per Water & Wastewater Servicing Master Plan, 2015)	2.4 persons/unit
2) Semi-Detached (Per Water & Wastewater Servicing Master Plan, 2015)	2.4 persons/unit
Total Residential Population	199 Persons
<u>Domestic Water Design Flows</u>	
Residential (Per Water & Wastewater Servicing Master Plan, 2015)	300 L/C-day
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	0.69 L/sec
Max Day Peak Factor (Per Table 3-1 of MECP Design for Drinking-Water Systems, 2008)	2.75
Max Day Demand Flow	1.90 L/sec
Peak Hour Factor (Per Table 3-1 of MECP Design for Drinking-Water Systems, 2008)	4.13
Peak Hour Flow	2.86 L/sec

**Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey**
Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

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

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction

= 1.5 for wood frame construction (structure essentially all combustible)

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

= 0.8 for non-combustible construction (unprotected metal structural components)

= 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

270 sq.m. total floor area

Fire resistive construction

1.0 C

Therefore F= 4,000 L/min (rounded to nearest 1000 L/min)

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction

30,000 L/min for ordinary construction

25,000 L/min for non-combustible construction

25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction

0 L/min reduction

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above may be reduced by up to 50% for complete automatic sprinkler protection.

Buildings will have automatic sprinklers (typical 30% reduction)

0 L/min reduction

**Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey**
Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		Distance		
North	Adjacent Dwelling	22	10%	400
East	Adjacent Dwelling	2.4	25%	1000
South	Adjacent Dwelling	15	15%	600
West	Adjacent Dwelling	2.4	25%	1000

3,000 L/min Surcharge
Determine Required Fire Flow

No. 1	4,000
No. 2	0 reduction
No. 3	0 reduction
No. 4	<u>3,000</u> surcharge

Required Flow: 7,000 L/min
**Rounded to nearest 1000l/min: 7,000 L/min or 116.7 L/s
1,849 USGPM**
Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Determine Required Fire Storage Volume

Flow from above 7,000 L/min

Required duration 2.00 hours

Therefore: 840,000 Litres or
840 cu.m. is the required fire storage volume.

**Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)

K = water supply coefficient

V = total building volume in cubic metres

 S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 23.0 Group C building with combustible construction (Table 1)

V = 1485 Total building volume in cubic metres

 S_{TOT} = 2 S_{TOT} Need Not Exceed 2.0

$$Q = 68310 \text{ L}$$

Based on ranges listed in Table 2, the required minimum water supply flow rate is

2700 L/min

45 L/s

**Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey**
Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

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

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction

= 1.5 for wood frame construction (structure essentially all combustible)

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

= 0.8 for non-combustible construction (unprotected metal structural components)

= 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

135 sq.m. total floor area

Fire resistive construction

1.0 C

Therefore F= 3,000 L/min (rounded to nearest 1000 L/min)

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction

30,000 L/min for ordinary construction

25,000 L/min for non-combustible construction

25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction

0 L/min reduction

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Buildings will have automatic sprinklers (typical 30% reduction)

0 L/min reduction

**Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey**
Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		Distance		
North	Adjacent Dwelling	22	10%	300
East	Adjacent Dwelling	2.4	25%	750
South	Adjacent Dwelling	15	15%	450
West	Adjacent Dwelling	2.4	25%	750
2,250 L/min Surcharge				

Determine Required Fire Flow

No. 1	3,000
No. 2	0 reduction
No. 3	0 reduction
No. 4	<u>2,250</u> surcharge

Required Flow: 5,250 L/min
Rounded to nearest 1000 L/min: 5,000 L/min or 83.3 L/s
 1,321 USGPM

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Determine Required Fire Storage Volume

Flow from above 5,000 L/min

Required duration 2.00 hours

Therefore: 600,000 Litres or
 600 cu.m. is the required fire storage volume.

**Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)

K = water supply coefficient

V = total building volume in cubic metres

 S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 23.0 Group C building with combustible construction (Table 1)

V = 742.5 Total building volume in cubic metres

 S_{TOT} = 2 S_{TOT} Need Not Exceed 2.0

$$Q = 34155 \text{ L}$$

Based on ranges listed in Table 2, the required minimum water supply flow rate is **2700 L/min****45 L/s**

Water Supply for Public Fire Protection - 1999**Fire Underwriters Survey****Part II - Guide for Determination of Required Fire Flow**

1. An estimate of fire flow required for a given area may be determined by the formula:

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

where

F = the required fire flow in litres per minute

C = coefficient related to the type of construction

= 1.5 for wood frame construction (structure essentially all combustible)

= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)

= 0.8 for non-combustible construction (unprotected metal structural components)

= 0.6 for fire-resistive construction (fully protected frame, floors, roof)

A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings

220 sq.m. total floor area

Fire resistive construction

1.0 C

Therefore F= 3,000 L/min (rounded to nearest 1000 L/min)

Fire flow determined above shall not exceed:

30,000 L/min for wood frame construction

30,000 L/min for ordinary construction

25,000 L/min for non-combustible construction

25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Burning	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction

0 L/min reduction

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Buildings will have automatic sprinklers (typical 30% reduction)

0 L/min reduction

**Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey**
Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) exposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name		Distance		
North	Adjacent Dwelling	22	10%	300
East	Adjacent Dwelling	2.4	25%	750
South	Adjacent Dwelling	15	15%	450
West	Adjacent Dwelling	2.4	25%	750
2,250 L/min Surcharge				

Determine Required Fire Flow

No. 1	3,000
No. 2	0 reduction
No. 3	0 reduction
No. 4	<u>2,250</u> surcharge

Required Flow: 5,250 L/min
Rounded to nearest 1000L/min: 5,000 L/min or 83.3 L/s
 1,321 USGPM

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Determine Required Fire Storage Volume

Flow from above 5,000 L/min
 Required duration 1.75 hours
 Therefore: 525,000 Litres or
 525 cu.m. is the required fire storage volume.

**Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)**

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)

K = water supply coefficient

V = total building volume in cubic metres

S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 23.0 Group C building with combustible construction (Table 1)

V = 1210 Total building volume in cubic metres

S_{TOT} = 2 S_{TOT} Need Not Exceed 2.0

$$Q = 55660 \text{ L}$$

Based on ranges listed in Table 2, the required minimum water supply flow rate is **2700 L/min**

45 L/s

APPENDIX C

Hydrant Flow Test Results dated October 3rd, 2022 (Vipond)

FLOW TEST RESULTS

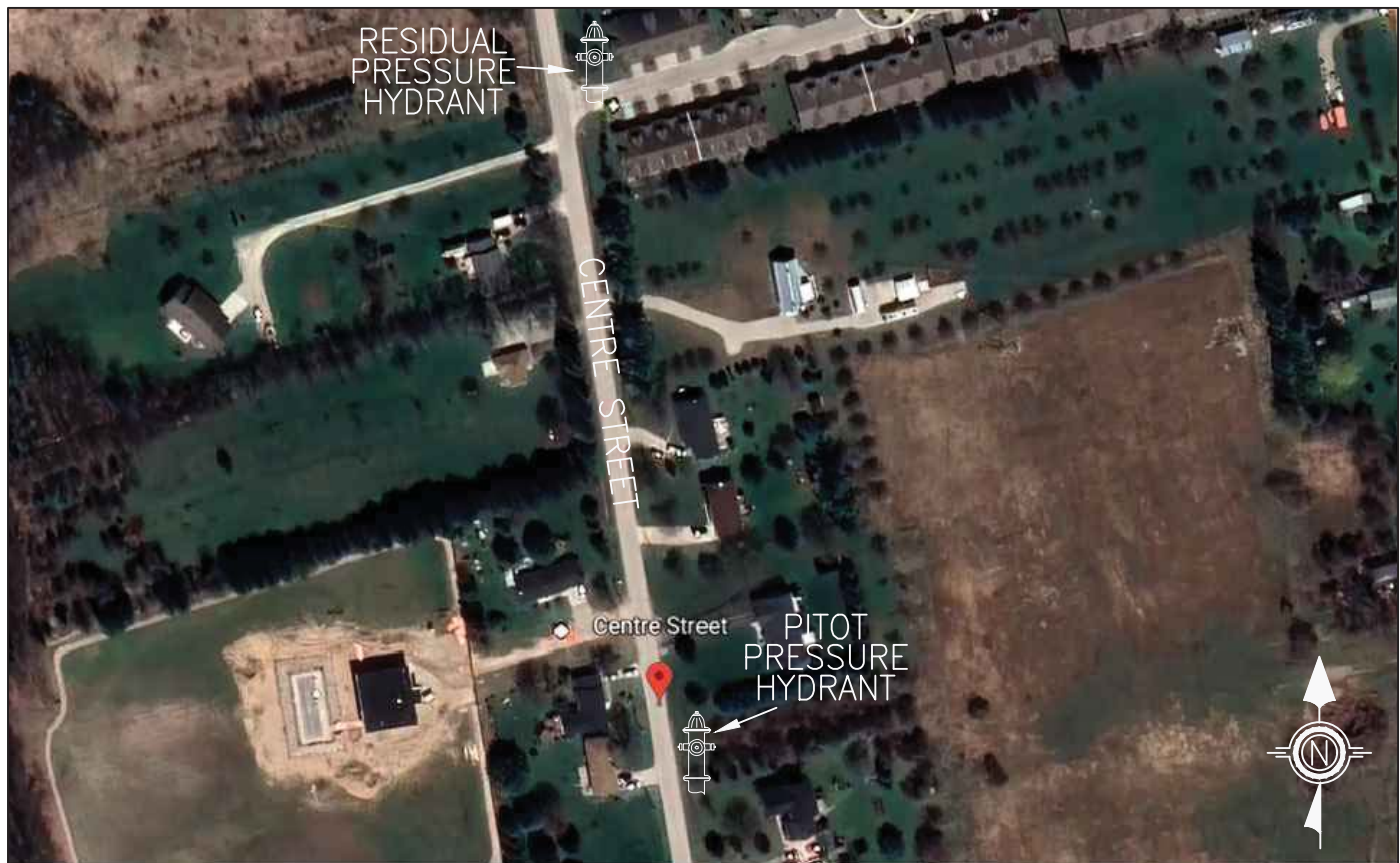
DATE : OCTOBER 3, 2022 TIME :

LOCATION : CENTRE STREET

MEAFORD

ONTARIO

TEST BY : LEN.K



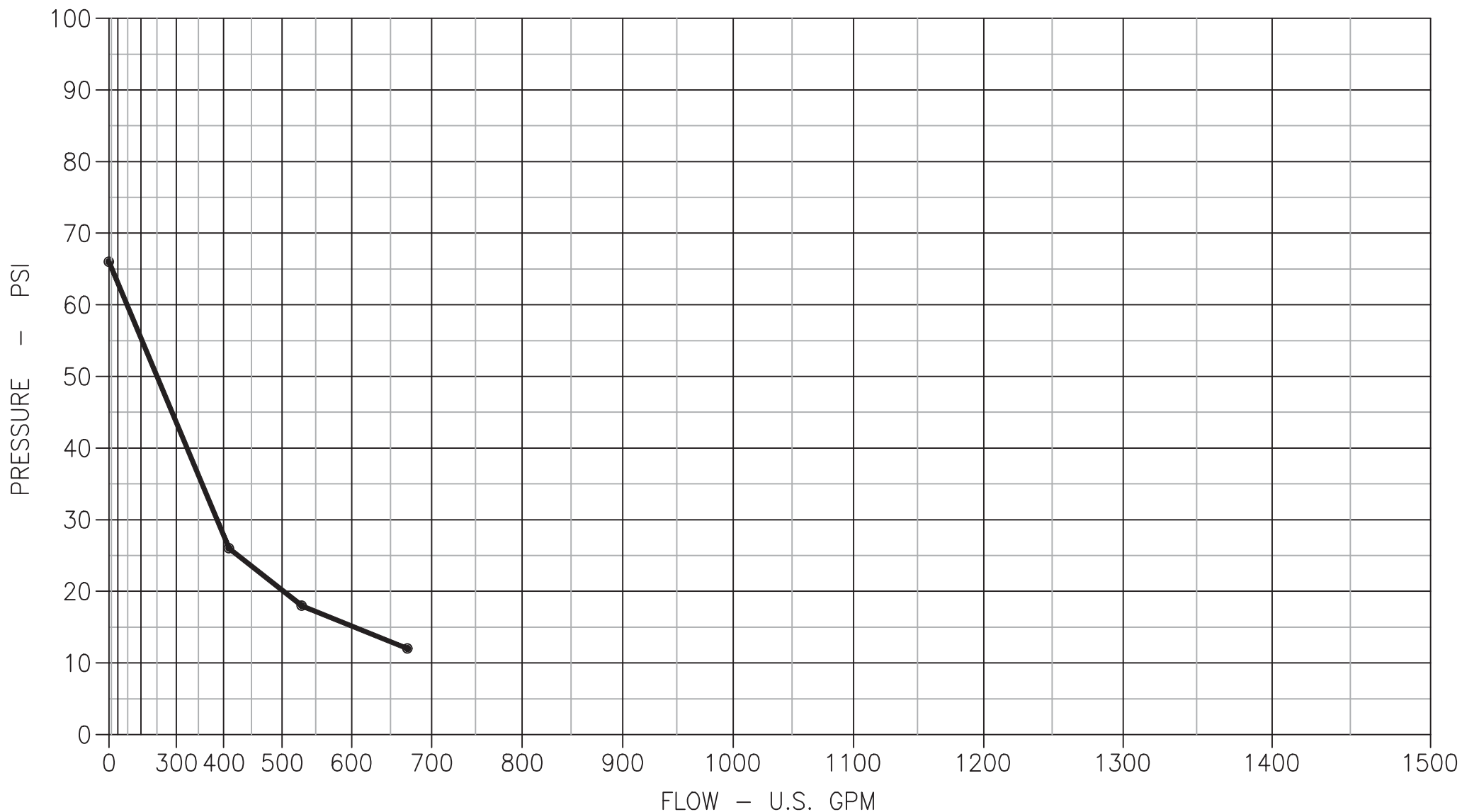
STATIC PRESSURE : 66 PSI

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	DISCHARGE CO-EFFICIENT	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	1-3/4	0.995	26	21	408
2	1	2-1/2	0.9	18	10	533
3	2	2-1/2	0.9	12	4	671



CENTRE STREET	BY : LEN.K/ETHAN.B
MEAFORD	OFFICE : BARRIE
ONTARIO	TEST BY : VIPOND & PUC
	DATE : OCTOBER 3, 2022

STATIC:		RESIDUAL:		FLOW:
<u>66</u> PSI	TEST#1	<u>26</u> PSI	@	<u>408</u> GPM
	TEST#2	<u>18</u> PSI	@	<u>533</u> GPM
	TEST#3	<u>12</u> PSI	@	<u>671</u> GPM



FLOW TEST RESULTS

DATE : OCTOBER 3, 2022 TIME :

LOCATION : UNION STREET

MEAFORD

ONTARIO

TEST BY : LEN.K



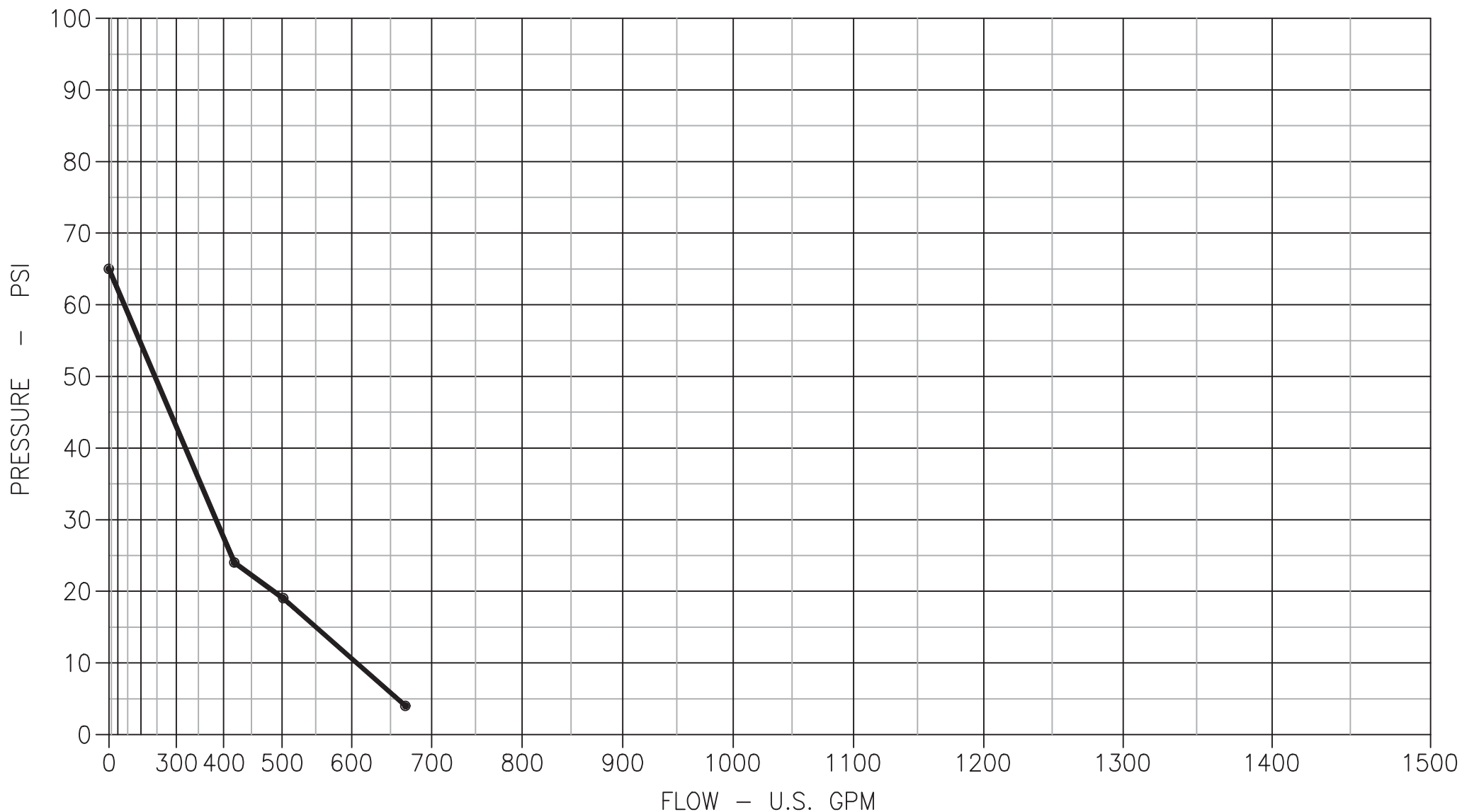
STATIC PRESSURE : 65 PSI

TEST NO.	NO. OF NOZZLES	NOZZLE DIAMETER (INCHES)	DISCHARGE CO-EFFICIENT	RESIDUAL PRESSURE (PSI)	PITOT PRESSURE (PSI)	DISCHARGE (U.S.GPM)
1	1	1-3/4	0.995	24	22	418
2	1	2-1/2	0.9	19	9	503
3	2	2-1/2	0.9	4	4	671



UNION STREET	BY : LEN.K/ETHAN.B
MEAFORD	OFFICE : BARRIE
ONTARIO	TEST BY : VIPOND & PUC
	DATE : OCTOBER 3, 2022

STATIC:		RESIDUAL:		FLOW:
<u>62</u> PSI	TEST#1	<u>24</u> PSI	@	<u>418</u> GPM
	TEST#2	<u>19</u> PSI	@	<u>503</u> GPM
	TEST#3	<u>4</u> PSI	@	<u>671</u> GPM



APPENDIX D

Municipal Staff Report (Dated November 30, 2020)



Date	Monday, November 30, 2020
From	Rob Armstrong, CAO / Director of Development Services
Subject	Meaford WWTP Servicing Allocation
Report No. CAO2020-23	Roll No. N/A

Recommendation

That Committee of the Whole recommend Council of the Municipality of Meaford:

1. Direct staff to advise the development community in writing of the current capacity constraint at the Meaford Waste Water Treatment Plant and the process the Municipality plans to take to address this issue;
2. Direct staff to develop an Inflow and Infiltration (I and I) Strategy to address critical areas of I and I within the system with the intent to obtaining additional capacity at the sewage plant; and
3. Direct staff to develop an uncommitted sewage reserve capacity implementation plan for future development in accordance with the policies of the Official Plan in consultation with the County of Grey and applicable Ministry.

Background

Existing EA

In 2007 the Municipality retained the services of Earth Tech Canada Inc. to complete a Schedule C Municipal Class Environmental Assessment (Class EA) for potential expansion of the Waste Water Treatment Plant (WWTP). The Class EA was triggered by the capacity analysis completed by Ainley and Associated Limited in 2006 and peer reviewed by Hydromantis, Inc. The capacity analysis identified that the plant capacity was over 80%. Since 2007 the average daily flow (ADF) have fluctuated between 55% and 80% of the rated plant capacity.

The 2007 Class EA utilized past and current population trends within Grey County to develop a 20 year planning population of 11,500 in urban

Meaford. The Class EA evaluation utilized this population to develop and evaluate alternatives. A combination of alternatives were identified as preferred including:

- Expand Existing Plant On-Site and Purchase Immediately Adjacent Property for Buffer/Flexibility
- Optimize Plant Operation
- Reduce Inflow and Infiltration and Improve Water Conservation

The capital costs required for the expansion to the existing plant were identified in 2007 to be \$18,425,000 with an additional \$3 million dollars required to add tertiary treatment to the plant.

Following completion of the 2007 Class EA it was determined that the Municipality did not have necessary funds to proceed with the preferred solution identified in the evaluation. In 2010, Genivar Consulting LP was retained by the Municipality to re-evaluate the design population and consider alternative options with reduced funding requirements to expand the plant capacity for future development. The revised evaluation identified a 20% expansion to the existing plant which would add capacity of approximately 605 residential units.

The work completed by Genivar included consultation with Indigenous communities that was not thoroughly completed as part of the 2007 Class EA as it was not a requirements at the time. Following completion of the report the Ministry of the Environment, Conservation and Parks (MECP) was contacted to determine next steps with regards to the Class EA process. Through the communication with the MECP it was identified that an addendum to the existing Class EA would be require to change the background information and to proceed with an alternative that differs from the preferred alternative identified in the existing Class EA.

Following completion of the evaluation by Genivar the Municipality proceeded with the initiation of the Class EA addendum process in 2015 obtaining proposals to complete the work. During the proposal review processes it was determined that the Municipality would no longer proceed with the project at that time as the wastewater volumes were at a decade low with the plant capacity only at 56%.

To date no further steps have been taken to complete the Class EA addendum. To proceed with the expansion of the WWTP the Municipality would have to complete the addendum. The addendum will include an

evaluation of the current population and development information as well as evaluate new technologies and opportunities to have phased expansion of the WWTP.

Current capacity

Annually the Municipality completes Capacity Allocation reports for the WWTP as the current plant is nearing capacity. The 2019 report identified that the 3-year average daily flow (ADF) at the plant is 75.8% of the rated capacity with the highest historical ADF in the past 3 years occurring in 2017. The peak flows at the plant exceeded the rated capacity and can be attributed to heavy rainfall and snowmelt. The significant peak flows confirms that excessive extraneous flow enter into the waste water collection system resulting in a large volume of storm water being treated unnecessarily by the WWTP.

An increase in CBOD influent concentration shows that the ongoing efforts to reduce extraneous flow are having a positive impact on the reduction of inflow and infiltration entering the wastewater system however it is recommended that efforts continue as part of the extraneous flow reduction program identified in the 2015 Water and Wastewater Master Plan.

The 2019 Report identified that there are currently 454 unconnected approved lots within the urban area of which 235 are existing lots and infill lots that are currently not serviced by sewer but are capable of being connected. Once these lots are connected to the distribution system the plant capacity will be at approximately 82%. The depleting ledger included in Appendix 1 outlines all existing, unconnected approved lots, and proposed and potential development connections within the distribution network, providing a long-range projection of needs at the WWTP.

Inflow and Infiltration

The Municipality has completed projects over the years to deal with the existing extraneous flow problem that is experienced in the wastewater collection system. The high inflow and infiltration is a result of wastewater mains and maintenance holes in poor condition that allow ground water to enter the system, and storm water connections from properties to the wastewater system.

In recent years the following projects have been completed to specifically reduce extraneous flows:

- 2015 Meaford Sewage Collection System Inflow and Infiltration Study, Ainley and Associates
- 2015 Meaford Sewage Collection System Smoke Testing Study, Ainley and Associates
- 2017 Wastewater Main Relining on Ivan Street, Sykes Street and Paul Street
- 2020 Wastewater State of the Infrastructure and Maintenance Hole Inspection

All wastewater infrastructure projects that allow for wastewater main and maintenance holes to be replaced also help to eliminate possible inflow that previously entered into the system through cracked and deteriorated infrastructure.

Official Plan

As part of the 2014 update of the Official Plan, the Municipality included a number of Servicing Policies including Section D1.9 – Municipal Servicing. With regard the limitations at the WWTP and proposed development, the following sections need to be considered in relation to this issue.

Sections D1.9.1 Reservation and Allocation Limitations addresses when commitments are made to both design and existing capacity of the WWTP and how phasing can occur. Section D1.9.2 Use of Holding Zones identifies how the lands can be zoned for development with the holding symbol and then lifted when confirmation of available capacity is completed. D1.9.3 Staging Priorities outline various criteria to which Council can give allocation. With it being noted that it is not necessarily tied to first come- first serve. The full policies are included in Appendix 2 to this report.

Analysis

Current Development Potential

The Municipality is experiencing significant pressures related to development. There have been a lot of properties over the last few years where interest has been expressed for development, however many are now moving to the approvals and construction stage. As highlighted in the depleting ledger noted in Appendix 1, in order to consider the development anticipated, the Municipality will need to proceed and address plant capacity.

Inflow and Infiltration

As identified in all major system reviews the Meaford wastewater collection system has significant extraneous flow issues. In a new system with limited I&I it would be expected that the quantity of water treated at the water treatment plant would match the wastewater treated at the WWTP. A good local example of this is the Town of Wasaga Beach where they produced 2,521,087m³ of drinking water and treat 2,347,885m³ wastewater in 2019. In Meaford in 2019 there was 598,532 m³ of drinking water produced however 1,073,343m³ of wastewater was treated. To further emphasize the problem, the Municipality has 45% more units, equal to 930 residential properties, connected to the water distribution system in urban Meaford that are not connected to the wastewater system and therefore the amount of water treated should be higher than the wastewater treated if extraneous flow was not an issue. The extraneous flow is contributing to over half of the wastewater treated at the WWTP based on this review.

The issue with I and I is that it does not result in an immediate ability to provide additional allocations. This is based on the fact that capacity is based on a three year average. It has been the position of staff that it is more economical to address the existing I and I issues, then proceeding with a more expensive expansion of the plant that could be considered premature. That is the key reason why the WWTP expansion has not proceeded.

The Municipality may wish to proceed with an aggressive plan to address the I and I and finance the works through debt. This could be equivalent to the user pay portion of the plant expansion. In order to consider this, staff would need to bring a report forward to Council that outlines the project with costing for Council consideration.

WWTP Amended Environmental Assessment and Plant expansion

As identified by the MECP following the 2007 Class EA any significant modifications to the project which occur after completion of a Class EA processes result in an addendum to be completed. The addendum will identify the circumstances necessitating the change, the environmental implications of the change and any new mitigation measure that will be implemented as part of the addendum. The addendum will be filed with the MECP with the original document and will be provided to all potentially affected members of the public and review agencies that were notified as part of the original Class EA. It will be made clear through the addendum

process which items are under review and only those items will be available for comment.

Another component of the Class EA process that is relevant to the Municipality for this project is timing of construction with relation to the completion of the Class EA. Following completion of a Schedule C Class EA the proponent has 10 years to commence construction of the preferred alternative. If a lapse of time occurs, the proposed project and environmental mitigation measures may no longer be valid. Following the 10 year period the proponent must complete a review of the planning and design process and the current environmental setting to ensure the recommendations are still valid. The review must be recorded in an addendum to the existing document and is to be placed on public record. This further highlights the need to complete an addendum to the existing Class EA that was completed in 2007. The proposed 2021 budget includes the commencement of the Environmental Assessment process.

The next steps if an addendum to the existing Class EA is the preferred direction forward are as follows:

1. Retain a consultant to complete a review of the existing Class EA and identify which components will need to be revised as part of the addendum. The addendum will include an evaluation of the background information, preferred alternative, preferred design and environmental mitigation measures to ensure that a phased approach is developed, if possible, to meet the needs of our current and future population within the Meaford wastewater collection area. The addendum processes will include public, agency and indigenous consultation for all changes made to the original document. It is typical that this processes could take 1-2 years to complete depending on the complexity of the changes and the public and agency consultation. The Town of Collingwood recently completed a similar processes for their Water Treatment Plant and the addendum process was approximately 1 year.
2. Following completing and filing of the Class EA addendum the project will proceed to detailed design of the preferred alternative identified through the addendum. This project will include complex engineering design and extensive review by the MECP through the Environmental Compliance Approval processes. It is anticipated that detailed design will be approximately 18 months but could vary depending on the outcome of the Class EA addendum.

3. Construction of the WWTP expansion can proceed following completion of detailed design. Depending on the final outcome of design the construction is estimated to take between 1-2 years.

Throughout the process outlined above there will be other items that will need to be completed concurrently with the design process. For example, based on the existing Class EA, the Municipality will need to acquire land adjacent to the existing WWTP to create a buffer zone. These items are not anticipated to affect the timeline at this point however if complications are experienced there could be delays to the process.

Official Plan Update

The Municipality currently has identified a project to update the current Official Plan. This update is required based on a number of factors including addressing compliance matters related to the approval of the new County of Grey Official Plan, as well as a review of the vision for the Community, particularly as it relates to growth. Some of these considerations will include consideration of minimum densities for development and identification of priority areas for growth which directly relate to the allocation required within an expanded WWTP. It is appropriate for the Official Plan update to be considered in conjunction with the Class EA process

Financial Impact

Development Charges

With the 2010 update to the Development Charges By-law, the Municipality identified the expansion of the WWTP as a capital project and started collecting a charge from new development in the existing urban area for this expansion. In 2010, the Background Study identified that the WWTP contract would be \$9,320,000, of which \$9,248,212 would be attributed to growth. In addition, there was a \$5,010,000 financing cost that was also identified. This resulted in a charge per residential unit of \$7,029 (single or semi) and \$5,624 (apartments and townhomes). The non-residential charge was \$63.71 per square metre.

In 2015, these numbers were updated and broken out into defined projects as outlined in Appendix 2. The total cost of all projects was \$26,737,000, of which \$21,242,345 was to be funded from growth (approximately 80%).

The 2019 Development Charge Year End Report noted that currently, the Municipality is holding \$ 1,184,341.11 in reserves for works at the WWTP

related to the expansion. These funds are expected to be enough to cover the cost of an updated EA and the design engineering costs for an expansion.

Debt capacity

As noted, cost for this project are significant and the current amount held in Development Charges is well less than what would be required to expand the plant. In this regard, any expansion to the plant would need to be fully funded from debt, with the costs (construction plus interest) being recovered through Development Charges (80%) and future user fees (20%). When considering the use of debt, the Municipality must be aware of the impacts on our debt capacity, especially for a project of this scale. Currently our annual debt repayment limit sits at approximately \$5.47M. This accounts for both existing and proposed debt as outlined in the 2021 budget documents. The remaining annual repayment limit is approximately \$4M after removing existing debt, 2021 repayments for the Library and Thompson Street and 2022 repayments for the Nelson Street Booster Station and Gillies Bridge. This would allow the Municipality to borrow up to \$60M at 4% over 25 years or \$45M at 4% over 15 years.

Implications

If the Municipality were not to proceed with addressing the capacity at the existing WWTP, any planning approvals that would exceed the allocation of the plant would be in conflict with the Provincial Policy. This would include the consideration of some key developments desired by this community.

Further, the Municipality has included the expansion of our WWTP within our Development Charges since 2010, which demonstrates a commitment to this project.

Council also needs to understand the significant risk in proceeding with the plant expansion. In particular, the reliance on continuous new development to fund the annual debt payments related to the expansion of the plant.

Strategic Priorities

This report supports the mission, vision and values of the Municipality of Meaford, as well as the goals and objectives set out in Council's Strategic Priorities, particularly with respect to:

- Investing in Infrastructure

Consultation and Communications

With the majority of developments, Staff have noted that the Municipality does have WWTP capacity limitations and that we continue to monitor the situation. It also noted that one of the key considerations when Developers acquire land for development is satisfying themselves that capacity is available for their proposal.

Staff have also consulted with the County of Grey Planning Department

Conclusion

Based on the foregoing, it is recommended that the Municipality formally advise the development community of the current constraints related to the WWTP capacity. Further staff recommend that two plans be developed. One being an Inflow and Infiltration strategy that will consider priority investment in infrastructure that optimizes the operation of the WWTP and the creation of additional capacity. The other being an uncommitted sewage reserve capacity implementation plan to address future development. This would include establishment of priorities and phasing.

Supporting Documentation

Appendix 1 – 2019 Depleting Ledger – Ainley Group

Appendix 2 – Official Plan excerpts

Respectfully Submitted:

Rob Armstrong, CAO / Director of Development Services

Tori Perejmybida
Director of Infrastructure Services

Design Capacity	3910	m³/d
Average Day Flow (3 yr. avg.)	2965.3	m³/d
Hydraulic Reserve Capacity (Cu)	945	m³/d
Estimated flow from Residential Units ¹	2694.0	m³/d
Estimated Number of Residential Units ²	2219	
Population ³	4749	persons

Future Population Density ⁴	2.400	people per unit (ppu)
Average Day Flow (future per capita) ⁵	540	L/cap/d
Average Day Flow (future per equivalent residential unit) ⁵	1.296	m ³ /unit/day

DEVELOPMENT	NUMBER OF EQUIVALENT RESIDENTIAL UNITS	PERSONS PER UNIT ^{2,4}	DEVELOPMENT EQUIVALENT RESIDENTIAL POPULATION	DEVELOPMENT TYPE	DEVELOPMENT ADF (m³/d)	CUMULATIVE EQUIVALENT POPULATION	CUMULATIVE ADF (m³/d)	CUMULATIVE PERCENT OF DESIGN (%)	*CAPACITY* REMAINING (m³/d)	REMAINING EQUIV. RES. UNITS (1.296 m³/unit.d)
DESIGN CAPACITY										
Existing Connections - Serviced										
^{1,2} Residential Connected to existing system	2219	2.14	4749	Residential	2684	4749	2683.5	68.6	1226.5	946
³ Commercial / Industrial Connected to existing system	99	2.14	213	Commercial	121	4962	2804.2	71.7	1105.8	853
³ Institutional Connected to existing system	132	2.14	282	Institutional	160	5244	2964.2	75.8	945.8	730
Septic Disposal	1	2.14	2	Septic	1	5246	2965.3	75.8	944.7	729
Existing - Unserviced										
Existing Lots other than Committed Plans, unserved by sewer in current extent of infrastructure	83	2.4	199	Various	107.6	5445	3072.9	78.6	837.1	646
Infill Lots	15	2.4	36	Various	19.4	5481	3092.3	79.1	817.7	631
Committed Reserve Capacity, in Approved Plans										
Coleman Street	11	2.4	26	Residential	14.3	5507	3106.6	79.5	803.4	620
Golf Course Villas (19 Connected, 1 Remaining)	1	2.4	2	Residential	1.3	5510	3107.9	79.5	802.1	619
Golfview (21 connected, 5 remaining)	5	2.4	12	Residential	6.5	5522	3114.4	79.7	795.6	614
Golf Course Development (Life Lease Development)	40	2.4	96	Residential	51.8	5618	3166.2	81.0	743.8	574
Pinehurst	27	2.4	65	Residential	35.0	5683	3201.2	81.9	708.8	547
Ridge Creek (13 connected, 1 remaining)	1	2.4	2	Residential	1.3	5685	3202.5	81.9	707.5	546
St. Andrews (27 connected, 7 remaining)	7	2.4	17	Residential	9.1	5702	3211.6	82.1	698.4	539
Proposed Developments (Capacity Not Committed)										
Collingwood Street ⁷	40	2.4	96	Residential	51.8	5798	3263.4	83.5	646.6	499
Cook Street ⁷	11	2.4	26	Residential	14.3	5824	3277.7	83.8	632.3	488
Golf Course Development (Hilton Heights Development)	51	2.4	122	Residential	66.1	5947	3343.8	85.5	566.2	437
Kennedy Property	249	2.4	598	Residential	322.7	6544	3666.5	93.8	243.5	188
Legion	120	2.4	288	Various	155.5	6832	3822.0	97.7	88.0	68
Meaford Haven	400	2.4	960	Various	518.4	7792	4340.4	111.0	-430.4	-332
Nelson Street East	45	2.4	108	Residential	58.3	7900	4398.7	112.5	-488.7	-377
Plaza	254	2.4	610	Commercial	329.2	8510	4727.9	120.9	-817.9	-631

Redevelopment of Meaford Community School 128 LTC beds 120 Retirement Home 19 Townhomes	158	2.4	379	Residential	204.8	8889	4932.7	126.2	-1022.7	-789
Stanley Knight Property - North Corner of the property: restaurant, bar, indoor / outdoor infinity pool, spa, 68 hotel rooms, 6 luxury condominiums.	54	2.4	130	Commercial	70.4	9019	5003.0	128.0	-1093.0	-843
Stanley Knight Property - One parcel - 150 residential condominiums One parcel – 50 units/50 units	250	2.4	600	Residential	777.6	9619	5780.6	147.8	-1870.6	-1443
Sykes Street	52	2.4	125	Residential	67.4	9744	5848.0	149.6	-1938.0	-1495
Other - Potential Development, land fronting or within reasonable distance to existing sanitary collection system (Capacity Not Committed) ⁸										
Industrial ⁹	27	2.4	65	Industrial	35.0	9809	5883.0	150.5	-1973.0	-1522
Commercial ¹⁰	267	2.4	640	Commercial	345.5	10449	6228.6	159.3	-2318.6	-1789
Underutilized ¹¹	264	2.4	634	Various	342.2	11082	6570.7	168.0	-2660.7	-2053
74 Bayfield / former Moose	60	2.4	144	Various	77.8	11226	6648.5	170.0	-2738.5	-2113
Special Policy Area 1	120	2.4	288	Various	155.5	11514	6804.0	174.0	-2894.0	-2233
Allowance for Septage from Septic Tanks ¹²	6	2.4	15	Septic	8.1	11529	6812.0	174.2	-2902.0	-2239
Other - Potential Development, land not within reasonable distance to existing sanitary collection system (Capacity Not Committed) ¹³										
Industrial ⁹	589	2.4	1413	Industrial	763.3	12293	7575.3	193.7	-3665.33	-2828

Note: All development proposals are listed in alphabetical order. Therefore, no preference nor priority is attributed to any proposed development over another.

Estimated flow from residential dwellings calculated based on: Average annual flow less leachate, septic disposal and estimated flow from Industrial, Commercial and Institutional

Number of existing residential units based on 1818 single family dwelling residential units and 27 apartment style complexes and condominiums with a total of 401 residential dwellings.

The Annual Performance Reports prepared by OCWA and by the Municipality indicate that the Serviced Population is 4,340. The same population is listed for the 2018 report as the 2017 and 2016 reports. In order to account for 81 more residential connections in 2018 than in 2016 the Serviced Population is estimated to be 4340+2.1*82= 4,510. The existing population density was estimated to be 2.1 in the 2016 Capacity Update.

For future calculations, a population density of 2.4 was used, per the Municipality.

Future development flows have been calculated based on MECP standard per capita flows and standard allowance for I&I inflow.

The MECP Standard Per Capita flow is 450 L/cap/day and the standard allowance for I&I flow is 90L/cap/day = 540L/cap/day

The leachate contract with the City Owen Sound has not been renewed. August of 2017 was the last time Meaford received leachate from Owen Sound. As such, the leachate that previously contributed to flows was removed from the ledger

Zoning Approved (Site Plan Approval Required)

Based on proximity to the existing sanitary collection system it is feasible these lands could be developed and serviced within a 10-year time frame.

Sanitary flow for lands currently zoned Industrial based on 28m³/ha/day. This is consistent with the latest Sewer Model and is considered to be conservative. The area is total of all lands zoned Industrial and identified for future potential development.

Sanitary flow for lands currently zoned Commercial based on 28m³/ha/day. This is consistent with the latest Sewer Model and is considered to be conservative.

Land identified as "underutilized" in the Master Plan. These lands are currently developed and have sanitary services, however they have been identified as having potential for higher density development.

Sanitary flow for lands identified as "underutilized" based on 28m³/ha/day. This is considered to be conservative. It is recommended that more refined numbers may be developed as potential land uses are proposed.

Existing flow has not been identified and subtracted. The area is total of all lands identified as Underutilized.

Per discussions with the Municipality, an allowance was made for septage from all septic tanks to be accepted at the wastewater treatment plant, to allow for the potential of by-law restrictions of land application of this waste.

The Municipality advised that there are 3,500 Septic Tanks in the Municipality. The frequency that a septic tank should be pumped is dependant on the size of the tank and the number of occupants in the residence.

A very general rule of thumb is every 3 - 5 years. The calculation to allow for the WPCP to receive septage from all the septic tanks in the Municipality assumes that each tank is pumped every 5 years. Thus, 1/5 of the tanks would be pumped each year.

While there is potential for development for these lands based on zoning, the distance from the established sanitary collection system makes it unlikely that they would be developed in the short term.

Appendix 2

Official Plan Excerpts

D1.9.1 Reservation and Allocations Limitations

1) The monitoring of service capacity is intended to identify the availability of required municipal water and sewage services for existing and future development. The commitment of servicing capacity shall be subject to the priorities outlined in Section D1.9.3. Development approvals shall be restricted on the basis of design capacity limitations.

2) The design capacity of the applicable water and sewage treatment plant facilities shall be reserved for all units within any site plan, plan of subdivision and plan of condominium development approvals, including all residential and non-residential development. Where such reservation of design servicing capacity is not available, any application for development shall be considered to be premature, and development approvals shall not be given.

3) The existing plant capacity of the applicable water and sewage treatment plant facilities shall only be allocated for units within any approved development or phase of approved development. Phasing of development and allocation of existing plant capacity shall be provided under the required development agreement. Where such allocation of existing plant capacity is not available, the development, or phase of development shall not proceed.

4) The Municipality shall have regard for competing demands for servicing capacity and proposed schedules of build out when considering commitment of plant capacity, with particular regard for appropriate servicing limitations related to phases of large developments. The allocation of existing plant capacity shall be generally be restricted to development phases of approximately thirty (30) units, where practical. The remaining development potential for the lands may be placed in a holding category and reservation from the design capacity may also be deferred for some future development phases where further detailed development approvals are required. Once the current phase of development has been substantially completed, a subsequent phase may advance to obtain allocation subject to the availability of existing plant capacity at that time, rezoning for the removal of any holding symbol and any other applicable requirements. Larger phases shall generally not be permitted, except as may be permitted under paragraph (5). In addition to development phasing, the commitment of plant capacity shall normally be subject to appropriate securities and time limitations.

5) It is recognized that larger phases of development may be necessary in some circumstances to facilitate proposed development, such as a single multiple residential building containing more than thirty (30) units. Larger phases of development may also be considered necessary to help finance a municipal servicing project. Such larger phases shall only be permitted where smaller phases are not practical and where the Municipality is satisfied that there will be no negative impact on the priorities for other existing and future development as further provided under Section D1.9.3.

In some cases, development approvals and the commitment of plant capacity may be more appropriately deferred for future development phases. The Municipality may refuse to approve large scale development proposals in excess of one hundred (100) units. Larger development proposals may be included under a concept plan with future development phases. Lots or blocks may also be established under plan of subdivision approvals, with future detailed plan of subdivision or other applicable development approvals to be required. The commitment of plant capacity may also be deferred for such lands.

6) Draft plan of subdivision or condominium approvals and reservation of existing design capacity shall lapse after three years unless an extension is approved.

7) Notwithstanding the above, an extended lapsing period may be allowed in relation to municipal servicing projects where a longer period of time may be required to help finance the project, the duration to be determined relative to the scale of the project. In no case shall any development approval be granted with an initial lapsing period of more than eight (8) years. Any extension of development approvals must be obtained prior to lapsing and may only be recommended for one (1) year intervals where the Municipality is satisfied that development will proceed.

D1.9.2 Use of Holding Zones

1) Holding zones shall be established under the implementing Zoning By-law to recognize the commitment of design capacity. The allocation of existing plant capacity under development agreement shall be a condition of any rezoning.

2) All lots or blocks within a plan of subdivision or condominium shall generally be placed in a holding (h) zone under the implementing Zoning By-law until such time as all necessary approvals for development have been obtained and

existing plant capacity allocation is available, amongst any other relevant matters.

3) Where lots or blocks for future development are proposed under a Concept Plan or included under a plan of subdivision, and approved on the basis that design capacity is not yet available or that further detailed development approvals are required, such lands shall be placed in a holding or other appropriate zone under the implementing Zoning By-law.

D1.9.3 Staging Priorities

1) It is the intent of this Plan to direct the development of priority areas within the Urban Area based on the availability of servicing capacity. These priority areas should promote infilling and the logical extension of growth in an efficient manner, which will also help promote the extension of municipal services to existing development areas.

Staging priorities should recognize competing demands for limited available servicing capacity and direct development toward primary areas which are intended to be developed first.

2) Priority for development should be given to lands which meet one or more of the following criteria:

- a. Lands that have development approvals and are zoned to permit development. The allocation of existing servicing capacity is to be established under a Development Agreement.
- b. Lands located within Service Area #1 (Downtown) as established via the Municipal Development Charges By-law, as may be amended.
- c. Existing development which can connect to existing municipal service lines.
- d. Existing development where environmental servicing concerns have been identified.
- e. Existing development located in close proximity to existing municipal service lines and is likely to be serviced.
- f. Lands to be serviced with participation in a municipal servicing strategy to expand municipal treatment plant facilities and/or extend municipal service lines.

g. Lands which can be considered infilling development.

h. Lands to be developed which are considered to be a public benefit to include recreational amenities, public trails, proposed park dedications, affordable housing, or municipal servicing facilities, and could also qualify as bonus zoning provisions.

i. Lands to be developed which are otherwise considered to be a public benefit.

3) Service allocation shall not necessarily be given on a first come basis. A higher priority should be given to lands which can satisfy several staging priority criteria.

The Municipality may refuse to grant service allocation where it is to be reserved for other priority areas. A holdback will be retained to accommodate existing unserviced vacant lots within the extent of servicing, limited infill and industrial development.

4) Developers may be required to finance the cost of municipal service infrastructure which are required in order to obtain development approvals, with suitable provisions for reimbursement of the cost for works which benefit other lands, where appropriate. Developers may also be required to participate in municipal servicing projects which are designed to expand municipal treatment plant facilities and/or extend municipal service lines, which may also require ESR approvals for additional design service capacity, as well as other associated works.

APPENDIX E

Sanitary Servicing Design Calculations

425 Union Street Development - Sanitary Demand

Developed Site Area	5.21 ha
Number of Residential Units and Land Usage	
1) Single Residential	49 Units
2) Semi-Detached Residential	34 Units
Person Per Residential Unit	
1) Single Residential (Per Section 4.3 of Water & Wastewater Servicing Master Plan, 2015)	2.4 persons/unit
2) Semi-Detached (Per Section 4.3 of Water & Wastewater Servicing Master Plan, 2015)	2.4 persons/unit
Total Residential Population	199 Persons
Unit Sewage flows	
Residential (Per Section 5.5 of Water & Wastewater Servicing Master Plan, 2015)	300 L/C-day
Infiltration	0.23 L/s/ha
Total Design Sewage Flows	
Infiltration/Inflow Residential	1.20 L/sec
Average Daily Residential Flow	0.69 L/sec
Residential Peak Factor (Harmon Formula)	4
Total Peak Daily Flow	4.07 L/sec

Gates of Kent																							
SANITARY SEWER DESIGN MODEL																							
DESIGN: J.Proctor		N = 0.013												Peak Factor (M) = 1+(14/4+(P/1000)^0.5)									
CHECK: K.Morris		Population= 3.5 p.p.u.												Avg. Daily/Capita Flow = 450 L/cap.d									
														Q infiltration = 0.23 L/ha.s									
Location	FROM MH	TO MH	Length (m)	Area (Ha)	Units	Pop.	TOTAL trib pop	Peak Factor	Avg. Flow (l/s)	Max Flow (l/s)	Infilt. (l/s)	TOTAL Infilt.	Combined (l/s)	Pipe Diam (mm)	Upper Inv. El.	Lower Inv. El.	Slope (%)	Cap. (l/s)	Vel. (m/s)	Ground Upper	Ground Lower	Cover Upper	Cover Lower
FIRST LANE SECOND LANE THIRD LANE MAIN ROAD	9	5	80.4	0.52	14	49.0	49	4.32	0.26	1.10	0.12	0.12	1.22	200	210.75	210.33	0.5%	23.71	0.75	213.55	214.23	2.60	3.70
	8	4	80.4	0.58	16	56.0	56	4.30	0.29	1.26	0.13	0.13	1.39	200	210.98	210.18	1.0%	32.72	1.04	213.83	214.52	2.65	4.14
	7	3	80.4	0.60	16	56.0	56	4.30	0.29	1.26	0.14	0.14	1.39	200	211.14	210.34	1.0%	32.72	1.04	213.99	214.67	2.65	4.13
	6	5	87.5	0.60	14	49.0	49	4.32	0.26	1.10	0.14	0.14	1.24	200	211.89	210.28	1.8%	44.49	1.42	214.70	214.23	2.61	3.75
	5	4	66.1	0.25	6	21.0	119	4.22	0.62	2.62	0.06	0.32	2.93	200	210.25	209.92	0.5%	23.17	0.74	214.23	214.52	3.78	4.40
	4	3	66.2	0.28	8	28.0	203	4.15	1.06	4.38	0.06	0.51	4.90	200	209.89	209.56	0.5%	23.16	0.74	214.52	214.67	4.43	4.91
	3	2	96.7	0.47	10	35.0	294	4.08	1.53	6.25	0.11	0.76	7.01	200	209.53	209.05	0.5%	23.11	0.74	214.67	213.25	4.94	4.00
	UNION STREET	2	1	98.7	0.00	4	14.0	308	4.07	1.60	6.53	0.00	0.76	7.29	200	208.97	208.48	0.5%	23.11	0.74	213.25	212.08	4.08
1		STUB	99.1	0.00	4	14.0	322	4.07	1.68	6.82	0.00	0.76	7.58	200	208.45	207.95	0.5%	23.30	0.74	212.08	210.31	3.43	2.16
Note: The highlighted/italics section above will be all private sanitary sewers located within the proposed Gates of Kent Development lands. This portion of sanitary sewers will be owned and operated by the Condominium Corporation																							

Pipe Capacity (m³/s)

Nominal Pipe Size (mm)	Nominal Pipe Size (in)	Material	SDR	Slope (%)																					
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.5	4	4.5	5
75	3	PVC	28	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.004	0.004	0.005	0.005	0.005
100	4	PVC	28	0.002	0.002	0.003	0.003	0.004	0.004	0.004	0.005	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.010	0.010	0.011	0.012
125	5	PVC	29	0.003	0.004	0.005	0.006	0.007	0.007	0.008	0.008	0.009	0.009	0.010	0.011	0.012	0.013	0.014	0.015	0.016	0.016	0.018	0.019	0.020	0.021
150	6	PVC	28	0.005	0.007	0.008	0.010	0.011	0.012	0.013	0.014	0.014	0.015	0.017	0.019	0.020	0.022	0.023	0.024	0.025	0.026	0.028	0.030	0.032	0.034
200	8	PVC	35	0.010	0.015	0.018	0.021	0.023	0.025	0.027	0.029	0.031	0.033	0.037	0.040	0.043	0.046	0.049	0.052	0.054	0.057	0.061	0.066	0.070	0.073
250	10	PVC	35	0.019	0.027	0.033	0.038	0.042	0.046	0.050	0.053	0.056	0.059	0.066	0.073	0.079	0.084	0.089	0.094	0.10	0.10	0.11	0.12	0.13	0.13
300	12	PVC	35	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.15	0.16	0.17	0.18	0.19	0.21	0.22
375		PVC	35	0.06	0.08	0.10	0.11	0.12	0.14	0.15	0.16	0.17	0.18	0.20	0.21	0.23	0.25	0.26	0.28	0.29	0.30	0.33	0.35	0.37	0.39
450	18	PVC/Conc	35	0.09	0.13	0.16	0.18	0.20	0.22	0.24	0.26	0.27	0.29	0.32	0.35	0.38	0.40	0.43	0.45	0.47	0.49	0.53	0.57	0.60	0.64
525		Conc	35	0.14	0.19	0.24	0.27	0.30	0.33	0.36	0.38	0.41	0.43	0.48	0.53	0.57	0.61	0.65	0.68	0.71	0.74	0.80	0.86	0.91	0.96
600	24	Conc	35	0.19	0.27	0.34	0.39	0.43	0.48	0.51	0.55	0.58	0.61	0.69	0.75	0.81	0.87	0.92	0.97	1.02	1.06	1.15	1.23	1.30	1.37
675		Conc	35	0.27	0.38	0.46	0.53	0.59	0.65	0.70	0.75	0.80	0.84	0.94	1.03	1.11	1.19	1.26	1.33	1.39	1.46	1.57	1.68	1.78	1.88
750		Conc	35	0.35	0.50	0.61	0.70	0.79	0.86	0.93	1.00	1.06	1.11	1.24	1.36	1.47	1.57	1.67	1.76	1.85	1.93	2.08	2.23	2.36	2.49
825		Conc	35	0.45	0.64	0.79	0.91	1.02	1.11	1.20	1.28	1.36	1.44	1.60	1.76	1.90	2.03	2.15	2.27	2.38	2.49	2.69	2.87	3.05	3.21
900	36	Conc	35	0.57	0.81	0.99	1.14	1.28	1.40	1.51	1.62	1.72	1.81	2.02	2.22	2.39	2.56	2.72	2.86	3.00	3.14	3.39	3.62	3.84	4.05
975		Conc	35	0.71	1.00	1.23	1.42	1.58	1.74	1.87	2.00	2.13	2.24	2.51	2.74	2.96	3.17	3.36	3.54	3.72	3.88	4.19	4.48	4.75	5.01
1050		Conc	35	0.86	1.22	1.50	1.73	1.93	2.12	2.28	2.44	2.59	2.73	3.05	3.34	3.61	3.86	4.10	4.32	4.53	4.73	5.11	5.46	5.79	6.11
1200	48	Conc	35	1.23	1.74	2.14	2.47	2.76	3.02	3.26	3.49	3.70	3.90	4.36	4.77	5.16	5.51	5.85	6.16	6.47	6.75	7.29	7.80	8.27	8.72
1350		Conc	35	1.69	2.39	2.92	3.38	3.77	4.13	4.47	4.77	5.06	5.34	5.97	6.54	7.06	7.55	8.01	8.44	8.85	9.24	9.99	10.67	11.32	11.93

Pipe Velocity (m/s)

Nominal Pipe Size (mm)	Nominal Pipe Size (in)	Material	SDR	Slope (%)																					
				0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	3.5	4	4.5	5
75	3	PVC	28	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.1	1.2	1.2
100	4	PVC	28	0.2	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.4	1.5
125	5	PVC	29	0.2	0.3	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.7
150	6	PVC	28	0.3	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.9
200	8	PVC	35	0.3	0.5	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.2	1.3	1.4	1.5	1.6	1.7	1.7	1.8	2.0	2.1	2.2	2.3
250	10	PVC	35	0.4	0.5	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.6	2.7
300	12	PVC	35	0.4	0.6	0.7	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.6	2.7	2.9	3.1
375	18	PVC	35	0.5	0.7	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.9	2.1	2.2	2.4	2.5	2.6	2.7	3.0	3.2	3.4	3.5
450		PVC/Conc	35	0.6	0.8	1.0	1.1	1.3	1.4	1.5	1.6	1.7	1.8	2.0	2.2	2.4	2.5	2.7	2.8	3.0	3.1	3.4	3.6	3.8	4.0
525		Conc	35	0.6	0.9	1.1	1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.4	3.7	4.0	4.2	4.4
600	24	Conc	35	0.7	1.0	1.2	1.4	1.5	1.7	1.8	1.9	2.1	2.2	2.4	2.7	2.9	3.1	3.3	3.4	3.6	3.8	4.1	4.3	4.6	4.9
675		Conc	35	0.7	1.1	1.3	1.5	1.7	1.8	2.0	2.1	2.2	2.3	2.6	2.9	3.1	3.3	3.5	3.7	3.9	4.1	4.4	4.7	5.0	5.3
750		Conc	35	0.8	1.1	1.4	1.6	1.8	2.0	2.1	2.3	2.4	2.5	2.8	3.1	3.3	3.6	3.8	4.0	4.2	4.4	4.7	5.0	5.3	5.6
825	36	Conc	35	0.8	1.2	1.5	1.7	1.9	2.1	2.2	2.4	2.5	2.7	3.0	3.3	3.6	3.8	4.0	4.2	4.5	4.7	5.0	5.4	5.7	6.0
900		Conc	35	0.9	1.3	1.6	1.8	2.0	2.2	2.4	2.5	2.7	2.8	3.2	3.5	3.8	4.0	4.3	4.5	4.7	4.9	5.3	5.7	6.0	6.4
975		Conc	35	0.9	1.3	1.6	1.9	2.1	2.3	2.5	2.7	2.8	3.0	3.4	3.7	4.0	4.2	4.5	4.7	5.0	5.2	5.6	6.0	6.4	6.7
1050	48	Conc	35	1.0	1.4	1.7	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.5	3.9	4.2	4.5	4.7	5.0	5.2	5.5	5.9	6.3	6.7	7.1
1200		Conc	35	1.1	1.5	1.9	2.2	2.4	2.7	2.9	3.1	3.3	3.4	3.9	4.2	4.6	4.9	5.2	5.5	5.7	6.0	6.4	6.9	7.3	7.7
1350		Conc	35	1.2	1.7	2.0	2.4	2.6	2.9	3.1	3.3	3.5	3.7	4.2	4.6	4.9	5.3	5.6	5.9	6.2	6.5	7.0	7.5	7.9	8.3

PRELIMINARY SANITARY SEWER DESIGN SHEET

Street Name	Manhole ID	T/G (MASL)	INV OUT (MASL)	Drop (mm)	INV IN (MASL)	COVER (m)	Pipe Diameter (mm)	Pipe Length (m)	Slope (%)	U/S Invert (MASL)
Union Street	Existing SANMH#2	213.25	-		209.00	4.1	200	75.0	2.5	210.88
	PROP MH1	214.57	210.88	30	210.91	3.5	200	73.0	1.5	212.00
	PROP MH2	215.34	212.00	30	212.03	3.1	200	71.0	1.5	213.10
STREET A	PROP MH3	216.11	213.10	80	213.18	2.7	200	11.0	1.2	213.31
	PROP MH4	216.24	213.31	30	213.34	2.7	200	100.0	1.5	214.84
	PROP MH5	217.76	214.84	30	214.87	2.7	200	31.0	1.5	215.33
STREET C	PROP MH6	218.38	215.33	80	215.41	2.8	200	19.0	0.5	215.51
	PROP MH7	218.44	215.51	30	215.54	2.7	200	13.3	0.5	215.60
	PROP MH8	218.48	215.60	30	215.63	2.6	200	62.0	0.5	215.94
	PROP MH9	218.69	215.94	30	215.97	2.5	200	6.9	0.5	216.01
	PROP MH10	218.89	216.01	50	216.06	2.6	200	7.3	0.5	216.09
	PROP MH11	218.93	216.09	30	216.12	2.6	200	52.0	0.5	216.38
	PROP MH12	219.17	216.38	30	216.41	2.6	200	6.0	1.0	216.47
	PROP MH13	219.21	216.47		-	2.5		-		-
	PROP MH6	218.38	215.33	30	215.36	2.8	200	73.0	0.5	215.73
STREET A	PROP MH14	218.77	215.73	80	215.81	2.8	200	28.6	0.5	215.95
STREET C	PROP MH15	218.9	215.95	30	215.98	2.7	200	25.5	0.5	216.11
	PROP MH16	219.03	216.11	30	216.14	2.7	200	24.4	1.0	216.38
	PROP MH17	219.27	216.38	30	216.41	2.7	200	5.6	1.0	216.47
	PROP MH13	219.21	216.47		-	2.5		-		-
STREET A	PROP MH14	218.77	215.73	30	215.76	2.8	200	29.5	0.5	215.90
	PROP MH18	218.89	215.90	30	215.93	2.8	200	13.8	1.0	216.07
	PROP MH19	218.96	216.07			2.7				
STREET B	PROP MH14	218.77	215.73	80	215.81	2.8	200	25.3	0.5	215.93
	PROP MH20	218.91	215.93	30	215.96	2.7	200	65.6	0.5	216.29
	PROP MH21	219.23	216.29	30	216.32	2.7	200	7.2	1.0	216.39
	PROP MH22	219.27	216.39			2.7				
STREET B	PROP MH6	218.38	215.33	80	215.41	2.8	200	22.6	0.5	215.53
	PROP MH23	218.49	215.53	30	215.56	2.7	200	61.0	0.5	215.86
	PROPMH24	218.80	215.86	30	215.89	2.7	200	4.5	0.5	215.91
	PROP MH25	218.82	215.91	50	215.96	2.7	200	6.9	1.0	216.03
	PROPMH26	218.89	216.03	30	216.06	2.6	200	56.6	1.0	216.63
	PROP MH27	219.46	216.63	30	216.66	2.6	200	6.8	1.0	216.73
	PROP MH22	219.27	216.73			2.3				

APPENDIX F

Stormwater Management Calculations



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2022-10-20
 By: JK

D.A. NAME 201
 D.A. AREA (ha) 3.63

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	3.63
				0
				0
				0
Total Area Check				3.63

Impervious Landuses Present:													
		Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs		0.59	98		98	0.393	98	0.8	98		98	1.783	174.73
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
Subtotal Area		0.59		0		0.393		0.8		0			

Pervious Landuses Present:													
		Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs		0		0		0		1.85	49	0		1.847	90.503
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
Subtotal Area		0		0		0		1.847		0			

	Pervious Area Calculations		Total Pervious Area		1.847	
			Composite Pervious Curve Number		49	
	Impervious Area Calculations		Total Directly Connected Area		0.983	
			Total Indirectly Connected Area		0.8	
			Total Impervious Area		1.783	
			% X imp		27.1	
			% T imp		49.1	
Total Area Check					3.63	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.847	9.235
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	156	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 Updated: 2022-10-20
 By: JK

D.A. NAME 202
 D.A. AREA (ha) 0.71

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 202

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	0.71
				0
				0
				0
Total Area Check				0.71

Impervious Landuses Present:													
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs		98		98	0	98	0.124	98		98	0.124	12.152	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
Subtotal Area	0		0		0		0.124		0				

Pervious Landuses Present:													
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs	0		0		0		0.586	49	0		0.586	28.714	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
Subtotal Area	0		0		0		0.586		0				

	Pervious Area Calculations		Total Pervious Area		0.586
			Composite Pervious Curve Number		49
	Impervious Area Calculations		Total Directly Connected Area		0.0313
			Total Indirectly Connected Area		0.0927
			Total Impervious Area		0.124
			% X imp		4.4
% T imp			17.5		
Total Area Check				0.71	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.586	2.93
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	69	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 By: EF

D.A. NAME 203
 D.A. AREA (ha) 0.12

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 203

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	0.12
				0
				0
				0
Total Area Check				0.12

Impervious Landuses Present:													
		Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs			98		98	0.0045	98	0.0462	98		98	0.0507	4.9686
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
Subtotal Area		0		0		0.0045		0.0462		0			

Pervious Landuses Present:													
		Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs		0		0		0		0.0693	49	0		0.0693	3.3957
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
Subtotal Area		0		0		0		0.0693		0			

				Pervious Area Calculations		Total Pervious Area		0.0693	
						Composite Pervious Curve Number		49	
				Impervious Area Calculations		Total Directly Connected Area		0.0245	
						Total Indirectly Connected Area		0.0262	
						Total Impervious Area		0.0507	
						% X imp		20.4	
						% T imp		42.3	
Total Area Check								0.12	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.0693	0.3465
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	28	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 By: EF

D.A. NAME 204
 D.A. AREA (ha) 0.12

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 204

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	0.12
				0
				0
				0
Total Area Check				0.12

Impervious Landuses Present:													
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs	0.0579	98		98		98		98		98	0.0579	5.6742	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
Subtotal Area	0.0579		0		0		0		0				
Pervious Landuses Present:													
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs	0		0		0		0.0621	49	0		0.0621	3.0429	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
Subtotal Area	0		0		0		0.0621		0				
				Pervious Area Calculations			Total Pervious Area				0.0621		
							Composite Pervious Curve Number				49		
				Impervious Area Calculations			Total Directly Connected Area				0.0579		
							Total Indirectly Connected Area				0		
							Total Impervious Area				0.0579		
% X imp							48.3						
							% T imp				48.3		
Total Area Check												0.12	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.0621	0.3105
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	28	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 By: EF

D.A. NAME 205
 D.A. AREA (ha) 0.55

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 205

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	0.55
				0
				0
				0
Total Area Check				0.55

Impervious Landuses Present:													
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs		98		98		98	0.11	98		98	0.11	10.78	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
0		98		98		98		98		98	0	0	
Subtotal Area	0		0		0		0.11		0				

Pervious Landuses Present:													
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals		
	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN	
Brs	0		0		0		0.44	49	0		0.44	21.56	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
0	0		0		0		0		0		0	0	
Subtotal Area	0		0		0		0.44		0				

	Pervious Area Calculations		Total Pervious Area		0.44	
			Composite Pervious Curve Number		49	
	Impervious Area Calculations		Total Directly Connected Area		0.0273	
			Total Indirectly Connected Area		0.0827	
			Total Impervious Area		0.11	
			% X imp		5.0	
% T imp			20.0			
Total Area Check					0.55	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.44	2.2
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	61	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2022-10-20
 By: JK

D.A. NAME 206
 D.A. AREA (ha) 0.04

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 206

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Brighton Sand	Brs	A	100	0.04
				0
				0
				0
Total Area Check				0.04

Impervious Landuses Present:													
		Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs		0.025	98		98	0	98	0	98		98	0.025	2.45
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
	0		98		98		98		98		98	0	0
Subtotal Area		0.025		0		0		0		0			

Pervious Landuses Present:													
		Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils		Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Brs		0		0		0		0.02	49	0		0.015	0.735
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
	0	0		0		0		0		0		0	0
Subtotal Area		0		0		0		0.015		0			

				Pervious Area Calculations		Total Pervious Area		Composite Pervious Curve Number		0.015	
				Impervious Area Calculations		Total Directly Connected Area				0.025	
						Total Indirectly Connected Area				0	
						Total Impervious Area				0.025	
						% X imp				62.5	
						% T imp				62.5	
								Total Area Check		0.04	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.015	0.075
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	20	0.25
Impervious	2.0	2	16	0.013



Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 By: EF

D.A. NAME 101
 D.A. AREA (ha) 2.97

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Brighton Sand	Brs	A	100	2.97
				0
				0
				0
Total Area				2.97

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Brs		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal	0		0		0		0		0			
Pervious Landuses Present:												
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Brs	0.00		0.00		0.00		0.39	49	2.58	62	2.97	179.12
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal	0.00		0.00		0.00		0.39		2.58			
Composite Area Calculations											Total Pervious Area	
											2.97	
											Total Impervious Area	
											0	
											% Impervious	
											0.00%	
											Composite Curve Number	
											60.3	
											Total Area Check	
											2.97	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient							
Landuse	IA (mm)	Area (ha)	A * IA	Brighton Sand		0		0		0	
				RC	Area	RC	Area	RC	Area	RC	Area
Woodland	10	0	0		0		0		0		0
Meadow	8	0	0		0		0		0		0
Wetland	16	0	0		0		0		0		0
Lawn	5	0.3861	1.9305	0.15	0		0		0		0.05792
Cultivated	7	2.5839	18.0873	0.25	3		0		0		0.64598
Impervious	2	0	0		0		0		0		0
Composite		2.97	6.74	Composite Runoff Coefficient							
											0.24

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	V/S ^{0.5}	Velocity (m/s)	Tc (hr)	Tp (hr)	TOTAL Tp (hr)	Tc (hr)	Tp (hr)	Tc (hr)	Tp (hr)
Sheet	100	1	1.00%		0.00				0.17	0.11	0.61	0.41
Channel	107	1.87	1.75%		0							

Appropriate calculated time to peak:	0.41	Appropriate Method:	Airport
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Project Name: Union Street - Meaford
 Project Number: 1923-5641
 Date: 2021-05-19
 By: EF

D.A. NAME 102
 D.A. AREA (ha) 2.25

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 102

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Brighton Sand	Brs	A	100	2.25
				0
				0
				0
Total Area				2.25

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Brs		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal	0		0		0		0		0			
Pervious Landuses Present:												
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Brs	0.00		0.00		0.00		0.29	49	1.96	62	2.25	135.70
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal	0.00		0.00		0.00		0.29		1.96			
					Composite Area Calculations		Total Pervious Area				2.25	
							Total Impervious Area				0	
							% Impervious				0.00%	
							Composite Curve Number				60.3	
							Total Area Check				2.25	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient							
Landuse	IA (mm)	Area (ha)	A * IA	Brighton Sand		0		0		0	
				RC	Area	RC	Area	RC	Area	RC	Area
Woodland	10	0	0		0		0		0		0
Meadow	8	0	0		0		0		0		0
Wetland	16	0	0		0		0		0		0
Lawn	5	0.2925	1.4625	0.15	0		0		0		0.04388
Cultivated	7	1.9575	13.7025	0.25	2		0		0		0.48938
Impervious	2	0	0		0		0		0		0
Composite		2.25	6.74	Composite Runoff Coefficient							0.24

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	V/S ^{0.5}	Velocity (m/s)	Tc (hr)	Tp (hr)	TOTAL Tp (hr)	Tc (hr)	Tp (hr)	Tc (hr)	Tp (hr)
Sheet	100	1.6	1.60%		0.00				0.19	0.13	0.66	0.44
Channel	130	1.3	1.00%		0							

Appropriate calculated time to peak:	0.44	Appropriate Method:	Airport
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Chicago Output

C.F. Crozier & Associates Inc.

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018020 *#----- 2 YEAR, 4 HOUR CHICAGO STORM -----
018025 CHICAGO STORM | INF curve parameters: A= 429.893
018030 Pictail 32.55 mm | B= 1.500
018035 C= .723
018040 -----
018045 used in: INTENSITY = A / (t + B)^C
018050 -----
018100 Duration of storm = 4.00 hrs
018110 Storm time step = 5.00 min
018120 Time to peak ratio = 3.33
018130 -----
018140 The CORRELATION coefficient is = .9996866
018150 -----
018160 TIME ENTERED COMPUTED
018170 (min) (mm/hr) (mm/hr)
018180 5. 159.10 15.40
018190 10. 73.50 73.53
018200 15. 55.40 56.64
018210 20. 34.20 35.49
018220 60. 21.10 21.88
018230 120. 14.00 13.37
018240 180. 9.70 6.08
018250 240. 6.10 3.69
018260 360. 4.30 2.24
018270 -----
018280 TIME RAIN/ TIME RAIN/ TIME RAIN/ TIME RAIN/ TIME RAIN/ TIME RAIN/
018290 hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
018300 0:05 2.421 0:45 4.303 1:25 32.620 2:05 5.817 2:45 6.430 3:25 7.274
018310 0:10 2.548 0:50 4.848 1:30 18.433 2:10 5.178 2:50 5.778 3:30 6.481
018320 0:15 2.693 0:55 5.592 1:35 13.421 2:15 5.010 2:55 5.345 3:35 5.285
018330 0:20 2.859 1:00 6.681 1:40 10.742 2:20 4.696 3:00 4.494 3:40 2.573
018340 0:25 3.052 1:05 8.465 1:45 9.058 2:25 4.420 3:05 3.108 3:45 2.453
018350 0:30 3.280 1:10 12.065 1:50 7.888 2:30 4.280 3:10 3.004 3:50 2.393
018360 0:35 3.552 1:15 22.330 1:55 7.023 2:35 3.981 3:15 2.907 3:55 2.337
018370 0:40 3.885 1:20 111.077 2:00 6.353 2:40 3.796 3:20 2.818 4:00 2.283
018380 -----
018400 #0001:C00063-----
018410 *#----- EXISTING -----
018420 -----
018430 -----
018440 CALIB STANHYD | Area (ha) = 6.250
018450 01:102 DTS= 1.00 | Total Imp(h) = 2.700 # of Linear Res. (N) = 30.30
018460 U.S. Ppt(hr) = 4.10
018470 -----
018480 Unit Hyd Peak (cms) = .012
018490 -----
018500 PEAK FLOW (cms) = 2.010
018510 TIME TO PEAK (hrs) = 1.950
018520 DURATION (hrs) = 6.783 (dddd hh:mm:ss) = 0106:47
018530 AVERAGE FLOW (cms) = .003
018540 RUNOFF VOLUME (mm) = 3.461
018550 TOTAL RAINFALL (mm) = 32.549
018560 RUNOFF COEFFICIENT = .106
018570 -----
018580 (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
018590 -----
018600 -----
018610 #0001:C00064-----
018620 *#----- PROPOSED -----
018630 -----
018640 CALIB STANHYD | Area (ha) = 3.63
018650 05:201 DTS= 1.00 | Total Imp(h) = 4.000 Dir. Conn.(%) = 26.70
018660 -----
018670 IMPERVIOUS PERVIOUS (i)
018680 Surface Area (ha) = 2.600
018690 Dep. Storage (mm) = 2.000 5.00
018700 Average Slope (ft) = 2.00 2.00
018710 Length (m) = 158.00 32.55
018720 Mannings n = .013 .250
018730 -----
018740 Max.off.Inten.(mm/hr) = 111.08 8.34
018750 Storage Coeff. (min) = 3.630 15.00
018760 Unit Hyd. Peak (min) = 2.40 (ii) 15.17 (ii)
018770 Unit Hyd. Peak (cms) = 3.00 5.00
018780 Unit Hyd. Peak (cms) = .41 .10
018790 -----
018800 PEAK FLOW (cms) = .24 .02 "TOTALS"
018810 TIME TO PEAK (hrs) = 1.35 1.60 .249 (iii)
018820 RUNOFF VOLUME (mm) = 30.55 3.97 11.064
018830 TOTAL RAINFALL (mm) = 32.55 32.55
018840 RUNOFF COEFFICIENT = .94 .12 .340
018850 -----
018860 (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
018870 CN = 49.0 Ia = Dep. Storage (Above)
018880 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
018890 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
018900 -----
018910 -----
018920 #0001:C00065-----
018930 *#----- FOND -----
018940 -----
018950 -----
018960 -----
018970 ROUTE RESPONSE -> | Requested routing time step = 1.0 min.
018980 -----
018990 02:02:POND | ***** OUTFLOW STORAGE TABLE *****
019000 02:02:POND | (cms) (cms) (ha.s.) (cms) (ha.s.) (cms) (ha.s.)
019010 .000 .0000E+00 .020 1050E+00 .100 1500E+00 .254 2650E+00
019020 .000 .0000E+00 .033 1270E+00 .158 1740E+00 1.197 2800E+00
019030 .010 .6400E-01 .075 1390E+00 .260 2110E+00 1.868 3110E+00
019040 .011 .8400E-01 .100 1500E+00 .353 2240E+00 1.000 .0000E+00
019050 -----
019060 AREA PEAK TPEAK R.V.
019070 INFLOW 05:201 3.630 2.49 1.350 11.064
019080 OUTFLOW 02:02:POND 3.630 0.00 0.00 0.00
019090 OVERFLOW 03:POND OUT .000 .000 .000 .000
019100 -----
019110 TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
019120 CUMULATIVE TIME OF OVERFLOWS (hrs) = .00
019130 PERCENTAGE OF TIME OVERFLOWING (hours) = .00
019140 -----
019150 PEAK FLOW REDUCTION [Out/(In)] (ha.s.) = 2.663
019160 TIME SHIFT OF PEAK (min) (min) = 163.00
019170 MAXIMUM STORAGE USED (ha.s.) = 340E-01
019180 -----
019210 #0001:C00066-----
019220 -----
019230 -----
019240 CALIB STANHYD | Area (ha) = .71
019250 04:206 DTS= 1.00 | Total Imp(h) = 20.00 Dir. Conn.(%) = 5.00
019260 -----
019270 IMPERVIOUS PERVIOUS (i)
019280 Surface Area (ha) = .24 .57
019290 Dep. Storage (mm) = 2.00 5.00
019300 Average Slope (ft) = 2.00 2.00
019310 Length (m) = 62.00 20.00
019320 Mannings n = .013 .250
019330 -----
019340 Max.off.Inten.(mm/hr) = 111.08 5.04
019350 Storage Coeff. (min) = 3.630 18.00
019360 Unit Hyd. Peak (min) = 1.49 (ii) 16.88 (ii)
019370 Unit Hyd. Peak (cms) = 1.00 17.00
019380 Unit Hyd. Peak (cms) = .83 .07 "TOTALS"
019390 -----
019400 PEAK FLOW (cms) = .01 .00 .011 (iii)
019410 TIME TO PEAK (hrs) = 1.33 1.65 1.333
019420 RUNOFF VOLUME (mm) = 30.53 4.20 2.466
019430 TOTAL RAINFALL (mm) = 32.55 32.55
019440 RUNOFF COEFFICIENT = .94 .10 .140
019450 -----
019460 (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
019470 CN = 49.0 Ia = Dep. Storage (Above)
019480 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
019490 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
019500 -----
019510 -----
019520 #0001:C00067-----
019530 *#----- FOND -----
019540 -----
019550 -----
019560 CALIB STANHYD | Area (ha) = .04
019570 04:206 DTS= 1.00 | Total Imp(h) = 67.00 Dir. Conn.(%) = 67.00
019580 -----
019590 IMPERVIOUS PERVIOUS (i)
019600 Surface Area (ha) = .03 .01
019610 Dep. Storage (mm) = 2.00 5.00
019620 Average Slope (ft) = 2.00 2.00
019630 Length (m) = 14.00 20.00
019640 Mannings n = .013 .250
019650 -----
019660 Max.off.Inten.(mm/hr) = 111.08 3.16
019670 Storage Coeff. (min) = 3.630 19.00
019680 Unit Hyd. Peak (min) = .61 (ii) 19.15 (ii)
019690 Unit Hyd. Peak (cms) = 1.37 .17 "TOTALS"
019700 -----
019710 PEAK FLOW (cms) = .01 .00 .008 (iii)
019720 TIME TO PEAK (hrs) = 1.33 1.58 1.333
019730 RUNOFF VOLUME (mm) = 30.54 21.00 2.120
019740 TOTAL RAINFALL (mm) = 32.55 32.55
019750 RUNOFF COEFFICIENT = .94 .08 .655
019760 -----
019770 -----
019780 -----
019790 -----
019800 -----

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01981)      (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
01982)      CN* = 49.0 Ia = Dep. Storage (Above)
01983)      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01984)      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01985)
01986)
01987) R0001:C0006:-----|-----|-----|-----|-----|-----|
01988)
01989)
01990) ADD HYD I
01991) 06:CULVERT I ID:HYD Area (ha) OPEAK TPEAK R.V. CMF
01992) 10 1 02:POND (hrs) (cms) (hrs) (mm) (mm)
01993) +ID 2 03:POND 3.630 .007 4.067 11.064 .000
01994) +ID 3 03:POND OUT .000 .000 .000 .000 .000 *CRW**
01995) +ID 3 04:TOZ .710 .011 1.333 4.566 .000
01996) +ID 4 05:TOZ .040 .008 1.333 21.320 .000
01997)
01998) R0M 06:CULVERT 4.380 .021 1.333 10.104 .000
01999)
02000) NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02001)
02002)
02003) #-----|-----|-----|-----|-----|-----|
02004) #-----|-----|-----|-----|-----|-----|
02005) #-----|-----|-----|-----|-----|-----|
02006) #-----|-----|-----|-----|-----|-----|
02007)
02008) CALIS STANHOYD | Area (ha) = .12
02009) 09:203 DTM= 1.00 | Total Imp(h) = 42.30 Dir. Conn.(%) = 20.00
02010)
02011) IMPERVIOUS PREVIOUS (i)
02012) Surface Area (ha) = .05 .07
02013) Dep. Storage (mm) = 2.00 5.00
02014) Average Slope (ft) = 2.00 2.00
02015) Length (mm) = 28.00 20.00
02016) Mannings n = .013 .250
02017)
02018) Max. eff. Inten. (mm/hr) = 111.08 7.96
02019) over (min) 1.00 14.00
02020) Storage Coeff. (min) = .99 (ii) 13.74 (ii)
02021) Unit Hyd. Tpeak (min) = 1.00 14.00
02022) Unit Hyd. Peak (cms) = 1.12 .00 *TOTALS*
02023)
02024) PEAK FLOW (cms) = .01 .00 .008 (iii)
02025) TIME TO PEAK (hrs) = 1.33 1.57 1.333
02026) DURATION (hrs) = 30.53 3.81 9.158
02027) RUNOFF VOLUME (mm) = 32.55 32.55 32.549
02028) TOTAL RAINFALL (mm) = .94 .08 .495
02029) RUNOFF COEFFICIENT = .12
02030)
02031) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02032) CN* = 49.0 Ia = Dep. Storage (Above)
02033) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02034) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02035)
02036) R0001:C0007:-----|-----|-----|-----|-----|-----|
02037) #-----|-----|-----|-----|-----|-----|
02038) #-----|-----|-----|-----|-----|-----|
02039) #-----|-----|-----|-----|-----|-----|
02040)
02041) CALIS NASRID | Area (ha) = .210 Curve Number (CN) = 60.30
02042) 01:104 DTM= 1.00 | Ia (mm) = 6.740 # of Linear Res. (N) = 3.00
02043) U.S. Tp(hrs) = .440
02044)
02045) Unit Hyd Gpeak (cms) = .018
02046)
02047) PEAK FLOW (cms) = .001 (i)
02048) TIME TO PEAK (hrs) = 2.000
02049) DURATION (hrs) = 6.967, (ddddhh:mm) = 016:58
02050) AVERAGE FLOW (cms) = .000
02051) RUNOFF VOLUME (mm) = 3.461
02052) TOTAL RAINFALL (mm) = 32.549
02053) RUNOFF COEFFICIENT = .106
02054)
02055) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02056)
02057) R0001:C0007:-----|-----|-----|-----|-----|-----|
02058) #-----|-----|-----|-----|-----|-----|
02059) #-----|-----|-----|-----|-----|-----|
02060)
02061) CALIS STANHOYD | Area (ha) = .12
02062) 10:204 DTM= 1.00 | Total Imp(h) = 48.30 Dir. Conn.(%) = 48.30
02063)
02064) IMPERVIOUS PREVIOUS (i)
02065) Surface Area (ha) = .06 .04
02066) Dep. Storage (mm) = 2.00 5.00
02067) Average Slope (ft) = 2.00 2.00
02068) Length (mm) = 28.00 20.00
02069) Mannings n = .013 .250
02070)
02071) Max. eff. Inten. (mm/hr) = 111.08 3.08
02072) over (min) 1.00 20.00
02073) Storage Coeff. (min) = .98 (ii) 18.65 (ii)
02074) Unit Hyd. Tpeak (min) = 1.00 .09
02075) Unit Hyd. Peak (cms) = 1.12 .00 *TOTALS*
02076)
02077) PEAK FLOW (cms) = .02 .00 .018 (iii)
02078) TIME TO PEAK (hrs) = 70.33 1.733
02079) RUNOFF VOLUME (mm) = 30.54 2.60 16.096
02080) TOTAL RAINFALL (mm) = 32.55 32.55 32.549
02081) RUNOFF COEFFICIENT = .94 .08 .495
02082)
02083) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02084) CN* = 49.0 Ia = Dep. Storage (Above)
02085) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02086) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02087)
02088)
02089) R0001:C0007:-----|-----|-----|-----|-----|-----|
02090) #-----|-----|-----|-----|-----|-----|
02091) #-----|-----|-----|-----|-----|-----|
02092)
02093) CALIS NASRID | Area (ha) = 2.970 Curve Number (CN) = 60.30
02094) 07:101 DTM= 1.00 | Ia (mm) = 6.700 # of Linear Res. (N) = 3.00
02095) U.S. Tp(hrs) = .440
02096)
02097) Unit Hyd Gpeak (cms) = .258
02098)
02099) PEAK FLOW (cms) = .015 (i)
02100) TIME TO PEAK (hrs) = 2.000
02101) DURATION (hrs) = 6.967, (ddddhh:mm) = 016:58
02102) AVERAGE FLOW (cms) = .004
02103) RUNOFF VOLUME (mm) = 3.461
02104) TOTAL RAINFALL (mm) = 32.549
02105) RUNOFF COEFFICIENT = .106
02106)
02107) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02108)
02109) R0001:C0007:-----|-----|-----|-----|-----|-----|
02110) #-----|-----|-----|-----|-----|-----|
02111) #-----|-----|-----|-----|-----|-----|
02112)
02113) CALIS STANHOYD | Area (ha) = .25
02114) 08:205 DTM= 1.00 | Total Imp(h) = 50.00 Dir. Conn.(%) = 5.00
02115)
02116) IMPERVIOUS PREVIOUS (i)
02117) Surface Area (ha) = .11 .44
02118) Dep. Storage (mm) = 2.00 5.00
02119) Average Slope (ft) = 2.00 2.00
02120) Length (mm) = 61.00 20.00
02121) Mannings n = .013 .250
02122)
02123) Max. eff. Inten. (mm/hr) = 111.08 5.04
02124) over (min) 1.00 17.00
02125) Storage Coeff. (min) = 1.18 (ii) 16.86 (ii)
02126) Unit Hyd. Tpeak (min) = 1.00 17.00
02127) Unit Hyd. Peak (cms) = .83 .01 *TOTALS*
02128)
02129) PEAK FLOW (cms) = .01 .00 .009 (iii)
02130) TIME TO PEAK (hrs) = 1.33 1.65 1.333
02131) DURATION (hrs) = 30.51 3.20 4.566
02132) RUNOFF VOLUME (mm) = 32.55 32.55 32.549
02133) TOTAL RAINFALL (mm) = .94 .08 .495
02134) RUNOFF COEFFICIENT = .12
02135)
02136) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02137) CN* = 49.0 Ia = Dep. Storage (Above)
02138) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02139) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02140)
02141) R0001:C0007:-----|-----|-----|-----|-----|-----|
02142) #-----|-----|-----|-----|-----|-----|
02143) #-----|-----|-----|-----|-----|-----|
02144) #-----|-----|-----|-----|-----|-----|
02145)
02146) 25mm Event
02147)
02148) ID# curve parameters: A= 566.700
02149) B= 6.662
02150) C= .819
02151) used in: INTENSITY = A / (t + B)^C
02152)
02153) Duration of storm = 5.00 hrs
02154) Storm time step = 5.00 min
02155) Time to peak ratio = .33
02156)
02157) TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
02158) h0/hr 1.3581 0.145 2.816 1.25 33.671 2:05 4.781 2:45 2.261 3:25 1.581
02159) 0:05 1.3581 0:45 2.816 1:25 33.671 2:10 3.774 2:50 2.143 3:30 1.581
02160) 0:10 1.4480 0:55 3.971 1:35 12.651 2:15 3.431 2:55 2.037 3:35 1.581

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02161> 0:20 1.671 1:00 5.034 1:40 9.463 2:20 3.156 3:00 1.942 3:40 1.426
02162> 0:25 1.671 1:05 5.034 1:45 9.463 2:25 3.156 3:05 1.856 3:45 1.381
02163> 0:30 1.987 1:10 11.025 1:50 6.281 2:30 2.720 3:10 1.778 3:50 1.339
02164> 0:35 2.199 1:15 26.138 1:55 5.377 2:35 2.546 3:15 1.706 3:55 1.300
02165> 0:40 2.447 1:20 76.987 2:00 4.704 2:40 2.393 3:20 1.641 4:00 1.264
02166>
02167>
02168> R0001:C00075-----
02169> *#-----EXISTING-----
02170> *#-----
02171>
02172> | CALIB STANHYD | Area (ha)= 2.250 Curve Number (CN)= 60.30
02173> | 01:101 DT= 1.00 | Ia (mm)= 6.700 # of Linear Res.(N)= 3.00
02174> U.H. Tp(hrs)= .410
02175>
02176> Unit Hyd Peak (cms)= .210
02177>
02178> PEAK FLOW (cms)= .007 (i)
02179> TIME TO PEAK (hrs)= 2.000
02180> DURATION (hrs)= 6.789, (ddddhh:mm)= 0106:47
02181> AVERAGE FLOW (cms)= .002
02182> RUNOFF VOLUME (mm)= 1.603
02183> TOTAL RAINFALL (mm)= 24.991
02184> RUNOFF COEFFICIENT = .072
02185>
02186> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02187>
02188>
02189> R0001:C00076-----
02190> *#-----PROPOSED-----
02191> *#-----
02192> | CALIB STANHYD | Area (ha)= 3.63
02193> | 05:201 DT= 1.00 | Total Imp(h)= 49.00 Dir. Conn.(h)= 26.70
02194>
02195> IMPERVIOUS PERVIOUS (i)
02196> Surface Area (ha)= 1.78 1.85
02197> Dep. Storage (mm)= 5.077 1.350
02198> Average Slope (h)= 2.00 2.00
02199> Length (m)= 156.00 20.00
02200> Mannings n = .013 .250
02201>
02202> Max. eff. Inten. (mm/hr)= 76.07 4.45
02203> over (min)= 3.00 19.00
02204> Storage Coeff. (min)= 1.02 (ii) 19.19 (ii)
02205> Unit Hyd. Peak (min)= 3.00 19.00
02206> Unit Hyd. Peak (cms)= .37 .06
02207>
02208> PEAK FLOW (cms)= .17 .01
02209> TIME TO PEAK (hrs)= 1.35 1.72
02210> RUNOFF VOLUME (mm)= 22.99 1.41
02211> TOTAL RAINFALL (mm)= 24.99 24.991
02212> RUNOFF COEFFICIENT = .92 .312
02213>
02214> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02215> CN* = 49.0 Ia = Dep. Storage (Above)
02216> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02217> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02218>
02219>
02220> R0001:C00077-----
02221> *#-----EXISTING-----
02222> *#-----
02223> *#-----
02224>
02225> | ROUTE RESERVOIR -> | Requested routing time step = 1.0 min.
02226> | INV=51201 |
02227> | OUT=02:POND |
02228>
02229> OUTFLOW STORAGE| OUTFLOW STORAGE| OUTFLOW STORAGE| OUTFLOW STORAGE
02230> (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.)
02231> .007 .9400E+01 .053 .1270E+01 .158 .1740E+01 1.197 .2800E+00
02232> .011 .1300E+01 .075 .1900E+01 .260 .2110E+01 1.868 .3110E+00
02233> .011 .9400E+01 .100 .1500E+01 .353 .2240E+01 .000 .0000E+00
02234>
02235> ROUTING RESULTS AREA OPEAK TPEAK R.V.
02236> (ha) (cms) (hrs) (mm)
02237> OVERFLOW > 05:01:00 3.630 .005 4.033 7.789
02238> OVERFLOW < 03:POND OUT .000 .000 .000 0.000
02239>
02240> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02241> CUMULATIVE TIME OF OVERFLOW (hours) = .00
02242> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02243>
02244>
02245> PEAK FLOW REDUCTION [Qout/Qin] (%) = 2.766
02246> TIME SHIFT OF PEAK FLOW (min) = 161.000
02247> MAXIMUM STORAGE USED (ha.m.) = .2394E+01
02248>
02249>
02250>
02251> R0001:C00078-----
02252> *#-----EXISTING-----
02253> *#-----
02254>
02255> | CALIB STANHYD | Area (ha)= .71
02256> | 04:202 DT= 1.00 | Total Imp(h)= 20.00 Dir. Conn.(h)= 5.00
02257>
02258> IMPERVIOUS PERVIOUS (i)
02259> Surface Area (ha)= .14 .57
02260> Dep. Storage (mm)= 2.00 5.00
02261> Average Slope (h)= 2.00 2.00
02262> Length (m)= 60.00 20.00
02263> Mannings n = .013 .250
02264>
02265> Max. eff. Inten. (mm/hr)= 76.07 2.63
02266> over (min)= 2.00 22.00
02267> Storage Coeff. (min)= 1.74 (ii) 21.44 (ii)
02268> Unit Hyd. Peak (min)= 2.00 22.00
02269> Unit Hyd. Peak (cms)= .61 .05
02270>
02271> PEAK FLOW (cms)= .01 .00
02272> TIME TO PEAK (hrs)= 1.23 1.33
02273> RUNOFF VOLUME (mm)= 22.99 1.77
02274> TOTAL RAINFALL (mm)= 24.99 24.991
02275> RUNOFF COEFFICIENT = .92 .07
02276>
02277> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02278> CN* = 49.0 Ia = Dep. Storage (Above)
02279> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02280> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02281>
02282>
02283> R0001:C00079-----
02284> *#-----EXISTING-----
02285> *#-----
02286>
02287> | CALIB STANHYD | Area (ha)= .04
02288> | 05:206 DT= 1.00 | Total Imp(h)= 67.00 Dir. Conn.(h)= 67.00
02289>
02290> IMPERVIOUS PERVIOUS (i)
02291> Surface Area (ha)= .03 .01
02292> Dep. Storage (mm)= 2.00 5.077
02293> Average Slope (h)= 2.00 2.00
02294> Length (m)= 14.00 20.00
02295> Mannings n = .013 .250
02296>
02297> Max. eff. Inten. (mm/hr)= 76.07 1.60
02298> over (min)= 1.00 25.00
02299> Storage Coeff. (min)= .71 (ii) 25.03 (ii)
02300> Unit Hyd. Peak (min)= 1.00 25.00
02301> Unit Hyd. Peak (cms)= 1.28 .13
02302>
02303> PEAK FLOW (cms)= .01 .00
02304> TIME TO PEAK (hrs)= 1.33 1.68
02305> RUNOFF VOLUME (mm)= 22.99 1.41
02306> TOTAL RAINFALL (mm)= 24.99 24.991
02307> RUNOFF COEFFICIENT = .92 .06
02308>
02309> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02310> CN* = 49.0 Ia = Dep. Storage (Above)
02311> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02312> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02313>
02314>
02315> R0001:C00080-----
02316> *#-----PROPOSED-----
02317> *#-----
02318> | ADD HYD |
02319> | 06:CUVERT | ID:HYD1 AREA OPEAK TPEAK R.V. CWF
02320> (ha) (cms) (hrs) (mm) (cms)
02321> ID 1 02:POND 3.630 .005 4.033 7.789 .000
02322> ID 2 03:POND OUT .000 .000 .000 .000 .000 **DRY**
02323> ID 3 04:202 .710 .007 1.333 2.835 .000
02324> ID 4 05:206 .040 .006 1.333 15.864 .000
02325>
02326> SUM 06:CUVERT 4.380 .014 1.333 7.060 .000
02327>
02328> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02329>
02330>
02331> R0001:C00081-----
02332> *#-----EXISTING-----
02333> *#-----
02334> *#-----
02335>
02336> | CALIB STANHYD | Area (ha)= .12
02337> | 09:203 DT= 1.00 | Total Imp(h)= 42.30 Dir. Conn.(h)= 20.00
02338>
02339> IMPERVIOUS PERVIOUS (i)
02340> Surface Area (ha)= .05 .07
02341>
02342>
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02507>
02508>
02509>
02510>
02511>
02512>
02513>
02514>
02515>
02516>
02517>
02518>
02519>
02520>
```

```
02521> over (min)= 4.00 10.00
02522> Storage Coeff. (min)= 2.86 (ii) 9.7024
02523> Unit Hyd. Tpeak (min)= 4.00 10.00
02524> Unit Hyd. peak (cms)= .29 .11
02525>
02526> PEAK FLOW (cms)= .12 .26
02527> TIME TO PEAK (hrs)= 7.00 7.007 7.000
02528> RUNOFF VOLUME (mm)= 191.00 135.41 150.252
02529> TOTAL RAINFALL (mm)= 191.00 193.00 193.000
02530> RUNOFF COEFFICIENT = .99 .779
02531>
02532> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02533> CN* = 70.0 Ia = Dep. Storage (Above)
02534> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02535> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02536>
-----
02538> R0001:C00089-----
02539> #-----
02540> #-----
02541> #-----
02542>
02543> | ROUTE RESERVOIR -> | Requested routing time step = 1.0 min.
02544> | IN:05:201 |
02545> | OUT:02:POND |
02546>
-----
02547> OUTFLOW STORAGE| OUTFLOW STORAGE| OUTFLOW STORAGE| OUTFLOW STORAGE
02548> (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.)
02549> .000 .0000E+00 .020 .1050E+00 .100 .1500E+00 .924 .2650E+00
02550> .007 .3400E-01 .053 .1270E+00 .158 .1740E+00 1.197 .2800E+00
02551> .010 .4300E-01 .075 .1380E+00 .240 .2110E+00 1.868 .3110E+00
02552> .011 .9400E-01 .100 .1500E+00 .353 .2240E+00 .000 .0000E+00
02553>
02553> ROUTING RESULTS AREA OPEAK TPEAK R.V.
02554> (ha) (cms) (hrs) (mm)
02555> INFLOW > 05:201 3.630 .375 7.000 150.252
02556> OUTFLOW < 02:POND 3.630 .234 7.250 150.248
02557> OVERFLOW < 03:POND OUT .000 .000 .000 .000
02558>
02559> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
02560> CUMULATIVE TIME OF OVERFLOWS (hours)= .00
02561> PERCENTAGE OF TIME OVERFLOWING (%) = .00
02562>
02563> PEAK FLOW REDUCTION [out/in] (%) = 62.512
02564> TIME SHIFT OF PEAK TIME (min)= 15.00
02565> MAXIMUM STORAGE USED (ha.m.)=.2017E+00
02566>
-----
02568> R0001:C00090-----
02569> #-----
02570> #-----
02571> #-----
02572>
02573> | CALIB STANDHYD | Area (ha)= .71
02574> | 04:102 DT= 1.00 | Total Imp(h)= 20.00 Dir. Conn. (h)= 5.00
02575>
02576>
-----
02577> IMPERVIOUS PERVIOUS (i)
02578> Surface Area (ha)= .14
02579> Dep. Storage (mm)= 2.00 5.00
02580> Average Slope (h)= 2.00 2.00
02581> Length (m)= 62.00 20.00
02582> Mannings n = .013 .250
02583>
02583> Max.eff.Inten.(mm/hr)= 43.00 40.36
02584> over (min)= 2.00 9.00
02585> Storage Coeff. (min)= 2.18 (ii) 8.88 (ii)
02586> Unit Hyd. Tpeak (min)= 2.00 9.00
02587> Unit Hyd. peak (cms)= .23 .13
02588>
02589> PEAK FLOW (cms)= .00 .06
02590> TIME TO PEAK (hrs)= 6.92 7.000
02591> RUNOFF VOLUME (mm)= 191.00 127.08 130.278
02592> TOTAL RAINFALL (mm)= 191.00 193.00 193.000
02593> RUNOFF COEFFICIENT = .99 .66
02594>
02595> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02596> CN* = 70.0 Ia = Dep. Storage (Above)
02597> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02598> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02599>
-----
02601> R0001:C00091-----
02602> #-----
02603> #-----
02604>
02605> | CALIB STANDHYD | Area (ha)= .04
02606> | 05:206 DT= 1.00 | Total Imp(h)= 67.00 Dir. Conn. (h)= 67.00
02607>
02608>
-----
02609> IMPERVIOUS PERVIOUS (i)
02610> Surface Area (ha)= .03 .01
02611> Dep. Storage (mm)= 2.00 5.00
02612> Average Slope (h)= 2.00 2.00
02613> Length (m)= 12.00 20.00
02614> Mannings n = .013 .250
02615>
02615> Max.eff.Inten.(mm/hr)= 43.00 32.18
02616> over (min)= 1.00 8.00
02617> Storage Coeff. (min)= .89 (ii) 8.22 (ii)
02618> Unit Hyd. Tpeak (min)= 1.00 8.00
02619> Unit Hyd. peak (cms)= 1.14 .15
02620>
02621> PEAK FLOW (cms)= .00 .00
02622> TIME TO PEAK (hrs)= 6.90 7.000
02623> RUNOFF VOLUME (mm)= 190.77 119.06 167.105
02624> TOTAL RAINFALL (mm)= 191.00 193.00 193.000
02625> RUNOFF COEFFICIENT = .99 .62
02626>
02627> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02628> CN* = 70.0 Ia = Dep. Storage (Above)
02629> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02630> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02631>
02632>
02633> R0001:C00092-----
02634> #-----
02635> #-----
02636>
02637> | ADD HYD |
02638> | 06:CULVERT | ID:HYD AREA OPEAK TPEAK R.V. CNF
02639> (ha) (cms) (hrs) (mm) (cms)
02640> ID 1 02:POND 3.630 .234 7.250 150.248 .000
02641> ID 2 03:POND OUT .000 .000 .000 .000 .000 **DRY**
02642> ID 3 04:102 .710 .067 7.000 130.278 .000
02643> ID 4 05:206 .040 .004 7.000 167.105 .000
02644> SUM 06:CULVERT 4.380 .291 7.083 147.165 .000
02645>
02646> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02647>
-----
02649> R0001:C00093-----
02650> #-----
02651> #-----
02652> #-----
02653>
02654> | CALIB STANDHYD | Area (ha)= .12
02655> | 09:103 DT= 1.00 | Total Imp(h)= 41.30 Dir. Conn. (h)= 20.00
02656>
02657>
-----
02658> IMPERVIOUS PERVIOUS (i)
02659> Surface Area (ha)= .05 .07
02660> Dep. Storage (mm)= 2.00 5.00
02661> Average Slope (h)= 2.00 2.00
02662> Length (m)= 28.00 20.00
02663> Mannings n = .013 .250
02664>
02664> Max.eff.Inten.(mm/hr)= 43.00 49.22
02665> over (min)= 1.00 8.00
02666> Storage Coeff. (min)= 1.35 (ii) 7.54 (ii)
02667> Unit Hyd. Tpeak (min)= 1.00 8.00
02668> Unit Hyd. peak (cms)= .89 .15
02669>
02670> PEAK FLOW (cms)= .00 .01
02671> TIME TO PEAK (hrs)= 6.83 7.000
02672> RUNOFF VOLUME (mm)= 190.48 133.89 145.207
02673> TOTAL RAINFALL (mm)= 193.00 193.00 193.000
02674> RUNOFF COEFFICIENT = .99 .69
02675>
02676> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02677> CN* = 70.0 Ia = Dep. Storage (Above)
02678> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02679> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02680>
-----
02682> R0001:C00094-----
02683> #-----
02684> #-----
02685> #-----
02686>
02686> | CALIB NASHYD | Area (ha)= .210 Curve Number (CN)= 78.00
02687> | 01:104 DT= 1.00 | Ia (mm)= 6.740 # of Linear Res. (N)= 3.00
02688> | U.S. Tp(hrs)= .440
02689>
02690> Unit Hyd. peak (cms)= .018
02691>
02692> PEAK FLOW (cms)= .019 (i)
02693> TIME TO PEAK (hrs)= 7.133
02694> DURATION (hrs)= 14.967, (ddddhh:mm)= 014:58
02695> AVERAGE FLOW (cms)= .005
02696> RUNOFF VOLUME (mm)= 134.320
02697> TOTAL RAINFALL (mm)= 193.000
02698> RUNOFF COEFFICIENT = .697
02699>
02700> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
02701>
-----
02703> R0001:C00095-----
02704> #-----
02705> #-----
02706>
02707> | CALIB STANDHYD | Area (ha)= .12
02708> | 10:204 DT= 1.00 | Total Imp(h)= 48.30 Dir. Conn. (h)= 48.30
02709>
02710>
-----
02711> IMPERVIOUS PERVIOUS (i)
02712> Surface Area (ha)= .06 .06
02713> Dep. Storage (mm)= 2.00 5.00
02714> Average Slope (h)= 2.00 2.00
02715> Length (m)= 28.00 20.00
02716> Mannings n = .013 .250
02717>
02717> Max.eff.Inten.(mm/hr)= 43.00 32.14
02718> over (min)= 1.00 9.00
02719> Storage Coeff. (min)= 1.35 (ii) 8.69 (ii)
02720> Unit Hyd. Tpeak (min)= 1.00 9.00
02721> Unit Hyd. peak (cms)= .89 .13
02722>
02723> PEAK FLOW (cms)= .01 .01
02724> TIME TO PEAK (hrs)= 6.87 7.000
02725> RUNOFF VOLUME (mm)= 190.75 119.06 153.687
02726> TOTAL RAINFALL (mm)= 193.00 193.00 193.000
02727> RUNOFF COEFFICIENT = .99 .62
02728>
02729> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02730> CN* = 70.0 Ia = Dep. Storage (Above)
02731> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02732> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02733>
-----
02735> R0001:C00096-----
02736> #-----
02737> #-----
02738>
02738> | CALIB NASHYD | Area (ha)= 2.970 Curve Number (CN)= 78.00
02739> | 07:101 DT= 1.00 | Ia (mm)= 6.700 # of Linear Res. (N)= 3.00
02740> | U.S. Tp(hrs)= .440
02741>
02742> Unit Hyd. peak (cms)= .258
02743>
02744> PEAK FLOW (cms)= .262 (i)
02745> TIME TO PEAK (hrs)= 7.133
02746> DURATION (hrs)= 14.967, (ddddhh:mm)= 014:58
02747> AVERAGE FLOW (cms)= .074
02748> RUNOFF VOLUME (mm)= 134.557
02749> TOTAL RAINFALL (mm)= 193.000
02750> RUNOFF COEFFICIENT = .697
02751>
02752> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02753>
-----
02755> R0001:C00097-----
02756> #-----
02757> #-----
02758>
02758> | CALIB STANDHYD | Area (ha)= .55
02759> | 08:205 DT= 1.00 | Total Imp(h)= 20.00 Dir. Conn. (h)= 5.00
02760>
02761>
-----
02762> IMPERVIOUS PERVIOUS (i)
02763> Surface Area (ha)= .11 .44
02764> Dep. Storage (mm)= 2.00 5.00
02765> Average Slope (h)= 2.00 2.00
02766> Length (m)= 61.00 20.00
02767> Mannings n = .013 .250
02768>
02768> Max.eff.Inten.(mm/hr)= 43.00 40.36
02769> over (min)= 2.00 9.00
02770> Storage Coeff. (min)= 2.16 (ii) 8.86 (ii)
02771> Unit Hyd. Tpeak (min)= 2.00 9.00
02772> Unit Hyd. peak (cms)= .53 .13
02773>
02774> PEAK FLOW (cms)= .00 .05
02775> TIME TO PEAK (hrs)= 6.92 7.000
02776> RUNOFF VOLUME (mm)= 191.00 127.08 130.278
02777> TOTAL RAINFALL (mm)= 193.00 193.00 193.000
02778> RUNOFF COEFFICIENT = .99 .66
02779>
02780> (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:
02781> CN* = 70.0 Ia = Dep. Storage (Above)
02782> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02783> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02784>
-----
02786> R0001:C00098-----
02787> #-----
02788> #-----
02789>
02789> | FINISH |
02790>
-----
02792>
02793>
02794>
02795>
02796> Simulation ended on 2022-10-20 at 12:17:47
02797>
```

```

00001 2 Metric units
00002 *#-----
00003 *# Project Name: [Union Street - Meaford] Project Number: [1923-5641]
00004 *# Date : 2020-05-19
00005 *# Modeler : [EP]
00006 *# Company : C.F. Crozier & Associates Inc.
00007 *# License # : 2707046
00008 *#-----
00009 START TERO=[0.0], METOUT=[2], NFORM=[0], NFORM=[0]
00010 *# [ c=stream filename, one use line for NFORM time
00011 *#-----
00012 *#-----
00013 *#-----
00014 *#-----
00015 *#-----
00016 *# 10-YEAR, 24 HOUR SCS STORM
00017 *#-----
00018 *#-----
00019 MASS STORM POTVAL=[108.0] (mm), CSDT=[1] (min),
00020 CURVE_FILENAME=[SCS24HR1.met]
00021 *#-----
00022 *#-----
00023 CALIB NASHDY ID=[1], NYHD=[102*], DT=[1] (min), AREA=[2.25] (ha),
00024 DWF=[0] (cms), CN/C=[60.3], IA=[6.74] (mm),
00025 N=[3], TP=[0.44] hrs,
00026 RAINFALL=[ , , , ] (mm/hr), END=-1
00027 *#-----
00028 CALIB STANDHY ID=[5], NYHD=[201*], DT=[1] (min), AREA=[3.63] (ha),
00029 XIMP=[0.267], TIMP=[0.49], DWF=[0] (cms), LOSS=[2],
00030 SCS curve number CN=[49],
00031 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00032 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00033 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00034 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00035 RAINFALL=[ , , , ] (mm/hr), END=-1
00036 *#-----
00037 *#-----
00038 *#-----
00039 *#-----
00040 *#-----
00041 *#-----
00042 *#-----
00043 ROUTE RESERVOIR IDout=[2], NYHD=[*POND*], IDine=[5],
00044 ROP=[1] (min),
00045 TABLE OF ( OUTFLOW-STORAGE ) values
00046 ( cms ) - ( ha-m )
00047 [ 0.0 , 0.0 ]
00048 [ 0.007 , 0.036 ]
00049 [ 0.010 , 0.063 ]
00050 [ 0.011 , 0.094 ]
00051 [ 0.020 , 0.132 ]
00052 [ 0.053 , 0.127 ]
00053 [ 0.075 , 0.139 ]
00054 [ 0.100 , 0.150 ]
00055 [ 0.158 , 0.174 ]
00056 [ 0.240 , 0.211 ]
00057 [ 0.353 , 0.224 ]
00058 [ 0.524 , 0.265 ]
00059 [ 1.197 , 0.280 ]
00060 [ 1.868 , 0.311 ]
00061 -1 , -1 (max twenty pts)
00062 IDout=[3], NYHD=[*POND OUT*]
00063 *#-----
00064 *#-----
00065 CALIB STANDHY ID=[4], NYHD=[*202*], DT=[1] (min), AREA=[0.71] (ha),
00066 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00067 SCS curve number CN=[49],
00068 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00069 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00070 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00071 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00072 N=[3], TP=[0.44] hrs,
00073 RAINFALL=[ , , , ] (mm/hr), END=-1
00074 *#-----
00075 *#-----
00076 CALIB STANDHY ID=[5], NYHD=[*206*], DT=[1] (min), AREA=[0.04] (ha),
00077 XIMP=[0.67], TIMP=[0.67], DWF=[0] (cms), LOSS=[2],
00078 SCS curve number CN=[70],
00079 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00080 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00081 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00082 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00083 RAINFALL=[ , , , ] (mm/hr), END=-1
00084 *#-----
00085 *#-----
00086 ADD HYD IDsum=[6], NYHD=[*CULVERT*], IDa to add=[2,3,4,5]
00087 *#-----
00088 *#-----
00089 *#-----
00090 *#-----
00091 CALIB STANDHY ID=[9], NYHD=[*203*], DT=[1] (min), AREA=[0.12] (ha),
00092 XIMP=[0.20], TIMP=[0.423], DWF=[0] (cms), LOSS=[2],
00093 SCS curve number CN=[49],
00094 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00095 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00096 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00097 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00098 RAINFALL=[ , , , ] (mm/hr), END=-1
00099 *#-----
00100 *#-----
00101 CALIB NASHDY ID=[7], NYHD=[*101*], DT=[1] (min), AREA=[2.97] (ha),
00102 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00103 N=[3], TP=[0.44] hrs,
00104 RAINFALL=[ , , , ] (mm/hr), END=-1
00105 *#-----
00106 *#-----
00107 CALIB STANDHY ID=[10], NYHD=[*204*], DT=[1] (min), AREA=[0.12] (ha),
00108 XIMP=[0.483], TIMP=[0.483], DWF=[0] (cms), LOSS=[2],
00109 SCS curve number CN=[49],
00110 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00111 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00112 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00113 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00114 RAINFALL=[ , , , ] (mm/hr), END=-1
00115 *#-----
00116 CALIB NASHDY ID=[1], NYHD=[*101*], DT=[1] (min), AREA=[0.21] (ha),
00117 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00118 N=[3], TP=[0.44] hrs,
00119 RAINFALL=[ , , , ] (mm/hr), END=-1
00120 *#-----
00121 CALIB STANDHY ID=[8], NYHD=[*205*], DT=[1] (min), AREA=[0.55] (ha),
00122 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00123 SCS curve number CN=[49],
00124 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00125 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00126 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00127 LGI=[161] (m), MNI=[0.013], SCT=[0] (min),
00128 RAINFALL=[ , , , ] (mm/hr), END=-1
00129 *#-----
00130 *#-----
00131 *# 50-YEAR, 24 HOUR SCS STORM
00132 *#-----
00133 *#-----
00134 MASS STORM POTVAL=[96.0] (mm), CSDT=[1] (min),
00135 CURVE_FILENAME=[SCS24HR1.met]
00136 *#-----
00137 *#-----
00138 CALIB NASHDY ID=[1], NYHD=[*102*], DT=[1] (min), AREA=[2.25] (ha),
00139 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00140 N=[3], TP=[0.44] hrs,
00141 RAINFALL=[ , , , ] (mm/hr), END=-1
00142 *#-----
00143 CALIB STANDHY ID=[5], NYHD=[*201*], DT=[1] (min), AREA=[3.63] (ha),
00144 XIMP=[0.267], TIMP=[0.49], DWF=[0] (cms), LOSS=[2],
00145 SCS curve number CN=[49],
00146 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00147 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00148 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00149 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00150 RAINFALL=[ , , , ] (mm/hr), END=-1
00151 *#-----
00152 *#-----
00153 *#-----
00154 *#-----
00155 *#-----
00156 *#-----
00157 *#-----
00158 ROUTE RESERVOIR IDout=[2], NYHD=[*POND*], IDine=[5],
00159 ROP=[1] (min),
00160 TABLE OF ( OUTFLOW-STORAGE ) values
00161 ( cms ) - ( ha-m )
00162 [ 0.0 , 0.0 ]
00163 [ 0.007 , 0.036 ]
00164 [ 0.010 , 0.063 ]
00165 [ 0.011 , 0.094 ]
00166 [ 0.020 , 0.132 ]
00167 [ 0.053 , 0.127 ]
00168 [ 0.075 , 0.139 ]
00169 [ 0.100 , 0.150 ]
00170 [ 0.158 , 0.174 ]
00171 [ 0.240 , 0.211 ]
00172 [ 0.353 , 0.224 ]
00173 [ 0.524 , 0.265 ]
00174 [ 1.197 , 0.280 ]
00175 [ 1.868 , 0.311 ]
00176 -1 , -1 (max twenty pts)
00177 IDout=[3], NYHD=[*POND OUT*]
00178 *#-----
00179 *#-----
00180 *#-----
00181 CALIB STANDHY ID=[4], NYHD=[*202*], DT=[1] (min), AREA=[0.71] (ha),
00182 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00183 SCS curve number CN=[49],
00184 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00185 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00186 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00187 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00188 RAINFALL=[ , , , ] (mm/hr), END=-1
00189 *#-----
00190 *#-----
00191 CALIB STANDHY ID=[5], NYHD=[*206*], DT=[1] (min), AREA=[0.04] (ha),
00192 XIMP=[0.67], TIMP=[0.67], DWF=[0] (cms), LOSS=[2],
00193 SCS curve number CN=[70],
00194 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00195 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00196 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00197 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00198 RAINFALL=[ , , , ] (mm/hr), END=-1
00199 *#-----
00200 *#-----
00201 ADD HYD IDsum=[6], NYHD=[*CULVERT*], IDa to add=[2,3,4,5]
00202 *#-----
00203 *#-----
00204 *#-----
00205 CALIB STANDHY ID=[9], NYHD=[*203*], DT=[1] (min), AREA=[0.12] (ha),
00206 XIMP=[0.20], TIMP=[0.423], DWF=[0] (cms), LOSS=[2],
00207 SCS curve number CN=[49],
00208 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00209 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00210 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00211 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00212 RAINFALL=[ , , , ] (mm/hr), END=-1
00213 *#-----
00214 *#-----
00215 CALIB NASHDY ID=[1], NYHD=[*101*], DT=[1] (min), AREA=[2.97] (ha),
00216 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00217 N=[3], TP=[0.44] hrs,
00218 RAINFALL=[ , , , ] (mm/hr), END=-1
00219 *#-----
00220 *#-----
00221 CALIB STANDHY ID=[10], NYHD=[*204*], DT=[1] (min), AREA=[0.12] (ha),
00222 XIMP=[0.483], TIMP=[0.483], DWF=[0] (cms), LOSS=[2],
00223 SCS curve number CN=[49],
00224 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00225 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00226 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00227 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00228 RAINFALL=[ , , , ] (mm/hr), END=-1
00229 *#-----
00230 CALIB NASHDY ID=[7], NYHD=[*101*], DT=[1] (min), AREA=[2.97] (ha),
00231 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00232 N=[3], TP=[0.44] hrs,
00233 RAINFALL=[ , , , ] (mm/hr), END=-1
00234 *#-----
00235 CALIB STANDHY ID=[8], NYHD=[*205*], DT=[1] (min), AREA=[0.55] (ha),
00236 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00237 SCS curve number CN=[49],
00238 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00239 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00240 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00241 LGI=[161] (m), MNI=[0.013], SCT=[0] (min),
00242 RAINFALL=[ , , , ] (mm/hr), END=-1
00243 *#-----
00244 *# 25-YEAR, 24 HOUR SCS STORM
00245 *#-----
00246 *#-----
00247 *#-----
00248 MASS STORM POTVAL=[96.0] (mm), CSDT=[1] (min),
00249 CURVE_FILENAME=[SCS24HR1.met]
00250 *#-----
00251 *#-----
00252 CALIB NASHDY ID=[1], NYHD=[*102*], DT=[1] (min), AREA=[2.25] (ha),
00253 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00254 N=[3], TP=[0.44] hrs,
00255 RAINFALL=[ , , , ] (mm/hr), END=-1
00256 *#-----
00257 CALIB STANDHY ID=[5], NYHD=[*201*], DT=[1] (min), AREA=[3.63] (ha),
00258 XIMP=[0.267], TIMP=[0.49], DWF=[0] (cms), LOSS=[2],
00259 SCS curve number CN=[49],
00260 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00261 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00262 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00263 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00264 RAINFALL=[ , , , ] (mm/hr), END=-1
00265 *#-----
00266 *#-----
00267 *#-----
00268 *#-----
00269 *#-----
00270 *#-----
00271 ROUTE RESERVOIR IDout=[2], NYHD=[*POND*], IDine=[5],
00272 ROP=[1] (min),
00273 TABLE OF ( OUTFLOW-STORAGE ) values
00274 ( cms ) - ( ha-m )
00275 [ 0.0 , 0.0 ]
00276 [ 0.007 , 0.036 ]
00277 [ 0.010 , 0.063 ]
00278 [ 0.011 , 0.094 ]
00279 [ 0.020 , 0.132 ]
00280 [ 0.053 , 0.127 ]
00281 [ 0.075 , 0.139 ]
00282 [ 0.100 , 0.150 ]
00283 [ 0.158 , 0.174 ]
00284 [ 0.240 , 0.211 ]
00285 [ 0.353 , 0.224 ]
00286 [ 0.524 , 0.265 ]
00287 [ 1.197 , 0.280 ]
00288 [ 1.868 , 0.311 ]
00289 -1 , -1 (max twenty pts)
00290 IDout=[3], NYHD=[*POND OUT*]
00291 *#-----
00292 *#-----
00293 CALIB STANDHY ID=[4], NYHD=[*202*], DT=[1] (min), AREA=[0.71] (ha),
00294 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00295 SCS curve number CN=[49],
00296 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00297 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00298 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00299 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00300 RAINFALL=[ , , , ] (mm/hr), END=-1
00301 *#-----
00302 *#-----
00303 CALIB STANDHY ID=[5], NYHD=[*206*], DT=[1] (min), AREA=[0.04] (ha),
00304 XIMP=[0.67], TIMP=[0.67], DWF=[0] (cms), LOSS=[2],
00305 SCS curve number CN=[70],
00306 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00307 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00308 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00309 LGI=[141] (m), MNI=[0.013], SCT=[0] (min),
00310 RAINFALL=[ , , , ] (mm/hr), END=-1
00311 *#-----
00312 *#-----
00313 ADD HYD IDsum=[6], NYHD=[*CULVERT*], IDa to add=[2,3,4,5]
00314 *#-----
00315 *#-----
00316 *#-----
00317 *#-----
00318 *#-----
00319 CALIB STANDHY ID=[9], NYHD=[*203*], DT=[1] (min), AREA=[0.12] (ha),
00320 XIMP=[0.20], TIMP=[0.423], DWF=[0] (cms), LOSS=[2],
00321 SCS curve number CN=[49],
00322 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00323 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00324 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00325 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00326 RAINFALL=[ , , , ] (mm/hr), END=-1
00327 *#-----
00328 *#-----
00329 CALIB NASHDY ID=[1], NYHD=[*101*], DT=[1] (min), AREA=[2.97] (ha),
00330 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00331 N=[3], TP=[0.44] hrs,
00332 RAINFALL=[ , , , ] (mm/hr), END=-1
00333 *#-----
00334 *#-----
00335 CALIB STANDHY ID=[8], NYHD=[*205*], DT=[1] (min), AREA=[0.55] (ha),
00336 XIMP=[0.05], TIMP=[0.20], DWF=[0] (cms), LOSS=[2],
00337 SCS curve number CN=[49],
00338 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00339 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00340 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00341 LGI=[161] (m), MNI=[0.013], SCT=[0] (min),
00342 RAINFALL=[ , , , ] (mm/hr), END=-1
00343 *#-----
00344 CALIB NASHDY ID=[7], NYHD=[*101*], DT=[1] (min), AREA=[2.97] (ha),
00345 DWF=[0] (cms), CN/C=[60.3], IA=[6.7] (mm),
00346 N=[3], TP=[0.44] hrs,
00347 RAINFALL=[ , , , ] (mm/hr), END=-1
00348 *#-----
00349 CALIB STANDHY ID=[5], NYHD=[*201*], DT=[1] (min), AREA=[3.63] (ha),
00350 XIMP=[0.267], TIMP=[0.49], DWF=[0] (cms), LOSS=[2],
00351 SCS curve number CN=[49],
00352 Pervious surfaces: IAgp=[5.0] (mm), SLPF=[2.0] (v),
00353 LGP=[20] (m), MNP=[0.25], SCF=[0] (min),
00354 Impervious surfaces: IAgp=[2.0] (mm), SLPF=[2.0] (v),
00355 LGI=[156] (m), MNI=[0.013], SCT=[0] (min),
00356 RAINFALL=[ , , , ] (mm/hr), END=-1
00357 *#-----
00358 *#-----
00359 *# 10-YEAR, 24 HOUR SCS STORM
00360 *#-----

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00362) MASS STORM-----
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00700) *#-----
00701)-----
00702) FINISH-----

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Page 1

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00361> Unit Hyd Peak (cms) = .210
00362>
00363> PEAK FLOW (cms) = .129 (i)
00364> TIME TO PEAK (hrs) = 12.517
00365> DURATION (hrs) = 26.783, (dddd(hh:mm)) = 1:02:47
00366> AVERAGE FLOW (cms) = .009
00367> RUNOFF VOLUME (mm) = 18.190
00368> TOTAL RAINFALL (mm) = 108.000
00369> RUNOFF COEFFICIENT = .354
00370>
00371> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00372>
00373>-----PROPOSED-----
00374> R0001C00004-----
00375> *#-----
00376> *#-----
00377> | CALIB STANDHYD | Area (ha) = 3.63
00378> | 05:201 | DT= 1.00 | Total Imp(V) = 49.00 Dir. Conn.(%) = 26.70
00379>-----
00380> IMPERVIOUS PERVIOUS (i)
00381> Surface Area (ha) = 1.78 1.85
00382> Dep. Storage (mm) = 2.00 5.00
00383> Average Slope (%) = 2.00 2.00
00384> Length (m) = 156.00 20.00
00385> Mannings n = .013 .250
00386>
00387> Max.eff.Inten.(mm/hr) = 121.50 74.98
00388> over (min) 3.00 8.00
00389> Storage Coeff. (min) = 2.51 (ii) 7.73 (ii)
00390> Unit Hyd. Tpeak (min) = 3.00 8.00
00391> Unit Hyd. peak (cms) = .42 .14
00392>
00393> *TOTALS*
00394> PEAK FLOW (cms) = .32 .29 .596 (iii)
00395> TIME TO PEAK (hrs) = 12.20 12.25 12.200
00396> RUNOFF VOLUME (mm) = 106.00 37.87 56.062
00397> TOTAL RAINFALL (mm) = 108.00 108.00 108.000
00398> RUNOFF COEFFICIENT = .98 .35 .519
00399>
00400> (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
00401> CN* = 49.0 Ia = Dep. Storage (Above)
00402> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
00403> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00404>-----
00405> R0001C00005-----
00406> *#-----
00407> *#-----
00408> *#-----
00409> *#-----
00410> *#-----
00411> *#-----
00412>-----
00413> ROUTE RESERVOIR -> | Requested routing time step = 1.0 min.
00414> | IN05:201 |
00415> | OUT02:02POND |-----OUTFLOW STORAGE TABLE-----
00416> (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.) (cms) (ha.m.)
00417> 000 .0000E+00 .020 .1050E+00 .100 .1500E+00 .924 .2650E+04
00418> .007 .3600E+01 .053 .1270E+00 .158 .1740E+00 1.197 .2800E+00
00419> .010 .6100E+01 .075 .1380E+00 .260 .2110E+00 1.868 .3310E+00
00420> .001 .9400E+01 .100 .1500E+00 .353 .2240E+00 .000 .0000E+00
00421>
00422>
00423> ROUTING RESULTS Area OPEAK TPEAK R.V.
00424> INFLOW > 05:201 3.630 .596 12.200 56.062
00425> OUTFLOW < 02:02POND 3.630 .045 13.233 56.061
00426> OVERFLOW < 03:02POND OUT .000 .000 .000 .000
00427>
00428> TOTAL NUMBER OF SIMULATED OVERFLOWS = 0
00429> CUMULATIVE TIME OF OVERFLOWS (hours) = .00
00430> PERCENTAGE OF TIME OVERFLOWING (%) = .00
00431>
00432>
00433> PEAK FLOW REDUCTION [out/In] (%) = 7.493
00434> TIME SHIFT OF PEAK FLOW (min) = 62.00
00435> MAXIMUM STORAGE USED (ha.m.) = .1214E+00
00436>
00437>-----
00438> R0001C00006-----
00439> *#-----
00440> *#-----
00441> *#-----
00442>-----
00443> | CALIB STANDHYD | Area (ha) = .71
00444> | 04:102 | DT= 1.00 | Total Imp(V) = 20.00 Dir. Conn.(%) = 5.00
00445>-----
00446> IMPERVIOUS PERVIOUS (i)
00447> Surface Area (ha) = .14
00448> Dep. Storage (mm) = 2.00 5.00
00449> Average Slope (%) = 2.00 2.00
00450> Length (m) = 61.00 20.00
00451> Mannings n = .013 .250
00452>
00453> Max.eff.Inten.(mm/hr) = 121.50 54.69
00454> over (min) 1.00 7.00
00455> Storage Coeff. (min) = 1.44 (ii) 7.37 (ii)
00456> Unit Hyd. Tpeak (min) = 1.00 7.00
00457> Unit Hyd. peak (cms) = .85 .16
00458>
00459> *TOTALS*
00460> PEAK FLOW (cms) = .01 .07 .074 (iii)
00461> TIME TO PEAK (hrs) = 12.18 12.20 12.200
00462> RUNOFF VOLUME (mm) = 105.95 13.23 36.649
00463> TOTAL RAINFALL (mm) = 106.00 108.00 108.000
00464> RUNOFF COEFFICIENT = .98 .31 .339
00465>
00466> (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
00467> CN* = 49.0 Ia = Dep. Storage (Above)
00468> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
00469> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00470>-----
00471> R0001C00007-----
00472> *#-----
00473> *#-----
00474> *#-----
00475> | CALIB STANDHYD | Area (ha) = .04
00476> | 05:206 | DT= 1.00 | Total Imp(V) = 67.00 Dir. Conn.(%) = 67.00
00477>-----
00478> IMPERVIOUS PERVIOUS (i)
00479> Surface Area (ha) = .03 .01
00480> Dep. Storage (mm) = 2.00 5.00
00481> Average Slope (%) = 2.00 2.00
00482> Length (m) = 18.00 20.00
00483> Mannings n = .013 .250
00484>
00485> Max.eff.Inten.(mm/hr) = 121.50 71.06
00486> over (min) 1.00 6.00
00487> Storage Coeff. (min) = .29 (ii) 7.37 (ii)
00488> Unit Hyd. Tpeak (min) = 1.00 6.00
00489> Unit Hyd. peak (cms) = 1.39 .19
00490>
00491> *TOTALS*
00492> PEAK FLOW (cms) = .01 .00 .011 (iii)
00493> TIME TO PEAK (hrs) = 12.08 12.20 12.200
00494> RUNOFF VOLUME (mm) = 105.98 50.08 87.530
00495> TOTAL RAINFALL (mm) = 106.00 108.00 108.000
00496> RUNOFF COEFFICIENT = .98 .46 .810
00497>
00498> (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
00499> CN* = 70.0 Ia = Dep. Storage (Above)
00500> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
00501> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00502>-----
00503> R0001C00008-----
00504> *#-----
00505> *#-----
00506> *#-----
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SCS Output

C.F. Crozier & Associates Inc.

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0001: 0:49 9601 4:49 1:9201 8:49 2:8801 8:49 1:6160 16:49 2:4001 20:49 1:440
0002: 0:50 9601 4:50 1:9201 8:50 2:8801 12:50 8:1600 16:50 2:4001 20:50 1:440
0003: 0:51 9601 4:51 1:9201 8:51 2:8801 12:51 8:1600 16:51 2:4001 20:51 1:440
0004: 0:52 9601 4:52 1:9201 8:52 2:8801 12:52 8:1600 16:52 2:4001 20:52 1:440
0005: 0:53 9601 4:53 1:9201 8:53 2:8801 12:53 8:1600 16:53 2:4001 20:53 1:440
0006: 0:54 9601 4:54 1:9201 8:54 2:8801 12:54 8:1600 16:54 2:4001 20:54 1:440
0007: 0:55 9601 4:55 1:9201 8:55 2:8801 12:55 8:1600 16:55 2:4001 20:55 1:440
0008: 0:56 9601 4:56 1:9201 8:56 2:8801 12:56 8:1600 16:56 2:4001 20:56 1:440
0009: 0:57 9601 4:57 1:9201 8:57 2:8801 12:57 8:1600 16:57 2:4001 20:57 1:440
0010: 0:58 9601 4:58 1:9201 8:58 2:8801 12:58 8:1600 16:58 2:4001 20:58 1:440
0011: 0:59 9601 4:59 1:9201 8:59 2:8801 12:59 8:1600 16:59 2:4001 20:59 1:440
0012: 1:00 9601 5:00 1:9201 9:00 2:8801 13:00 8:1600 17:00 2:4001 21:00 1:440
0013: 1:01 9601 5:01 1:9201 9:01 2:8801 13:01 8:1600 17:01 2:4001 21:01 1:440
0014: 1:02 9601 5:02 1:9201 9:02 2:8801 13:02 8:1600 17:02 2:4001 21:02 1:440
0015: 1:03 9601 5:03 1:9201 9:03 2:8801 13:03 8:1600 17:03 2:4001 21:03 1:440
0016: 1:04 9601 5:04 1:9201 9:04 2:8801 13:04 8:1600 17:04 2:4001 21:04 1:440
0017: 1:05 9601 5:05 1:9201 9:05 2:8801 13:05 8:1600 17:05 2:4001 21:05 1:440
0018: 1:06 9601 5:06 1:9201 9:06 2:8801 13:06 8:1600 17:06 2:4001 21:06 1:440
0019: 1:07 9601 5:07 1:9201 9:07 2:8801 13:07 8:1600 17:07 2:4001 21:07 1:440
0020: 1:08 9601 5:08 1:9201 9:08 2:8801 13:08 8:1600 17:08 2:4001 21:08 1:440
0021: 1:09 9601 5:09 1:9201 9:09 2:8801 13:09 8:1600 17:09 2:4001 21:09 1:440
0022: 1:10 9601 5:10 1:9201 9:10 2:8801 13:10 8:1600 17:10 2:4001 21:10 1:440
0023: 1:11 9601 5:11 1:9201 9:11 2:8801 13:11 8:1600 17:11 2:4001 21:11 1:440
0024: 1:12 9601 5:12 1:9201 9:12 2:8801 13:12 8:1600 17:12 2:4001 21:12 1:440
0025: 1:13 9601 5:13 1:9201 9:13 2:8801 13:13 8:1600 17:13 2:4001 21:13 1:440
0026: 1:14 9601 5:14 1:9201 9:14 2:8801 13:14 8:1600 17:14 2:4001 21:14 1:440
0027: 1:15 9601 5:15 1:9201 9:15 2:8801 13:15 8:1600 17:15 2:4001 21:15 1:440
0028: 1:16 9601 5:16 1:9201 9:16 2:8801 13:16 8:1600 17:16 2:4001 21:16 1:440
0029: 1:17 9601 5:17 1:9201 9:17 2:8801 13:17 8:1600 17:17 2:4001 21:17 1:440
0030: 1:18 9601 5:18 1:9201 9:18 2:8801 13:18 8:1600 17:18 2:4001 21:18 1:440
0031: 1:19 9601 5:19 1:9201 9:19 2:8801 13:19 8:1600 17:19 2:4001 21:19 1:440
0032: 1:20 9601 5:20 1:9201 9:20 2:8801 13:20 8:1600 17:20 2:4001 21:20 1:440
0033: 1:21 9601 5:21 1:9201 9:21 2:8801 13:21 8:1600 17:21 2:4001 21:21 1:440
0034: 1:22 9601 5:22 1:9201 9:22 2:8801 13:22 8:1600 17:22 2:4001 21:22 1:440
0035: 1:23 9601 5:23 1:9201 9:23 2:8801 13:23 8:1600 17:23 2:4001 21:23 1:440
0036: 1:24 9601 5:24 1:9201 9:24 2:8801 13:24 8:1600 17:24 2:4001 21:24 1:440
0037: 1:25 9601 5:25 1:9201 9:25 2:8801 13:25 8:1600 17:25 2:4001 21:25 1:440
0038: 1:26 9601 5:26 1:9201 9:26 2:8801 13:26 8:1600 17:26 2:4001 21:26 1:440
0039: 1:27 9601 5:27 1:9201 9:27 2:8801 13:27 8:1600 17:27 2:4001 21:27 1:440
0040: 1:28 9601 5:28 1:9201 9:28 2:8801 13:28 8:1600 17:28 2:4001 21:28 1:440
0041: 1:29 9601 5:29 1:9201 9:29 2:8801 13:29 8:1600 17:29 2:4001 21:29 1:440
0042: 1:30 9601 5:30 1:9201 9:30 2:8801 13:30 8:1600 17:30 2:4001 21:30 1:440
0043: 1:31 9601 5:31 1:9201 9:31 2:8801 13:31 8:1600 17:31 2:4001 21:31 1:440
0044: 1:32 9601 5:32 1:9201 9:32 2:8801 13:32 8:1600 17:32 2:4001 21:32 1:440
0045: 1:33 9601 5:33 1:9201 9:33 2:8801 13:33 8:1600 17:33 2:4001 21:33 1:440
0046: 1:34 9601 5:34 1:9201 9:34 2:8801 13:34 8:1600 17:34 2:4001 21:34 1:440
0047: 1:35 9601 5:35 1:9201 9:35 2:8801 13:35 8:1600 17:35 2:4001 21:35 1:440
0048: 1:36 9601 5:36 1:9201 9:36 2:8801 13:36 8:1600 17:36 2:4001 21:36 1:440
0049: 1:37 9601 5:37 1:9201 9:37 2:8801 13:37 8:1600 17:37 2:4001 21:37 1:440
0050: 1:38 9601 5:38 1:9201 9:38 2:8801 13:38 8:1600 17:38 2:4001 21:38 1:440
0051: 1:39 9601 5:39 1:9201 9:39 2:8801 13:39 8:1600 17:39 2:4001 21:39 1:440
0052: 1:40 9601 5:40 1:9201 9:40 2:8801 13:40 8:1600 17:40 2:4001 21:40 1:440
0053: 1:41 
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01001# R0001C00021-----
01002# *-----PROPOSED-----
01003# *-----
01004# *-----
01005# *-----
01006# | CALIB STANDARD | Area (ha)= .12
01007# | 09:103 | DT= 1.00 | Total Imp(%)= 42.30 Dir. Conn.(%)= 20.00
01008# *-----
01009# *-----IMPERVIOUS PERVIOUS (i)
01010# Surface Area (ha)= .05
01011# Dep. Storage (mm)= 2.00 5.00
01012# Average Slope (ft)= 2.00 2.00
01013# Length (m)= 28.00 20.00
01014# Mannings n = .013 .250
01015#
01016# Max.eff.Inten.(mm/hr)= 108.00 58.33
01017# over (min)= 1.00 7.00
01018# Storage Coeff. (min)= .94 (li) 6.71 (li)
01019# Unit Hyd. Tpeak (min)= 1.00 7.00
01020# Unit Hyd. Tpeak (cms)= 1.11 1.17
01021#
01022# PEAK FLOW (cms)= .01 .01 "TOTALS"
01023# TIME TO PEAK (hrs)= 12.12 12.23 12.200
01024# RUNOFF VOLUME (mm)= 93.95 30.16 42.915
01025# TOTAL RAINFALL (mm)= 86.00 96.00 95.999
01026# RUNOFF COEFFICIENT = .98 .31 .447
01027#

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01028# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01029# CM = 49.0 Ia = Dep. Storage (Above)
01030# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01031# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01032#

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01033#
01034# R0001C00022-----
01035# *-----EXISTING-----
01036# *-----
01037# *-----
01038# *-----
01039# | CALIB STANDARD | Area (ha)= .210 Curve Number (CN)= 60.30
01040# | 01:104 | DT= 1.00 | Ia (mm)= 6.740 # of Linear Res.(N)= 3.00
01041# | 01:104 | DT= 1.00 | U.R. Tp(hrs)= .440
01042# *-----
01043# *-----IMPERVIOUS PERVIOUS (i)
01044# Surface Area (ha)= .06 .06
01045# Dep. Storage (mm)= 2.00 5.00
01046# Average Slope (ft)= 2.00 2.00
01047# Length (m)= 28.00 20.00
01048# Mannings n = .013 .250
01049#
01050# Max.eff.Inten.(mm/hr)= 108.00 52.14
01051# over (min)= 1.00 8.330
01052# Storage Coeff. (min)= .94 (li) 8.27 (li)
01053# Unit Hyd. Tpeak (min)= 1.00 8.330
01054# Unit Hyd. Tpeak (cms)= 1.11 .14 "TOTALS"
01055# PEAK FLOW (cms)= .02 .02
01056# TIME TO PEAK (hrs)= 12.13 12.25 12.200
01057# RUNOFF VOLUME (mm)= 31.063 31.063
01058# TOTAL RAINFALL (mm)= 95.999
01059# RUNOFF COEFFICIENT = .98 .24 .598
01060#

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01061# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01062# CM = 49.0 Ia = Dep. Storage (Above)
01063# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01064# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01065#

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01066#
01067# R0001C00023-----
01068# *-----PROPOSED-----
01069# *-----
01070# *-----
01071# *-----
01072# | CALIB STANDARD | Area (ha)= .12
01073# | 01:104 | DT= 1.00 | Total Imp(%)= 46.30 Dir. Conn.(%)= 48.30
01074# *-----
01075# *-----IMPERVIOUS PERVIOUS (i)
01076# Surface Area (ha)= .06 .06
01077# Dep. Storage (mm)= 2.00 5.00
01078# Average Slope (ft)= 2.00 2.00
01079# Length (m)= 28.00 20.00
01080# Mannings n = .013 .250
01081#
01082# Max.eff.Inten.(mm/hr)= 108.00 52.14
01083# over (min)= 1.00 8.330
01084# Storage Coeff. (min)= .94 (li) 8.27 (li)
01085# Unit Hyd. Tpeak (min)= 1.00 8.330
01086# Unit Hyd. Tpeak (cms)= 1.11 .14 "TOTALS"
01087# PEAK FLOW (cms)= .02 .02
01088# TIME TO PEAK (hrs)= 12.13 12.25 12.200
01089# RUNOFF VOLUME (mm)= 31.063 31.063
01090# TOTAL RAINFALL (mm)= 95.999
01091# RUNOFF COEFFICIENT = .98 .24 .598
01092#

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01093# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01094# CM = 49.0 Ia = Dep. Storage (Above)
01095# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01096# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01097#

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01098#
01099# R0001C00024-----
01100# *-----EXISTING-----
01101# *-----
01102# *-----
01103# *-----
01104# | CALIB STANDARD | Area (ha)= 2.970 Curve Number (CN)= 60.30
01105# | 01:101 | DT= 1.00 | Ia (mm)= 6.700 # of Linear Res.(N)= 3.00
01106# | 01:101 | DT= 1.00 | U.R. Tp(hrs)= .440
01107# *-----
01108# *-----IMPERVIOUS PERVIOUS (i)
01109# Surface Area (ha)= .06 .06
01110# Dep. Storage (mm)= 2.00 5.00
01111# Average Slope (ft)= 2.00 2.00
01112# Length (m)= 28.00 20.00
01113# Mannings n = .013 .250
01114#
01115# Max.eff.Inten.(mm/hr)= 108.00 52.14
01116# over (min)= 1.00 8.330
01117# Storage Coeff. (min)= .94 (li) 8.27 (li)
01118# Unit Hyd. Tpeak (min)= 1.00 8.330
01119# Unit Hyd. Tpeak (cms)= 1.11 .14 "TOTALS"
01120# PEAK FLOW (cms)= .02 .02
01121# TIME TO PEAK (hrs)= 12.13 12.25 12.200
01122# RUNOFF VOLUME (mm)= 31.063 31.063
01123# TOTAL RAINFALL (mm)= 95.999
01124# RUNOFF COEFFICIENT = .98 .24 .598
01125#

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01126# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01127# CM = 49.0 Ia = Dep. Storage (Above)
01128# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01129# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01130#

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01131#
01132# R0001C00025-----
01133# *-----PROPOSED-----
01134# *-----
01135# *-----
01136# *-----
01137# | CALIB STANDARD | Area (ha)= .55
01138# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01139# *-----
01140# *-----IMPERVIOUS PERVIOUS (i)
01141# Surface Area (ha)= .11 .44
01142# Dep. Storage (mm)= 2.00 5.00
01143# Average Slope (ft)= 2.00 2.00
01144# Length (m)= 20.00 2.00
01145# Mannings n = .013 .250
01146#
01147# Max.eff.Inten.(mm/hr)= 108.00 43.88
01148# over (min)= 1.00 8.00
01149# Storage Coeff. (min)= .94 (li) 11.97 (li)
01150# Unit Hyd. Tpeak (min)= 1.00 8.00
01151# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01152# PEAK FLOW (cms)= .01 .04 .045 (lii)
01153# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01154# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01155# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01156# RUNOFF COEFFICIENT = .98 .31 .414
01157#

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01158# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01159# CM = 49.0 Ia = Dep. Storage (Above)
01160# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01161# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01162#

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01163#
01164# R0001C00026-----
01165# *-----PROPOSED-----
01166# *-----
01167# *-----
01168# *-----
01169# | CALIB STANDARD | Area (ha)= .55
01170# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01171# *-----
01172# *-----IMPERVIOUS PERVIOUS (i)
01173# Surface Area (ha)= .11 .44
01174# Dep. Storage (mm)= 2.00 5.00
01175# Average Slope (ft)= 2.00 2.00
01176# Length (m)= 20.00 2.00
01177# Mannings n = .013 .250
01178#
01179# Max.eff.Inten.(mm/hr)= 108.00 43.88
01180# over (min)= 1.00 8.00
01181# Storage Coeff. (min)= .94 (li) 11.97 (li)
01182# Unit Hyd. Tpeak (min)= 1.00 8.00
01183# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01184# PEAK FLOW (cms)= .01 .04 .045 (lii)
01185# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01186# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01187# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01188# RUNOFF COEFFICIENT = .98 .31 .414
01189#

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01190# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01191# CM = 49.0 Ia = Dep. Storage (Above)
01192# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01193# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01194#

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01195#
01196# R0001C00027-----
01197# *-----PROPOSED-----
01198# *-----
01199# *-----
01200# *-----
01201# | CALIB STANDARD | Area (ha)= .55
01202# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01203# *-----
01204# *-----IMPERVIOUS PERVIOUS (i)
01205# Surface Area (ha)= .11 .44
01206# Dep. Storage (mm)= 2.00 5.00
01207# Average Slope (ft)= 2.00 2.00
01208# Length (m)= 20.00 2.00
01209# Mannings n = .013 .250
01210#
01211# Max.eff.Inten.(mm/hr)= 108.00 43.88
01212# over (min)= 1.00 8.00
01213# Storage Coeff. (min)= .94 (li) 11.97 (li)
01214# Unit Hyd. Tpeak (min)= 1.00 8.00
01215# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01216# PEAK FLOW (cms)= .01 .04 .045 (lii)
01217# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01218# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01219# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01220# RUNOFF COEFFICIENT = .98 .31 .414
01221#

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01222# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01223# CM = 49.0 Ia = Dep. Storage (Above)
01224# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01225# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01226#

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01227#
01228# R0001C00028-----
01229# *-----PROPOSED-----
01230# *-----
01231# *-----
01232# *-----
01233# | CALIB STANDARD | Area (ha)= .55
01234# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01235# *-----
01236# *-----IMPERVIOUS PERVIOUS (i)
01237# Surface Area (ha)= .11 .44
01238# Dep. Storage (mm)= 2.00 5.00
01239# Average Slope (ft)= 2.00 2.00
01240# Length (m)= 20.00 2.00
01241# Mannings n = .013 .250
01242#
01243# Max.eff.Inten.(mm/hr)= 108.00 43.88
01244# over (min)= 1.00 8.00
01245# Storage Coeff. (min)= .94 (li) 11.97 (li)
01246# Unit Hyd. Tpeak (min)= 1.00 8.00
01247# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01248# PEAK FLOW (cms)= .01 .04 .045 (lii)
01249# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01250# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01251# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01252# RUNOFF COEFFICIENT = .98 .31 .414
01253#

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01254# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01255# CM = 49.0 Ia = Dep. Storage (Above)
01256# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01257# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01258#

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01259#
01260# R0001C00029-----
01261# *-----PROPOSED-----
01262# *-----
01263# *-----
01264# *-----
01265# | CALIB STANDARD | Area (ha)= .55
01266# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01267# *-----
01268# *-----IMPERVIOUS PERVIOUS (i)
01269# Surface Area (ha)= .11 .44
01270# Dep. Storage (mm)= 2.00 5.00
01271# Average Slope (ft)= 2.00 2.00
01272# Length (m)= 20.00 2.00
01273# Mannings n = .013 .250
01274#
01275# Max.eff.Inten.(mm/hr)= 108.00 43.88
01276# over (min)= 1.00 8.00
01277# Storage Coeff. (min)= .94 (li) 11.97 (li)
01278# Unit Hyd. Tpeak (min)= 1.00 8.00
01279# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01280# PEAK FLOW (cms)= .01 .04 .045 (lii)
01281# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01282# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01283# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01284# RUNOFF COEFFICIENT = .98 .31 .414
01285#

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01286# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01287# CM = 49.0 Ia = Dep. Storage (Above)
01288# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01289# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01290#

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01291#
01292# R0001C00030-----
01293# *-----PROPOSED-----
01294# *-----
01295# *-----
01296# *-----
01297# | CALIB STANDARD | Area (ha)= .55
01298# | 08:205 | DT= 1.00 | Total Imp(%)= 20.00 Dir. Conn.(%)= 5.00
01299# *-----
01300# *-----IMPERVIOUS PERVIOUS (i)
01301# Surface Area (ha)= .11 .44
01302# Dep. Storage (mm)= 2.00 5.00
01303# Average Slope (ft)= 2.00 2.00
01304# Length (m)= 20.00 2.00
01305# Mannings n = .013 .250
01306#
01307# Max.eff.Inten.(mm/hr)= 108.00 43.88
01308# over (min)= 1.00 8.00
01309# Storage Coeff. (min)= .94 (li) 11.97 (li)
01310# Unit Hyd. Tpeak (min)= 1.00 8.00
01311# Unit Hyd. Tpeak (cms)= .83 .14 "TOTALS"
01312# PEAK FLOW (cms)= .01 .04 .045 (lii)
01313# TIME TO PEAK (hrs)= 12.17 12.25 12.200
01314# RUNOFF VOLUME (mm)= 93.88 26.80 30.151
01315# TOTAL RAINFALL (mm)= 96.00 96.00 95.999
01316# RUNOFF COEFFICIENT = .98 .31 .414
01317#

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01318# (i) ON PROCEDURE SELECTED FOR PVIOUS LOSSES:
01319# CM = 49.0 Ia = Dep. Storage (Above)
01320# (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01321# (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01322#

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[illegible]

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01621)          CN* = 0   Ia = Dep. Storage (Above)
01622)          (1) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01623)          (11) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01624)
01625)
01626) R0001:C00032:-----|-----|-----|-----|-----|-----|
01627) #-----|-----|-----|-----|-----|-----|
01628)
01629) I ADD HYD                      |
01630) I 06:CULVERT                    | ID:HYNDY                      AREA      QPEAK      TPEAK      R.V.      DMF
01631)                               | (ha)      (cms)      (hrs)      (cms)      (cms)
01632)                               | ID 1 02:POND                      3.630      .016 15.217  41.421    .000
01633)                               | ID 2 03:POND CUT                  .000      .000      .000      .000      .000
01634)                               | ID 3 04:OCELOT                    .710      .046 12.217  25.273    .000
01635)                               | ID 4 05:TOES                      .040      .009 12.200  39.046    .000
01636)                               |
01637) SUM 06:CULVERT                  4.380      .064 12.200  39.046    .000
01638)
01639) NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01640)
01641)
01642) R0001:C00033:-----|-----|-----|-----|-----|-----|
01643) #-----|-----|-----|-----|-----|-----|
01644) #-----|-----|-----|-----|-----|-----|
01645) #-----|-----|-----|-----|-----|-----|
01646) #-----|-----|-----|-----|-----|-----|
01647) I CALIB STANWYD                  | Area (ha) = .12
01648) I 10:203      DT= 1.00          | Total Imp(h)= 42.30   Dir. Conn.(%) = 20.00
01649)
01650)                               | IMPERVIOUS      PERVIOUS (i)
01651) Surface Area (ha) = .05      .05
01652) Dep. Storage (mm) = 2.00      5.00
01653) Average Slope (ft) = 2.00      2.00
01654) Length (m) = 28.00      20.00
01655) Mannings n = .013      .250
01656)
01657) Max. eff. Inten. (mm/hr) = 97.20  48.52
01658) over (min) = 1.00      7.00
01659) Storage Coeff. (min) = .98 (ii)  7.20 (ii)
01660) Unit Hyd. Peak (min) = 1.00      7.00
01661) Unit Hyd. Peak (cms) = 1.09      .16
01662)
01663) PEAK FLOW (cms) = .01      .01      *TOTALS*
01664) TIME TO PEAK (hrs) = 12.12  12.23      12.200
01665) RUNOFF VOLUME (mm) = 84.34  25.07      36.920
01666) TOTAL RAINFALL (mm) = 86.40  86.40      86.401
01667) RUNOFF COEFFICIENT = .98      .29      .427
01668)
01669) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSER:
01670) CN* = 49.0 Ia = Dep. Storage (Above)
01671) (1) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01672) (11) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01673)
01674)
01675) R0001:C00034:-----|-----|-----|-----|-----|-----|
01676) #-----|-----|-----|-----|-----|-----|
01677) #-----|-----|-----|-----|-----|-----|
01678) #-----|-----|-----|-----|-----|-----|
01679) I CALIB NASWYD                    | Area (ha) = .210   Curve Number (CN) = 60.30
01680) I 01:104      DT= 1.00          | Ia (mm) = 6.740   # of Linear Res. (N) = 3.00
01681)                               | U.H. T(hrs) = 4.40
01682)
01683) Unit Hyd Peak (cms) = .018
01684)
01685) PEAK FLOW (cms) = .008 (i)
01686) TIME TO PEAK (hrs) = 12.567
01687) DURATION (hrs) = 26.967, (ddd(hh:mm)) = 1:02:58
01688) AVERAGE FLOW (cms) = .001
01689) RUNOFF VOLUME (mm) = 25.703
01690) TOTAL RAINFALL (mm) = 86.401
01691) RUNOFF COEFFICIENT = .297
01692)
01693) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01694)
01695)
01696) R0001:C00035:-----|-----|-----|-----|-----|-----|
01697) #-----|-----|-----|-----|-----|-----|
01698) #-----|-----|-----|-----|-----|-----|
01699) #-----|-----|-----|-----|-----|-----|
01700) I CALIB STANWYD                  | Area (ha) = .12
01701) I 10:204      DT= 1.00          | Total Imp(h)= 48.30   Dir. Conn.(%) = 48.30
01702)
01703)                               | IMPERVIOUS      PERVIOUS (i)
01704) Surface Area (ha) = .06      .06
01705) Dep. Storage (mm) = 2.00      5.00
01706) Average Slope (ft) = 2.00      2.00
01707) Length (m) = 28.00      20.00
01708) Mannings n = .013      .250
01709)
01710) Max. eff. Inten. (mm/hr) = 97.20  26.06
01711) over (min) = 1.00      9.00
01712) Storage Coeff. (min) = .98 (ii)  9.05 (ii)
01713) Unit Hyd. Peak (min) = 1.00      9.00
01714) Unit Hyd. Peak (cms) = 1.09      .13
01715)
01716) PEAK FLOW (cms) = .02      .00      *TOTALS*
01717) TIME TO PEAK (hrs) = 12.13  12.27      12.200
01718) RUNOFF VOLUME (mm) = 84.38  19.16      30.401
01719) TOTAL RAINFALL (mm) = 86.401
01720) RUNOFF COEFFICIENT = .22      .586
01721)
01722) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSER:
01723) CN* = 49.0 Ia = Dep. Storage (Above)
01724) (1) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01725) (11) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01726)
01727)
01728) R0001:C00036:-----|-----|-----|-----|-----|-----|
01729) #-----|-----|-----|-----|-----|-----|
01730) #-----|-----|-----|-----|-----|-----|
01731) #-----|-----|-----|-----|-----|-----|
01732) I CALIB NASWYD                    | Area (ha) = 2.970   Curve Number (CN) = 60.30
01733) I 07:101      DT= 1.00          | Ia (mm) = 6.740   # of Linear Res. (N) = 3.00
01734)                               | U.H. T(hrs) = 4.40
01735)
01736) Unit Hyd Peak (cms) = .258
01737)
01738) PEAK FLOW (cms) = .108 (i)
01739) TIME TO PEAK (hrs) = 12.567
01740) DURATION (hrs) = 26.967, (ddd(hh:mm)) = 1:02:58
01741) AVERAGE FLOW (cms) = .008
01742) RUNOFF VOLUME (mm) = 25.725
01743) TOTAL RAINFALL (mm) = 86.401
01744) RUNOFF COEFFICIENT = .298
01745)
01746) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01747)
01748)
01749) R0001:C00037:-----|-----|-----|-----|-----|-----|
01750) #-----|-----|-----|-----|-----|-----|
01751) #-----|-----|-----|-----|-----|-----|
01752) #-----|-----|-----|-----|-----|-----|
01753) I CALIB STANWYD                  | Area (ha) = .55
01754) I 08:205      DT= 1.00          | Total Imp(h)= 20.00   Dir. Conn.(%) = 5.00
01755)
01756)                               | IMPERVIOUS      PERVIOUS (i)
01757) Surface Area (ha) = .44      .11
01758) Dep. Storage (mm) = 2.00      5.00
01759) Average Slope (ft) = 2.00      2.00
01760) Length (m) = 61.00      20.00
01761) Mannings n = .013      .250
01762)
01763) Max. eff. Inten. (mm/hr) = 97.20  35.81
01764) over (min) = 1.00      9.00
01765) Storage Coeff. (min) = 1.56 (ii)  8.58 (ii)
01766) Unit Hyd. Peak (min) = 1.00      9.00
01767) Unit Hyd. Peak (cms) = 1.09      .03
01768)
01769) PEAK FLOW (cms) = .01      .03      *TOTALS*
01770) TIME TO PEAK (hrs) = 12.18  12.27      12.217
01771) RUNOFF VOLUME (mm) = 84.40  22.16      25.273
01772) TOTAL RAINFALL (mm) = 86.40  86.40      86.401
01773) RUNOFF COEFFICIENT = .98      .26      .293
01774)
01775) (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSER:
01776) CN* = 49.0 Ia = Dep. Storage (Above)
01777) (1) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
01778) (11) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01779)
01780)
01781) R0001:C00038:-----|-----|-----|-----|-----|-----|
01782) #-----|-----|-----|-----|-----|-----|
01783) #-----|-----|-----|-----|-----|-----|
01784) #-----|-----|-----|-----|-----|-----|
01785) #-----|-----|-----|-----|-----|-----|
01786) I MASS STORM                      | Filename: J:\1900\1923-Royal Lespage\5641-425 Union St\Design\Civil\Water\MS
01787) I Potals= 72.00 mm              | Comments: 24 hour RSC II Storm
01788)
01789) Duration of storm = 24.00 hrs
01790) Mass curve time step = 12.00 min
01791) Selected storm time step = 1.00 min
01792) Volume of derived storm = 72.00 mm
01793)
01794)
01795) TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN
01796) hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr   hh:mm mm/hr
01797) 0:00 .000    4:02 .720    8:02 1.440    12:02 81.000    16:02 1.800    20:02 1.800    24:02 1.800    28:02 1.800
01798) 0:04 .000    4:04 .
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01801> 0:07 .0001 4:07 .7201 8:07 1:4401 12:07 81.0001 16:07 1:8001 20:07 1:4401
01802> 0:08 .0002 4:08 .7202 8:08 1:4402 12:08 81.0002 16:08 1:8002 20:08 1:4402
01803> 0:09 .0003 4:09 .7203 8:09 1:4403 12:09 81.0003 16:09 1:8003 20:09 1:4403
01804> 0:10 .0004 4:10 .7204 8:10 1:4404 12:10 81.0004 16:10 1:8004 20:10 1:4404
01805> 0:11 .0005 4:11 .7205 8:11 1:4405 12:11 81.0005 16:11 1:8005 20:11 1:4405
01806> 0:12 .0006 4:12 .7206 8:12 1:4406 12:12 81.0006 16:12 1:8006 20:12 1:4406
01807> 0:13 .0007 4:13 .7207 8:13 1:4407 12:13 81.0007 16:13 1:8007 20:13 1:4407
01808> 0:14 .7204 4:14 1:4404 8:14 2:1604 12:14 84.0004 16:14 1:8004 20:14 1:4404
01809> 0:15 .7205 4:15 1:4405 8:15 2:1605 12:15 84.0005 16:15 1:8005 20:15 1:4405
01810> 0:16 .7206 4:16 1:4406 8:16 2:1606 12:16 84.0006 16:16 1:8006 20:16 1:4406
01811> 0:17 .7207 4:17 1:4407 8:17 2:1607 12:17 84.0007 16:17 1:8007 20:17 1:4407
01812> 0:18 .7208 4:18 1:4408 8:18 2:1608 12:18 84.0008 16:18 1:8008 20:18 1:4408
01813> 0:19 .7209 4:19 1:4409 8:19 2:1609 12:19 84.0009 16:19 1:8009 20:19 1:4409
01814> 0:20 .7210 4:20 1:4410 8:20 2:1610 12:20 84.0010 16:20 1:8010 20:20 1:4410
01815> 0:21 .7211 4:21 1:4411 8:21 2:1611 12:21 84.0011 16:21 1:8011 20:21 1:4411
01816> 0:22 .7212 4:22 1:4412 8:22 2:1612 12:22 84.0012 16:22 1:8012 20:22 1:4412
01817> 0:23 .7213 4:23 1:4413 8:23 2:1613 12:23 84.0013 16:23 1:8013 20:23 1:4413
01818> 0:24 .7214 4:24 1:4414 8:24 2:1614 12:24 84.0014 16:24 1:8014 20:24 1:4414
01819> 0:25 .7215 4:25 1:4415 8:25 2:1615 12:25 84.0015 16:25 1:8015 20:25 1:4415
01820> 0:26 .7216 4:26 1:4416 8:26 2:1616 12:26 84.0016 16:26 1:8016 20:26 1:4416
01821> 0:27 .7217 4:27 1:4417 8:27 2:1617 12:27 84.0017 16:27 1:8017 20:27 1:4417
01822> 0:28 .7218 4:28 1:4418 8:28 2:1618 12:28 84.0018 16:28 1:8018 20:28 1:4418
01823> 0:29 .7219 4:29 1:4419 8:29 2:1619 12:29 84.0019 16:29 1:8019 20:29 1:4419
01824> 0:30 .7220 4:30 1:4420 8:30 2:1620 12:30 84.0020 16:30 1:8020 20:30 1:4420
01825> 0:31 .7221 4:31 1:4421 8:31 2:1621 12:31 84.0021 16:31 1:8021 20:31 1:4421
01826> 0:32 .7222 4:32 1:4422 8:32 2:1622 12:32 84.0022 16:32 1:8022 20:32 1:4422
01827> 0:33 .7223 4:33 1:4423 8:33 2:1623 12:33 84.0023 16:33 1:8023 20:33 1:4423
01828> 0:34 .7224 4:34 1:4424 8:34 2:1624 12:34 84.0024 16:34 1:8024 20:34 1:4424
01829> 0:35 .7225 4:35 1:4425 8:35 2:1625 12:35 84.0025 16:35 1:8025 20:35 1:4425
01830> 0:36 .7226 4:36 1:4426 8:36 2:1626 12:36 84.0026 16:36 1:8026 20:36 1:4426
01831> 0:37 .7227 4:37 1:4427 8:37 2:1627 12:37 84.0027 16:37 1:8027 20:37 1:4427
01832> 0:38 .7228 4:38 1:4428 8:38 2:1628 12:38 84.0028 16:38 1:8028 20:38 1:4428
01833> 0:39 .7229 4:39 1:4429 8:39 2:1629 12:39 84.0029 16:39 1:8029 20:39 1:4429
01834> 0:40 .7230 4:40 1:4430 8:40 2:1630 12:40 84.0030 16:40 1:8030 20:40 1:4430
01835> 0:41 .7231 4:41 1:4431 8:41 2:1631 12:41 84.0031 16:41 1:8031 20:41 1:4431
01836> 0:42 .7232 4:42 1:4432 8:42 2:1632 12:42 84.0032 16:42 1:8032 20:42 1:4432
01837> 0:43 .7233 4:43 1:4433 8:43 2:1633 12:43 84.0033 16:43 1:8033 20:43 1:4433
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02161) -----
02162) IMPERVIOUS PERVIOUS (i)
02163) Surface Area (ha) = .03 .01
02164) Dep. Storage (mm) = 2.00 5.00
02165) Average Slope (ft) = 2.00 2.00
02166) Length (m) = 14.00 20.00
02167) Mannings n = .013 .250
02168)
02169) Max.eff.Inten.(mm/hr) = 81.00 35.90
02170) over (min) = 1.00 8.00
02171) Storage Coeff. (min) = .69 (ii) 7.71 (iii)
02172) Unit Hyd. Tpeak (cms) = 28.00 8.00
02173) Unit Hyd. Peak (cms) = 1.30 .15
02174)
02175) PEAK FLOW (cms) = .01 .00
02176) TIME TO PEAK (hrs) = 12.10 12.25 12.200
02177) RUNOFF VOLUME (mm) = 69.99 25.33 55.315
02178) TOTAL RAINFALL (mm) = 72.00 72.00 72.000
02179) RUNOFF COEFFICIENT = .97 .35 .768
02180)
02181) (i) ON PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02182) CM = 70.0 Ia = Dep. Storage (Above)
02183) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02184) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02185) -----
02186) R0001C0004 -----
02187) # -----
02188) | -----
02189) | -----
02190) | ADD HYD | ID:HYD | AREA | QPEAK | TPEAK | R.V. | DMF |
02191) | 06:CUVERT | | | | | | | |
02192) | -----
02193) | ID 1 02:POND | 3.630 | .010 | 17.017 | 32.321 | .000 |
02194) | ID 2 03:POND CUT | .000 | .000 | .000 | .000 | .000 | **DRY**
02195) | ID 3 04:TOOT | .710 | .032 | 12.217 | 18.533 | .000 |
02196) | ID 4 05:TOOT | .440 | .007 | 12.200 | 55.315 | .000 |
02197) | -----
02198) | SUM 06:CUVERT | .030 | .046 | 12.200 | 30.396 | .000 |
02199)
02200) NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02201) -----
02202) R0001C0004 -----
02203) # -----
02204) | -----
02205) | -----
02206) | -----
02207) | -----
02208) | CALIB STANDHYD | Area (ha) = .12
02209) | 09:203 | DT= 1.00 | Total Imp(h) = 42.30 Dir. Conn.(%) = 20.00
02210) -----
02211) IMPERVIOUS PERVIOUS (i)
02212) Surface Area (ha) = .06 .06
02213) Dep. Storage (mm) = 2.00 5.00
02214) Average Slope (ft) = 2.00 2.00
02215) Length (m) = 28.00 20.00
02216) Mannings n = .013 .250
02217)
02218) Max.eff.Inten.(mm/hr) = 81.00 34.53
02219) over (min) = 1.00 8.00
02220) Storage Coeff. (min) = 1.05 (ii) 8.18 (iii)
02221) Unit Hyd. Tpeak (min) = 1.00 8.00
02222) Unit Hyd. Peak (cms) = 1.04 .14
02223)
02224) PEAK FLOW (cms) = .01 .00
02225) TIME TO PEAK (hrs) = 12.13 12.25
02226) RUNOFF VOLUME (mm) = 69.96 18.06 28.438
02227) TOTAL RAINFALL (mm) = 72.00 72.00 72.000
02228) RUNOFF COEFFICIENT = .97 .25 .395
02229)
02230) (i) ON PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02231) CM = 49.0 Ia = Dep. Storage (Above)
02232) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02233) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02234) -----
02235) R0001C0004 -----
02236) # -----
02237) | -----
02238) | -----
02239) | -----
02240) | CALIB STANDHYD | Area (ha) = .210 Curve Number (CN) = 60.30
02241) | 01:104 | DT= 1.00 | Ia (mm) = 6.740 # of Linear Res.(N) = 3.00
02242) | 01:104 | U.R. Tp(hrs) = .440
02243) -----
02244) Unit Hyd Peak (cms) = .018
02245)
02246) PEAK FLOW (cms) = .005 (i)
02247) TIME TO PEAK (hrs) = 12.167
02248) DURATION (hrs) = 26.967 (dddd(hh:mm)) = 1:02:18
02249) AVERAGE FLOW (cms) = .000
02250) RUNOFF VOLUME (mm) = 18.119
02251) TOTAL RAINFALL (mm) = 72.000
02252) RUNOFF COEFFICIENT = .254
02253)
02254) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02255) -----
02256) R0001C0004 -----
02257) # -----
02258) | -----
02259) | -----
02260) | -----
02261) | CALIB STANDHYD | Area (ha) = .12
02262) | 10:204 | DT= 1.00 | Total Imp(h) = 48.30 Dir. Conn.(%) = 48.30
02263) -----
02264) IMPERVIOUS PERVIOUS (i)
02265) Surface Area (ha) = .06 .06
02266) Dep. Storage (mm) = 2.00 5.00
02267) Average Slope (ft) = 2.00 2.00
02268) Length (m) = 28.00 20.00
02269) Mannings n = .013 .250
02270)
02271) Max.eff.Inten.(mm/hr) = 81.00 18.12
02272) over (min) = 1.00 10.00
02273) Storage Coeff. (min) = 1.05 (ii) 10.27 (iii)
02274) Unit Hyd. Tpeak (min) = 1.00 10.00
02275) Unit Hyd. Peak (cms) = 1.04 .14
02276)
02277) PEAK FLOW (cms) = .01 .00
02278) TIME TO PEAK (hrs) = 12.15 12.28 12.200
02279) RUNOFF VOLUME (mm) = 69.99 13.55 40.807
02280) TOTAL RAINFALL (mm) = 72.00 72.00 72.000
02281) RUNOFF COEFFICIENT = .97 .19 .567
02282)
02283) (i) ON PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02284) CM = 49.0 Ia = Dep. Storage (Above)
02285) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02286) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02287) -----
02288) R0001C0004 -----
02289) # -----
02290) | -----
02291) | -----
02292) | CALIB STANDHYD | Area (ha) = .297 Curve Number (CN) = 60.30
02293) | 07:101 | DT= 1.00 | Ia (mm) = 6.700 # of Linear Res.(N) = 3.00
02294) | 07:101 | U.R. Tp(hrs) = .440
02295) -----
02296) Unit Hyd Peak (cms) = .258
02297)
02298) PEAK FLOW (cms) = .076 (i)
02299) TIME TO PEAK (hrs) = 12.567
02300) DURATION (hrs) = 26.967 (dddd(hh:mm)) = 1:02:18
02301) AVERAGE FLOW (cms) = .006
02302) RUNOFF VOLUME (mm) = 18.138
02303) TOTAL RAINFALL (mm) = 72.000
02304) RUNOFF COEFFICIENT = .255
02305)
02306) (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02307) -----
02308) R0001C0004 -----
02309) # -----
02310) | -----
02311) | -----
02312) | CALIB STANDHYD | Area (ha) = .55
02313) | 08:205 | DT= 1.00 | Total Imp(h) = 20.00 Dir. Conn.(%) = 5.00
02314) -----
02315) IMPERVIOUS PERVIOUS (i)
02316) Surface Area (ha) = .11 .44
02317) Dep. Storage (mm) = 2.00 5.00
02318) Average Slope (ft) = 2.00 2.00
02319) Length (m) = 61.00 20.00
02320) Mannings n = .013 .250
02321)
02322) Max.eff.Inten.(mm/hr) = 81.00 25.17
02323) over (min) = 2.00 10.00
02324) Storage Coeff. (min) = 1.68 (ii) 9.76 (iii)
02325) Unit Hyd. Tpeak (min) = 2.00 10.00
02326) Unit Hyd. Peak (cms) = .62 .12
02327)
02328) PEAK FLOW (cms) = .01 .02
02329) TIME TO PEAK (hrs) = 12.20 12.28 12.217
02330) RUNOFF VOLUME (mm) = 72.00 15.82 18.533
02331) TOTAL RAINFALL (mm) = 72.00 72.00 72.000
02332) RUNOFF COEFFICIENT = .97 .42 .257
02333)
02334) (i) ON PROCEDURE SELECTED FOR PREVIOUS LOSSES:
02335) CM = 49.0 Ia = Dep. Storage (Above)
02336) (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
02337) (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02338) -----
02339) R0001C0005 -----
02340) # -----

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02341) -----
02342) # 5-YEAR, 24 HOUR SCS STORM
02343) -----
02344) -----
02345) -----
02346) | MASS STORM | Filename: J:\1900\1923-Royal\Leaps\5641-425 Union St\Design\Civil_Water\SW
02347) | Pctals: 62.40 | Comments: 24 hour SCS II storm mass curve
02348) -----
02349) Duration of storm = 24.00 hrs
02350) Mass curve time step = 1.00 min
02351) Selected storm time step = 1.00 min
02352) Volume of derived storm = 62.40 mm
02353) -----
02354) TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
02355) hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr hh:mm mm/hr
02356) 0:01 .000 4:01 .624 8:01 1.248 12:01 70.200 16:01 1.560 20:01 1.248
02357) 0:02 .000 4:02 .624 8:02 1.248 12:02 70.200 16:02 1.560 20:02 1.248
02358) 0:03 .000 4:03 .624 8:03 1.248 12:03 70.200 16:03 1.560 20:03 1.248
02359) 0:04 .000 4:04 .624 8:04 1.248 12:04 70.200 16:04 1.560 20:04 1.248
02360) 0:05 .000 4:05 .624 8:05 1.248 12:05 70.200 16:05 1.560 20:05 1.248
02361) 0:06 .000 4:06 .624 8:06 1.248 12:06 70.200 16:06 1.560 20:06 1.248
02362) 0:07 .000 4:07 .624 8:07 1.248 12:07 70.200 16:07 1.560 20:07 1.248
02363) 0:08 .000 4:08 .624 8:08 1.248 12:08 70.200 16:08 1.560 20:08 1.248
02364) 0:09 .000 4:09 .624 8:09 1.248 12:09 70.200 16:09 1.560 20:09 1.248
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027001
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027021 Unit Hyd. Tpeak (min)= .60 .10
027031
027041 PEAK FLOW (cms)= .01 .02
027051 TIME TO PEAK (hrs)= 12.20 12.20
027061 RUNOFF VOLUME (mm)= 60.40 12.06
027071 TOTAL RAINFALL (mm)= 62.40 62.40
027081 RUNOFF COEFFICIENT = .97 .19
027091
027101 (i) CN PROCEDURE SELECTED FOR PREVIOUS LOSSES:
027111 CN = 49.0 Ia = Dep. Storage (Above)
027121 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
027131 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
027141
027151
027161
027171
027181
027191
027201
027211
027221
027231
027241
027251
027261
027271
027281
027291
027301
027311
027321
027331
027341
027351
027361
027371
027381
027391
027401
027411
027421
027431
027441
027451
027461
027471
027481
027491
027501
027511
027521
027531
027541
027551
027561
027571
027581
027591
027601
027611
027621
027631
027641
027651
027661
027671
027681
027691
027701
027711
027721
027731
027741
027751
027761
027771
027781
027791
027801
027811
027821
027831
027841
027851
027861
027871
027881
027891
027901
027911
027921
027931
027941
027951
027961
027971
027981
027991
028001
028011
028021
028031
028041
028051
028061
028071
028081
028091
028101
028111
028121
028131
028141
028151
028161
028171
028181
028191
028201
028211
028221
028231
028241
028251
028261
028271
028281
028291
028301
028311
028321
028331
028341
028351
028361
028371
028381
028391
028401
028411
028421
028431
028441
028451
028461
028471
028481
028491
028501
028511
028521
028531
028541
028551
028561
028571
028581
028591
028601
028611
028621
028631
028641
028651
028661
028671
028681
028691
028701
028711
028721
028731
028741
028751
028761
028771
028781
028791
028801
028811
028821
028831
028841
028851
028861
028871
028881
028891
028901
028911
028921
028931
028941
028951
028961
028971
028981
028991
029001
```

```
028811 Mannings n = .013 .250
028822 -----
028833 Max.eff.Inten.(mm/hr)= 70.20 18.86
028844 over (min) = 2.00 11.00
028855 Storage Coeff (mm) = 10.85 8.11
028866 Unit Hyd. Tpeak (min)= 2.00 11.00
028877 Unit Hyd. peak (mm) = .40 .250
028888 -----
028899 PEAK FLOW (cms) = .01 .02
028900 TIME TO PEAK (hrs) = 12.00 12.00
028911 RUNOFF VOLUME (mm) = 60.40 14.475
028922 TOTAL RAINFALL (mm) = 62.40 14.475
028933 RUNOFF COEFFICIENT = .97 .19
028944 -----
028955 (i) ON PROCEDURE SELECTED FOR PREVIOUS LOSSES:
028966 CN = 49.0 Ia = Dep. Storage (Above)
028977 (ii) TIME STEP (FT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
028988 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
028999 -----
029000 *****
029011 R0001C00062-----
029022 *****
029033 *#-----
029044 *****
029055 *****
029066 -----
029077 | NRES STORM | Filename: J:\1902\1923-Royal Legume\5641-425 Union St\Design\Civil\WaterW
029088 | | Comments: 24 hour SCS II storm mass curve
029099 -----
029100 Duration of storm = 24.00 hrs
029111 Mass curve time step = 12.00 min
029122 Selected storm time step = 1.00 min
029133 Volume of derived storm = 45.60 mm
029144 -----
029155 TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN TIME RAIN
029166 h:mm mm/hr h:mm mm/hr h:mm mm/hr h:mm mm/hr h:mm mm/hr h:mm mm/hr h:mm mm/hr
029177 0:01 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02 4:02
029188 0:02 4:00 4:02 4:06 8:02 9:12 12:02 51:300 16:01 1:40 20:01 9:12
029199 0:03 4:00 4:03 4:06 8:03 9:12 12:03 51:300 16:02 1:40 20:03 9:12
029210 0:04 4:00 4:04 4:06 8:04 9:12 12:04 51:300 16:04 1:40 20:04 9:12
029221 0:05 4:00 4:05 4:06 8:05 9:12 12:05 51:300 16:05 1:40 20:05 9:12
029232 0:06 4:00 4:06 4:06 8:06 9:12 12:06 51:300 16:06 1:40 20:06 9:12
029243 0:07 4:00 4:07 4:06 8:07 9:12 12:07 51:300 16:07 1:40 20:07 9:12
029254 0:08 4:00 4:08 4:06 8:08 9:12 12:08 51:300 16:08 1:40 20:08 9:12
029265 0:09 4:00 4:09 4:06 8:09 9:12 12:09 51:300 16:09 1:40 20:09 9:12
029276 0:10 4:00 4:10 4:06 8:10 9:12 12:10 51:300 16:10 1:40 20:10 9:12
029287 0:11 4:00 4:11 4:06 8:11 9:12 12:11 51:300 16:11 1:40 20:11 9:12
029298 0:12 4:00 4:12 4:06 8:12 9:12 12:12 51:300 16:12 1:40 20:12 9:12
029309 0:13 4:06 4:13 9:12 9:13 1:08 12:13 9:12 16:13 1:40 20:13 9:12
029320 0:14 4:06 4:14 9:12 9:14 1:08 12:14 9:12 16:14 1:40 20:14 9:12
029331 0:15 4:06 4:15 9:12 9:15 1:08 12:15 9:12 16:15 1:40 20:15 9:12
029342 0:16 4:06 4:16 9:12 9:16 1:08 12:16 9:12 16:16 1:40 20:16 9:12
029353 0:17 4:06 4:17 9:12 9:17 1:08 12:17 9:12 16:17 1:40 20:17 9:12
029364 0:18 4:06 4:18 9:12 9:18 1:08 12:18 9:12 16:18 1:40 20:18 9:12
029375 0:19 4:06 4:19 9:12 9:19 1:08 12:19 9:12 16:19 1:40 20:19 9:12
029386 0:20 4:06 4:20 9:12 9:20 1:08 12:20 9:12 16:20 1:40 20:20 9:12
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029584 0:38 4:06 4:38 9:12 9:38 1:08 12:38 9:12 16:38 1:40 20:38 9:12
029595 0:39 4:06 4:39 9:12 9:39 1:08 12:39 9:12 16:39 1:40 20:39 9:12
029606 0:40 4:06 4:40 9:12 9:40 1:08 12:40 9:12 16:40 1:40 20:40 9:12
029617 0:41 4:06 4:41 9:12 9:41 1:08 12:41 9:12 16:41 1:40 20:41 9:12
029628 0:42 4:06 4:42 9:12 9:42 1:08 12:42 9:12 16:42 1:40 20:42 9:12
029639 0:43 4:06 4:43 9:12 9:43 1:08 12:43 9:12 16:43 1:40 20:43 9:12
029650 0:44 4:06 4:44 9:12 9:44 1:08 12:44 9:12 16:44 1:40 20:44 9:12
029661 0:45 4:06 4:45 9:12 9:45 1:08 12:45 9:12 16:45 1:40 20:45 9:12
029672 0:46 4:06 4:46 9:12 9:46 1:08 12:46 9:12 16:46 1:40 20:46 9:12
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029936 1:10 4:06 5:10 9:12 9:50 1:08 13:10 9:12 16:50 1:40 21:10 9:12
029947 1:11 4:06 5:11 9:12 9:51 1:08 13:11 9:12 16:51 1:40 21:11 9:12
029958 1:12 4:06 5:12 9:12 9:52 1:08 13:12 9:12 16:52 1:40 21:12 9:12
029969 1:13 4:06 5:13 9:12 9:53 1:08 13:13 9:12 16:53 1:40 21:13 9:12
029980 1:14 4:06 5:14 9:12 9:54 1:08 13:14 9:12 16:54 1:40 21:14 9:12
029991 1:15 4:06 5:15 9:12 9:55 1:08 13:15 9:12 16:55 1:40 21:15 9:12
030002 1:16 4:06 5:16 9:12 9:56 1:08 13:16 9:12 16:56 1:40 21:16 9:12
030013 1:17 4:06 5:17 9:12 9:57 1:08 13:17 9:12 16:57 1:40 21:17 9:12
030024 1:18 4:06 5:18 9:12 9:58 1:08 13:18 9:12 16:58 1:40 21:18 9:12
030035 1:19 4:06 5:19 9:12 9:59 1:08 13:19 9:12 16:59 1:40 21:19 9:12
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030057 1:21 4:06 5:21 9:12 9:51 1:08 13:21 9:12 16:51 1:40 21:21 9:12
030068 1:22 4:06 5:22 9:12 9:52 1:08 13:22 9:12 16:52 1:40 21:22 9:12
030079 1:23 4:06 5:23 9:12 9:53 1:08 13:23 9:12 16:53 1:40 21:23 9:12
030090 1:24 4:06 5:24 9:12 9:54 1:08 13:24 9:12 16:54 1:40 21:24 9:12
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030112 1:26 4:06 5:26 9:12 9:56 1:08 13:26 9:12 16:56 1:40 21:26 9:12
030123 1:27 4:06 5:27 9:12 9:57 1:08 13:27 9:12 16:57 1:40 21:27 9:12
030134 1:28 4:06 5:28 9:12 9:58 1:08 13:28 9:12 16:58 1:40 21:28 9:12
030145 1:29 4:06 5:29 9:12 9:59 1:08 13:29 9:12 16:59 1:40 21:29 9:12
030156 1:30 4:06 5:30 9:12 9:50 1:08 13:30 9:12 16:50 1:40 21:30 9:12
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030178 1:32 4:06 5:32 9:12 9:52 1:08 13:32 9:12 16:52 1:40 21:32 9:12
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030200 1:34 4:06 5:34 9:12 9:54 1:08 13:34 9:12 16:54 1:40 21:34 9:12
030211 1:35 4:06 5:35 9:12 9:55 1:08 13:35 9:12 16:55 1:40 21:35 9:12
030222 1:36 4:06 5:36 9:12 9:56 1:08 13:36 9:12 16:56 1:40 21:36 9:12
030233 1:37 4:06 5:37 9:12 9:57 1:08 13:37 9:12 16:57 1:40 21:37 9:12
030244 1:38 4:06 5:38 9:12 9:58 1:08 13:38 9:12 16:58 1:40 21:38 9:12
030255 1:39 4:06 5:39 9:12 9:59 1:08 13:39 9:12 16:59 1:40 21:39 9:12
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030277 1:41 4:06 5:41 9:12 9:51 1:08 13:41 9:12 16:51 1:40 21:41 9:12
030288 1:42 4:06 5:42 9:12 9:52 1:08 13:42 9:12 16:52 1:40 21:42 9:12
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030420 1:54 4:06 5:54 9:12 9:54 1:08 13:54 9:12 16:54 1:40 21:54 9:12
030431 1:55 4:06 5:55 9:12 9:55 1:08 13:55 9:12 16:55 1:40 21:55 9:12
030442 1:56 4:06 5:56 9:12 9:56 1:08 13:56 9:12 16:56 1:40 21:56 9:12
030453 1:57 4:06 5:57 9:12 9:57 1:08 13:57 9:12 16:57 1:40 21:57 9:12
030464 1:58 4:06 5:58 9:12 9:58 1:08 13:58 9:12 16:58 1:40 21:58 9:12
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030563 2:07 4:06 6:07 9:12 9:57 1:08 14:07 9:12 16:57 1:40 22:07 9:12
030574 2:08 4:06 6:08 9:12 9:58 1:08 14:08 9:12 16:58 1:40 22:08 9:12
030585 2:09 4:06 6:09 9:12 9:59 1:08 14:09 9:12 16:59 1:40 22:09 9:12
030596 2:10 4:06 6:10 9:12 9:50 1:08 14:10 9:12 16:50 1:40 22:10 9:12
030607 2:11 4:06 6:11 9:12 9:51 1:08 14:11 9:12 16:51 1:40 22:11 9:12
030618 2:12 4:06 6:12 9:12 9:52 1:08 14:12 9:12 16:52 1:40 22:12 9:12
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030651 2:15 4:06 6:15 9:12 9:55 1:08 14:15 9:12 16:55 1:40 22:15 9:12
030662 2:16 4:06 6:16 9:12 9:56 1:08 14:16 9:12 16:56 1:40 22:16 9:12
030673 2:17 4:06 6:17 9:12 9:57 1:08 14:17 9:12 16:57 1:40 22:17 9:12
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030739 2:23 4:06 6:23 9:12 9:53 1:08 14:23 9:12 16:53 1:40 22:23 9:12
030750 2:24 4:06 6:24 9:12 9:54 1:08 14:24 9:12 16:54 1:40 22:24 9:12
030761 2:25 4:06 6:25 9:12 9:55 1:08 14:25 9:12 16:55 1:40 22:25 9:12
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030794 2:28 4:06 6:28 9:12 9:58 1:08 14:28 9:12 16:58 1:40 22:28 9:12
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031021 2:45 4:06 6:45 9:12 9:55 1:08 14:45 9:12 16:55 1:40 22:45 9:12
031032 2:4
```

```
03241> TIME SHIFT OF PEAK FLOW (min)= 138.00
03242> MAXIMUM STORAGE USED (ha.m.)= 40398-01
03243>
03244>
03245> R0001:CO0066-----
03246> *-----
03247> *-----
03248>
03249> | CALIB STANDHYD | Area (ha)= .71
03250> | 04:102 DT= 1.00 | Total Imp(h)= 20.00 Dir. Conn.(%)= 5.00
03251>
03252> IMPERVIOUS PERVIOUS (i)
03253> Surface Area (ha)= .14 .57
03254> Dep. Storage (mm)= 2.00 5.00
03255> Average Slope (ft)= 2.00 2.00
03256> Length (m)= 62.00 20.00
03257> Mannings n = .013 .250
03258>
03259> Max.eff.Inten.(mm/hr)= 51.30 9.03
03260> over (min) 2.00 14.00
03261> Storage Coeff. (min)= 2.03 (ii) 14.22 (ii)
03262> Unit Hyd. Tpeak (min)= 2.00 14.00
03263> Unit Hyd. peak (cms)= .55 .08
03264>
03265> PEAK FLOW (cms)= .01 .01
03266> TIME TO PEAK (hrs)= 12.20 12.35 12.200
03267> RUNOFF VOLUME (mm)= 43.60 6.49 8.344
03268> TOTAL RAINFALL (mm)= 45.60 45.60 45.600
03269> RUNOFF COEFFICIENT = .96 .14 .183
03270>
03271> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03272> CN* = 49.0 Ia = Dep. Storage (Above)
03273> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
03274> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03275>
03276>
03277> R0001:CO0066-----
03278> *-----
03279> *-----
03280>
03281> | CALIB STANDHYD | Area (ha)= .04
03282> | 05:206 DT= 1.00 | Total Imp(h)= 67.00 Dir. Conn.(%)= 67.00
03283>
03284> IMPERVIOUS PERVIOUS (i)
03285> Surface Area (ha)= .03 .01
03286> Dep. Storage (mm)= 2.00 5.00
03287> Average Slope (ft)= 2.00 2.00
03288> Length (m)= 14.00 20.00
03289> Mannings n = .013 .250
03290>
03291> Max.eff.Inten.(mm/hr)= 51.30 14.86
03292> over (min) 2.00 11.00
03293> Storage Coeff. (min)= .83 (ii) 10.81 (ii)
03294> Unit Hyd. Tpeak (min)= 1.00 11.00
03295> Unit Hyd. peak (cms)= 1.19 .13
03296>
03297> PEAK FLOW (cms)= .00 .00
03298> TIME TO PEAK (hrs)= 12.10 12.30 12.200
03299> RUNOFF VOLUME (mm)= 43.57 11.03 32.830
03300> TOTAL RAINFALL (mm)= 45.60 45.60 45.600
03301> RUNOFF COEFFICIENT = .96 .24 .720
03302>
03303> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03304> CN* = 70.0 Ia = Dep. Storage (Above)
03305> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
03306> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03307>
03308>
03309> R0001:CO0068-----
03310> *-----
03311> *-----
03312>
03313> | ADD HYD | ID:HYD | AREA | QPEAK | TPEAK | R.V. | DMF
03314> | 06:CULVERT | | (ha) | (cms) | (hrs) | (mm) | (cms)
03315> ID 1 02:POND .630 .008 14.200 17.384 .000
03316> +ID 2 03:POND CUT .000 .000 .000 .000 .000 ***DRD**
03317> +ID 3 04:202 .710 .012 12.200 6.344 .000
03318> +ID 4 05:206 .040 .004 12.200 32.830 .000
03319>
03320> SUM 06:CULVERT 4.980 .020 12.200 16.068 .000
03321>
03322> NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03323>
03324>
03325> R0001:CO0069-----
03326> *-----
03327> *-----
03328>
03329>
03330> | CALIB STANDHYD | Area (ha)= .12
03331> | 09:203 DT= 1.00 | Total Imp(h)= 42.30 Dir. Conn.(%)= 20.00
03332>
03333> IMPERVIOUS PERVIOUS (i)
03334> Surface Area (ha)= .05 .07
03335> Dep. Storage (mm)= 2.00 5.00
03336> Average Slope (ft)= 2.00 2.00
03337> Length (m)= 28.00 20.00
03338> Mannings n = .013 .250
03339>
03340> Max.eff.Inten.(mm/hr)= 51.30 13.57
03341> over (min) 1.00 12.00
03342> Storage Coeff. (min)= 1.24 (ii) 11.61 (ii)
03343> Unit Hyd. Tpeak (min)= 1.00 12.00
03344> Unit Hyd. peak (cms)= .93 .10
03345>
03346> PEAK FLOW (cms)= .00 .00
03347> TIME TO PEAK (hrs)= 12.13 12.32 12.200
03348> RUNOFF VOLUME (mm)= 43.52 7.58 14.768
03349> TOTAL RAINFALL (mm)= 45.60 45.60 45.600
03350> RUNOFF COEFFICIENT = .95 .17 .324
03351>
03352> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03353> CN* = 49.0 Ia = Dep. Storage (Above)
03354> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
03355> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03356>
03357>
03358> R0001:CO0070-----
03359> *-----
03360> *-----
03361>
03362>
03363> | CALIB WASHYD | Area (ha)= .210 Curve Number (CN)= 60.30
03364> | 01:104 DT= 1.00 | Ia (mm)= 6.740 # of Linear Res.(N)= 3.00
03365> U.W. Tp(hrs)= .440
03366>
03367> Unit Hyd Tpeak (cms)= .018
03368>
03369> PEAK FLOW (cms)= .002 (i)
03370> TIME TO PEAK (hrs)= 12.583
03371> DURATION (hrs)= 26.967, (dddd)hh:mm)= 1:02:58
03372> AVERAGE FLOW (cms)= .000
03373> RUNOFF VOLUME (mm)= 7.128
03374> TOTAL RAINFALL (mm)= 45.600
03375> RUNOFF COEFFICIENT = .161
03376>
03377> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03378>
03379> R0001:CO0071-----
03380> *-----
03381> *-----
03382>
03383>
03384> | CALIB STANDHYD | Area (ha)= .12
03385> | 10:204 DT= 1.00 | Total Imp(h)= 48.30 Dir. Conn.(%)= 48.30
03386>
03387> IMPERVIOUS PERVIOUS (i)
03388> Surface Area (ha)= .06 .06
03389> Dep. Storage (mm)= 2.00 5.00
03390> Average Slope (ft)= 2.00 2.00
03391> Length (m)= 28.00 20.00
03392> Mannings n = .013 .250
03393>
03394> Max.eff.Inten.(mm/hr)= 51.30 5.82
03395> over (min) 1.00 16.00
03396> Storage Coeff. (min)= 1.24 (ii) 15.79 (ii)
03397> Unit Hyd. Tpeak (min)= 1.00 16.00
03398> Unit Hyd. peak (cms)= .93 .08
03399>
03400> PEAK FLOW (cms)= .01 .00
03401> TIME TO PEAK (hrs)= 12.15 12.38 12.200
03402> RUNOFF VOLUME (mm)= 43.57 5.41 23.836
03403> TOTAL RAINFALL (mm)= 45.60 45.60 45.600
03404> RUNOFF COEFFICIENT = .96 .12 .523
03405>
03406> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03407> CN* = 49.0 Ia = Dep. Storage (Above)
03408> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
03409> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03410>
03411>
03412> R0001:CO0072-----
03413> *-----
03414> *-----
03415>
03416>
03417> | CALIB WASHYD | Area (ha)= 2.970 Curve Number (CN)= 60.30
03418> | 07:101 DT= 1.00 | Ia (mm)= 6.700 # of Linear Res.(N)= 3.00
03419> U.W. Tp(hrs)= .440
03420>
03421> Unit Hyd Tpeak (cms)= .258
03422>
03423> PEAK FLOW (cms)= .029 (i)
```

```
03421> TIME TO PEAK (hrs)= 12.583
03422> DURATION (hrs)= 26.967, (dddd)hh:mm)= 1:02:58
03423> AVERAGE FLOW (cms)= .002
03424> RUNOFF VOLUME (mm)= 7.341
03425> TOTAL RAINFALL (mm)= 45.600
03426> RUNOFF COEFFICIENT = .161
03427>
03428> (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03429>
03430>
03431> R0001:CO0073-----
03432> *-----PROPOSED-----
03433>
03434> | CALIB STANDHYD | Area (ha)= .55
03435> | 08:203 DT= 1.00 | Total Imp(h)= 20.00 Dir. Conn.(%)= 5.00
03436>
03437> IMPERVIOUS PERVIOUS (i)
03438> Surface Area (ha)= .11 .44
03439> Dep. Storage (mm)= 2.00 5.00
03440> Average Slope (ft)= 2.00 2.00
03441> Length (m)= 61.00 20.00
03442> Mannings n = .013 .250
03443>
03444> Max.eff.Inten.(mm/hr)= 51.30 9.03
03445> over (min) 2.00 14.00
03446> Storage Coeff. (min)= 2.01 (ii) 14.20 (ii)
03447> Unit Hyd. Tpeak (min)= 2.00 14.00
03448> Unit Hyd. peak (cms)= .56 .08
03449>
03450> PEAK FLOW (cms)= .00 .01
03451> TIME TO PEAK (hrs)= 12.20 12.35 12.200
03452> RUNOFF VOLUME (mm)= 43.60 6.49 8.344
03453> TOTAL RAINFALL (mm)= 45.60 45.60 45.600
03454> RUNOFF COEFFICIENT = .96 .14 .183
03455>
03456> (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03457> CN* = 49.0 Ia = Dep. Storage (Above)
03458> (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
03459> (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03460>
03461>
03462> R0001:CO0074-----
03463> *-----
03464>
03465> | FINISH |
03466>
03467>
03468>
03469>
03470>
03471> Simulation ended on 2022-10-20 at 12:23:58
03472>
03473>
```



425 Union Street, Meaford - SWM POND DESIGN

Project: 425 Union Street
 Project No.: 1923-5641
 File: Pond Hydraulic Design
 Design by: J. Kerschbaumer
 Date: 2021.05.25
 Updated: 2022.10.14

Pond Stage - Storage - Discharge Calculations

E.D. Orifice Diameter: 0.085 m
 E.D. Orifice Invert Elevation: 215.37 m
 Rect weir length: 0.375 m
 Rect weir invert: 215.92 m
 Weir Elevation Above PP: 0.55 m
 Extended Detention Depth: 0.25 m
 Emergency Spill Elev. 216.42 m
 Emerg Spill Bot. Width 3 m
 Trap. Side Slopes 3 :1 H:V

Elev. (m)	Depth Above PP (m)	Depth Above AS Weir (m)	Area (sqm)	Storage Volume (cu.m)	ED Orifice Discharge (cu.m/s)	AS Weir Discharge* (cu.m/s)	Emerg. Weir Ave. Width (m)	Emerg. Weir Discharge (cu.m/s)	Total Discharge (cu.m/s)	Storage (ha-m)
215.37	0.00	0.00	1200	0	0.0000	0.0000	0.00	0.000	0.000	0.000
215.42	0.05	0.00	1291	62	0.0014	0.0000	0.00	0.000	0.001	0.006
215.47	0.10	0.00	1382	129	0.0039	0.0000	0.00	0.000	0.004	0.013
215.52	0.15	0.00	1473	200	0.0053	0.0000	0.00	0.000	0.005	0.020
215.57	0.20	0.00	1564	276	0.0064	0.0000	0.00	0.000	0.006	0.028
215.62	0.25	0.00	1655	357	0.0073	0.0000	0.00	0.000	0.007	0.036
215.67	0.30	0.00	1745	442	0.0082	0.0000	0.00	0.000	0.008	0.044
215.72	0.35	0.00	1836	531	0.0089	0.0000	0.00	0.000	0.009	0.053
215.77	0.40	0.00	1927	625	0.0096	0.0000	0.00	0.000	0.010	0.063
215.82	0.45	0.00	2018	724	0.0103	0.0000	0.00	0.000	0.010	0.072
215.87	0.50	0.00	2109	827	0.0109	0.0000	0.00	0.000	0.011	0.083
215.92	0.55	0.00	2200	935	0.0115	0.0000	0.00	0.000	0.011	0.094
215.97	0.60	0.05	2230	1046	0.0120	0.0077	0.00	0.000	0.020	0.105
216.02	0.65	0.10	2260	1158	0.0125	0.0218	0.00	0.000	0.034	0.116
216.07	0.70	0.15	2290	1272	0.0130	0.0401	0.00	0.000	0.053	0.127
216.12	0.75	0.20	2320	1387	0.0135	0.0617	0.00	0.000	0.075	0.139
216.17	0.80	0.25	2350	1504	0.0140	0.0863	0.00	0.000	0.100	0.150
216.22	0.85	0.30	2380	1622	0.0145	0.1134	0.00	0.000	0.128	0.162
216.27	0.90	0.35	2410	1742	0.0149	0.1429	0.00	0.000	0.158	0.174
216.32	0.95	0.40	2440	1863	0.0153	0.1746	0.00	0.000	0.190	0.186
216.37	1.00	0.45	2470	1986	0.0157	0.2083	0.00	0.000	0.224	0.199
216.42	1.05	0.50	2500	2110	0.0161	0.2440	3.00	0.000	0.260	0.211
216.47	1.10	0.55	2602	2238	0.0165	0.2814	3.15	0.055	0.353	0.224
216.52	1.15	0.60	2704	2370	0.0169	0.3207	3.30	0.163	0.500	0.237
216.57	1.20	0.65	2806	2508	0.0173	0.3616	3.45	0.313	0.692	0.251
216.62	1.25	0.70	2907	2651	0.0177	0.4041	3.60	0.502	0.924	0.265
216.67	1.30	0.75	3009	2799	0.0180	0.4482	3.75	0.731	1.197	0.280
216.72	1.35	0.80	3111	2952	0.0184	0.4937	3.90	1.000	1.512	0.295
216.77	1.40	0.85	3213	3110	0.0187	0.5407	4.05	1.308	1.868	0.311



Project No: 1923-5641
Project: Water Quality
File: Extended Detention
Design by: J. Kerschbaumer
Checked by: R. Alexander
Date: 2022-10-20

Extended Detention Specifications

(Per MECP)

Extended Detention Volume (Area x runoff from 25mm event)	283
t (drawdown time - seconds, <i>hours in italics</i>)	24.0
Ao (cross section area of orifice - sqm)	0.0057
h (maximum water elevation above orifice for extended detention- m)	0.25
C (discharge coefficient)	0.64
Ap (average surface area for extended detention - sqm)	1427

$$t = 2 * A_p * (h^{0.5}) / (C * A_o * (g * 2)^{0.5})$$

Ao = 0.006 sqm d = 86 mm

Extended Detention Orifice Diameter (as designed) d = 85 mm

ACTUAL DRAWDOWN TIME

* Neglecting tailwater conditions*

Extended Detention Volume Used	357
d (orifice diameter, mm)	85
h (maximum head acting on orifice for extended detention, m)	0.25
Ao (cross section area of orifice, m ²)	0.0057
C (discharge coefficient)	0.64
Ap (average surface area for extended detention, m ²)	1427

$$t = 2 * A_p * (h^{0.5}) / (C * A_o * (g * 2)^{0.5})$$

t (hours) 25



Project No: 1923-5641
Project: 425 Union Street
Design by: JK
Checked by: RA
Date: 2022-10-20

Post-Development Scenario Water Quality Requirements

Areas Contributing	Area (ha)	% Imp	25mm RV (mm)	25mm RV (m ³)
POST-1	3.63	55	7.79	283
Total	3.63	55		283
MOE Total WQ Volume (m ³ /ha)				190
MOE ED Volume (m ³ /ha)				40
MOE ED Volume (m ³)				145
MOE PP Volume (m ³ /ha)				150
MOE PP Volume (m ³)				545
Pond Required ED Volume (m ³)				283
Pond Required PP Volume (m ³)				545
Pond Required AS Volume (m ³)				1644

Worksheet for Pond Outlet Drainage Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	m/m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Discharge	0.21	m³/s

Results

Normal Depth	0.32	m
Flow Area	0.31	m²
Wetted Perimeter	2.04	m
Hydraulic Radius	0.15	m
Top Width	1.93	m
Critical Depth	0.25	m
Critical Slope	0.01891	m/m
Velocity	0.67	m/s
Velocity Head	0.02	m
Specific Energy	0.35	m
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.32	m
Critical Depth	0.25	m
Channel Slope	0.00500	m/m
Critical Slope	0.01891	m/m

Crozier

Cross Section for Pond Outlet Drainage Channel

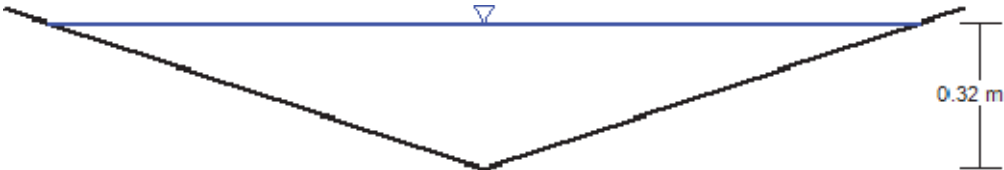
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	m/m
Normal Depth	0.32	m
Left Side Slope	3.00	m/m (H:V)
Right Side Slope	3.00	m/m (H:V)
Discharge	0.21	m³/s

Cross Section Image



V: 1
H: 1

APPENDIX G

Gates of Kent Storm Sewer Design Sheet



CF CROZIER & ASSOCIATES INC
LAND DEVELOPMENT CONSULTANTS

GATES OF KENT - STORM SEWER DESIGN SHEET

FREQUENCY	5 YEARS - Owen Sound IDF				100 YEARS - Owen Sound IDF			
	Coef. A=	28.5	Coef. B=	-0.726	Coef. A=	46.5	Coef. B=	-0.734

PROJECT: Gates of Kent
PROJECT No.: 183-2737

Design: Kyle Simmons
Date: 3/11/2007 Revised 3/13/2007 0:54

FILE: storm sewer design
DATE: 3/13/2007 0:54

Date:	3/11/2007	Revised	3/13/2007 0:54			TIME OF CONCENTRATION				10.00	MANNINGS "n"		0.013	DATE: 3/13/2007 0:54									
location	FR	TO	AREA (A) Ha	RUN- OFF COEFF	A x C	Cummul. A x C	TIME OF CONC. min	I mm/hr	Q l/sec	SLOPE %	PIPE DIA. mm	VEL. m/sec	LENGTH m	TIME OF FLOW min	CAPACITY l/sec	FALL m	GROUND ELEV.		PIPE INV. ELEV.		COVER		
	MH NO	MH NO															UPPER END	LOWER END	UPPER END	LOWER END	UPPER END	LOWER END	
NORTH LINE																							
	1	2	0.39	0.70	0.27	0.275	10.00	104.66	79.88	0.50	300	0.97	30	0.52	68.38	0.15	212.60	212.43	211.03	210.879	1.27	1.25	
	2	3	0.21	0.70	0.15	0.422	10.52	100.90	118.38	0.50	450	1.27	38	0.50	201.60	0.19	212.43	212.24	210.78	210.589	1.20	1.20	
	3	4	0.25	0.70	0.17	0.595	11.02	97.56	161.35	0.50	450	1.27	32	0.42	201.60	0.16	212.24	212.10	210.49	210.329	1.30	1.32	
	4	8	0.22	0.70	0.16	0.750	11.44	94.94	198.00	0.55	450	1.33	38	0.48	211.44	0.21	212.10	211.89	210.23	210.020	1.42	1.42	
MAIN ROAD LINE																							
	5	6	0.24	0.70	0.17	0.168	10.00	104.66	48.88	0.50	300	0.97	60	1.03	68.38	0.30	214.05	213.70	211.97	211.67	1.78	1.73	
	6	7	0.29	0.70	0.20	0.620	10.00	104.66	180.28	1.00	450	1.79	65	0.60	285.11	0.65	213.70	212.70	211.57	210.92	1.68	1.33	
	7	8	0.72	0.70	0.50	1.354	11.03	97.45	366.69	1.00	600	2.17	80	0.61	614.01	0.80	212.70	211.89	210.82	210.02	1.28	1.27	
	8	Outlet	0.36	0.70	0.25	1.606	11.65	93.69	418.19	1.00	600	2.17	17	0.13	614.01	0.17	211.89	211.55	209.92	209.75	1.37	1.20	
EXTERNAL DRAINAGE																							
	EXT 1	7	2.30	0.10	0.23	0.230	15.00	77.97	49.86	0.50	300	0.97	50	0.86	68.38								
	EXT 2	6	2.50	0.10	0.25	0.250	15.00	77.97	54.19	0.50	300	0.97	40	0.69	68.38								

FIGURES

- Figure 1:** Site Location
- Figure 2:** Draft Plan of Subdivision (Travis & Associates, 2022)
- Figure 3:** Public Road Cross-Section
- Figure 4:** Private Road Cross-Section
- Figure 5:** Preliminary Water Distribution Plan
- Figure 6:** Preliminary Sanitary Service Plan
- Figure 7:** Pre-Development Drainage Plan
- Figure 8:** Post-Development Drainage Plan
- Figure 9:** Stormwater Management Facility
- Figure 10:** Preliminary Outlet#1 Grading



SITE LOCATION

RUSSETT DRIVE

CENTRE STREET

UNION STREET

Legend = SUBJECT LANDS	Project 425 UNION STREET MUNICIPALITY OF MEAFORD Drawing SITE LOCATION	CROZIER CONSULTING ENGINEERS THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301 COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA Drawn By N.L. Design By N.L. Project 1923-5641 Scale N.T.S. Date APR/20/2021 Check By G.C. Drawing FIG. 1
---	--	--



SURVEYOR CERTIFICATE:

DATED THE ____ DAY OF _____ 2022

NAME: PAUL R. THOMSEN

ONTARIO LAND SURVEYOR

DATED THE ____ DAY OF _____ 2022

NAME: _____

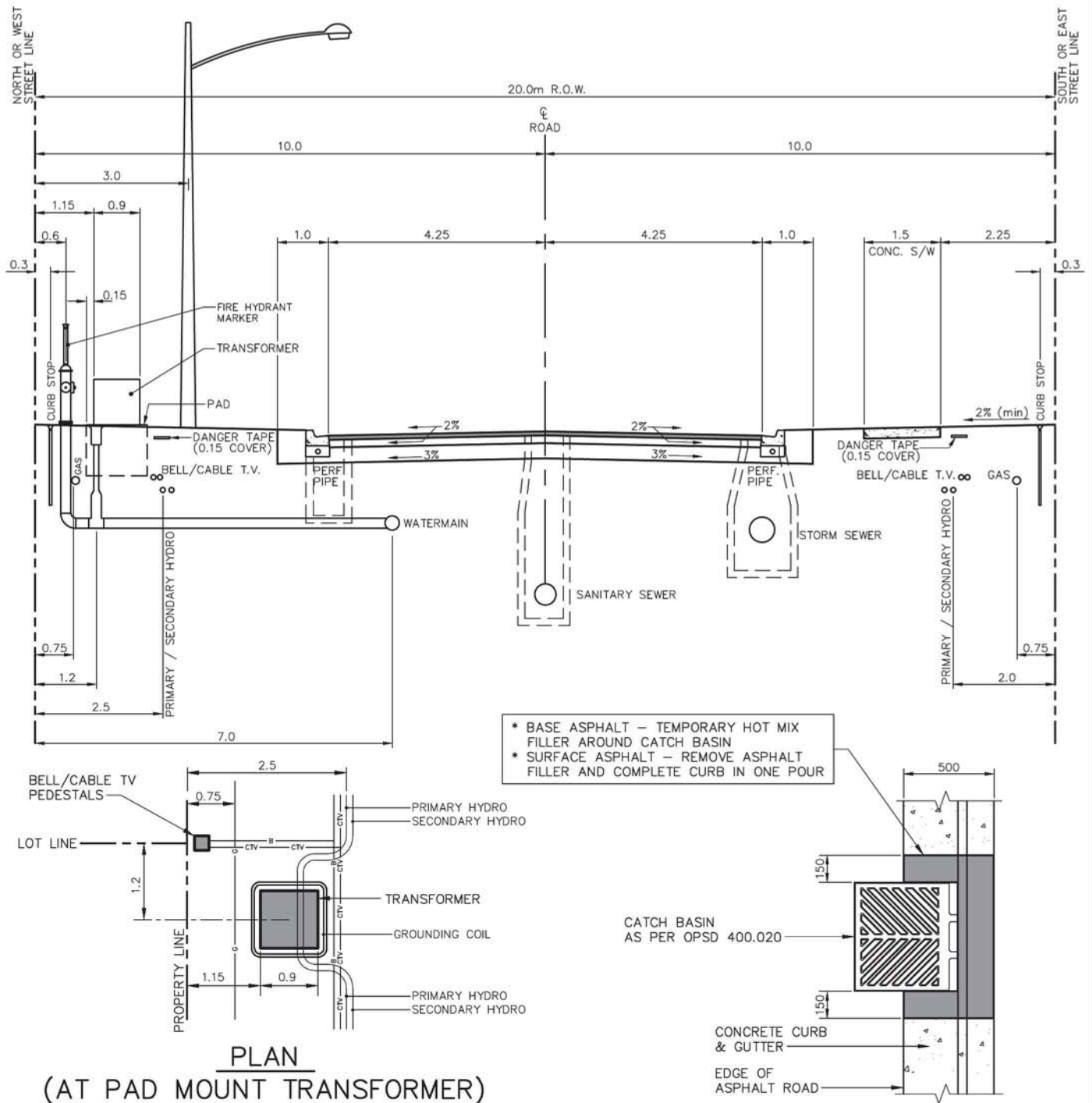
I HAVE THE AUTHORITY TO
BIND THE CORPORATION

Revision#. Date D/M/Y	Description / Notes
1. 27/04/2021	DRAFT PLAN FOR SUBMISSION
2. 20/05/2021	REVISED DRAFT PLAN FOR SUBMISSION
3. 31/05/2021	REVISED DRAFT PLAN FOR SUBMISSION
4. 13/01/2022	REVISED DRAFT PLAN FOR SUBMISSION
5. 05/05/2022	REVISED DRAFT PLAN FOR SUBMISSION
6. 12/05/2022	REVISED DRAFT PLAN FOR SUBMISSION
7. 19/10/2022	REVISED DRAFT PLAN FOR SUBMISSION



File/CAD: TA-MEAFORD-DRAFT.dwg			D-1
Date(d/m/y): 19/10/2022	Drafted by: D.C.	Checked by: C.T.	

D-1



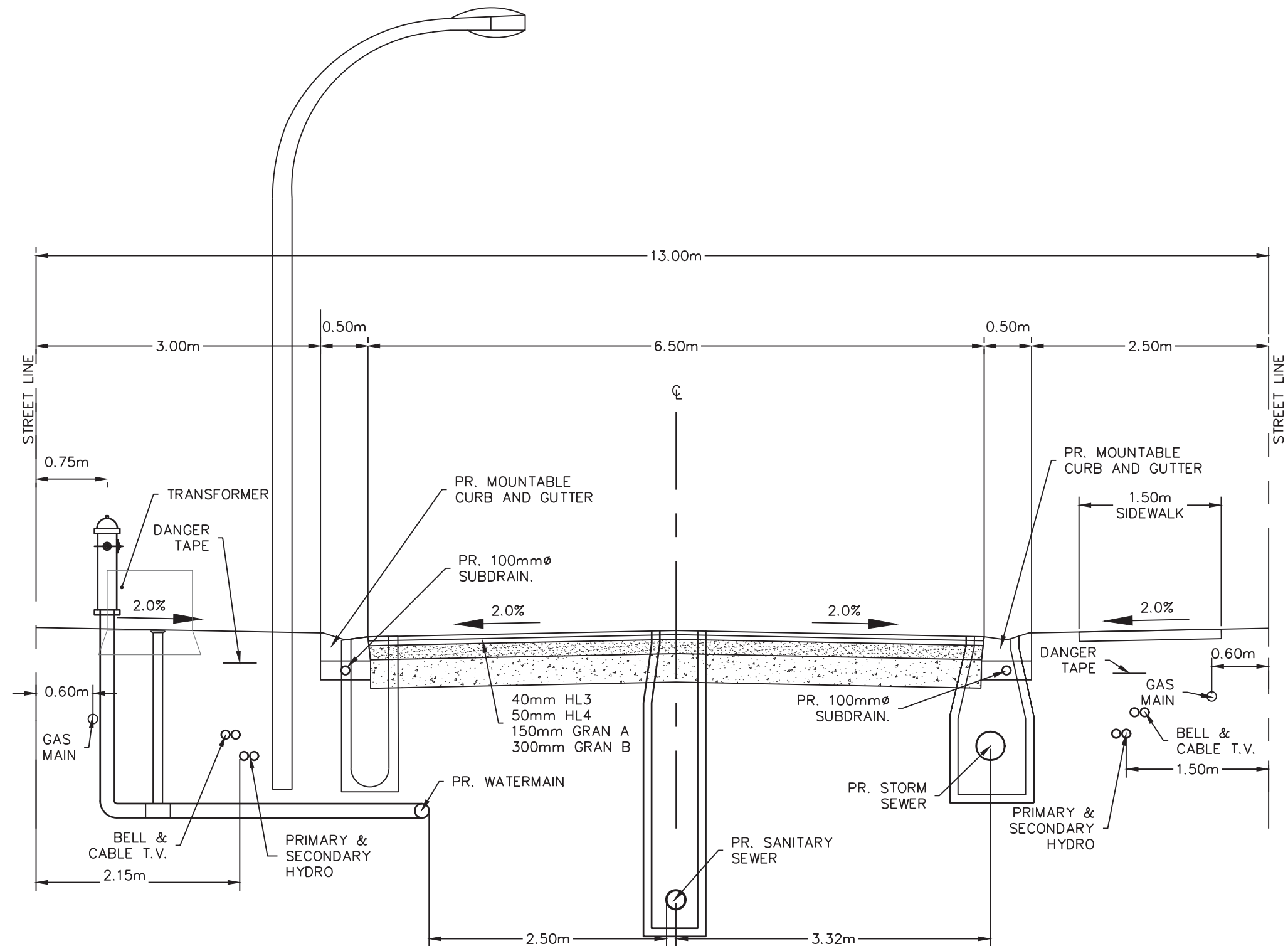
NOTES:

1. TOPSOIL TO BE REMOVED TO ITS FULL DEPTH ALONG ENTIRE WIDTH OF RIGHT-OF-WAY
2. ORGANIC MATERIAL WITHIN 1.2m OF TOP OF PAVEMENT TO BE REMOVED.
3. BOULEVARDS TO BE FULLY SODDED AS SPECIFIED (100mm TOPSOIL AND SOD).
4. ROAD BASE:
 - 40mm HL3 ASPHALT SURFACE COURSE
 - 50mm HL4 ASPHALT BASE COURSE
 - 150mm GRANULAR 'A'
 - 300mm GRANULAR 'B'
5. CONCRETE CURB AND GUTTER PER OPSD 600.040 AND 600.070 IN NEW DEVELOPMENT
6. CONCRETE SIDEWALK PER OPSD 310.010
7. MINIMUM DEPTH OF COVER :
 - SANITARY SEWER - 2.75m
 - STORM SEWER - 1.5m
 - WATERMAIN - 1.7m
 - HYDRO - 1.2m
 - CABLE - 0.9m
 - BELL - 0.9m
 - GAS - 0.6m
 - GAS AT CROSSING ROAD - 1.0m

MUNICIPALITY OF MEAFORD

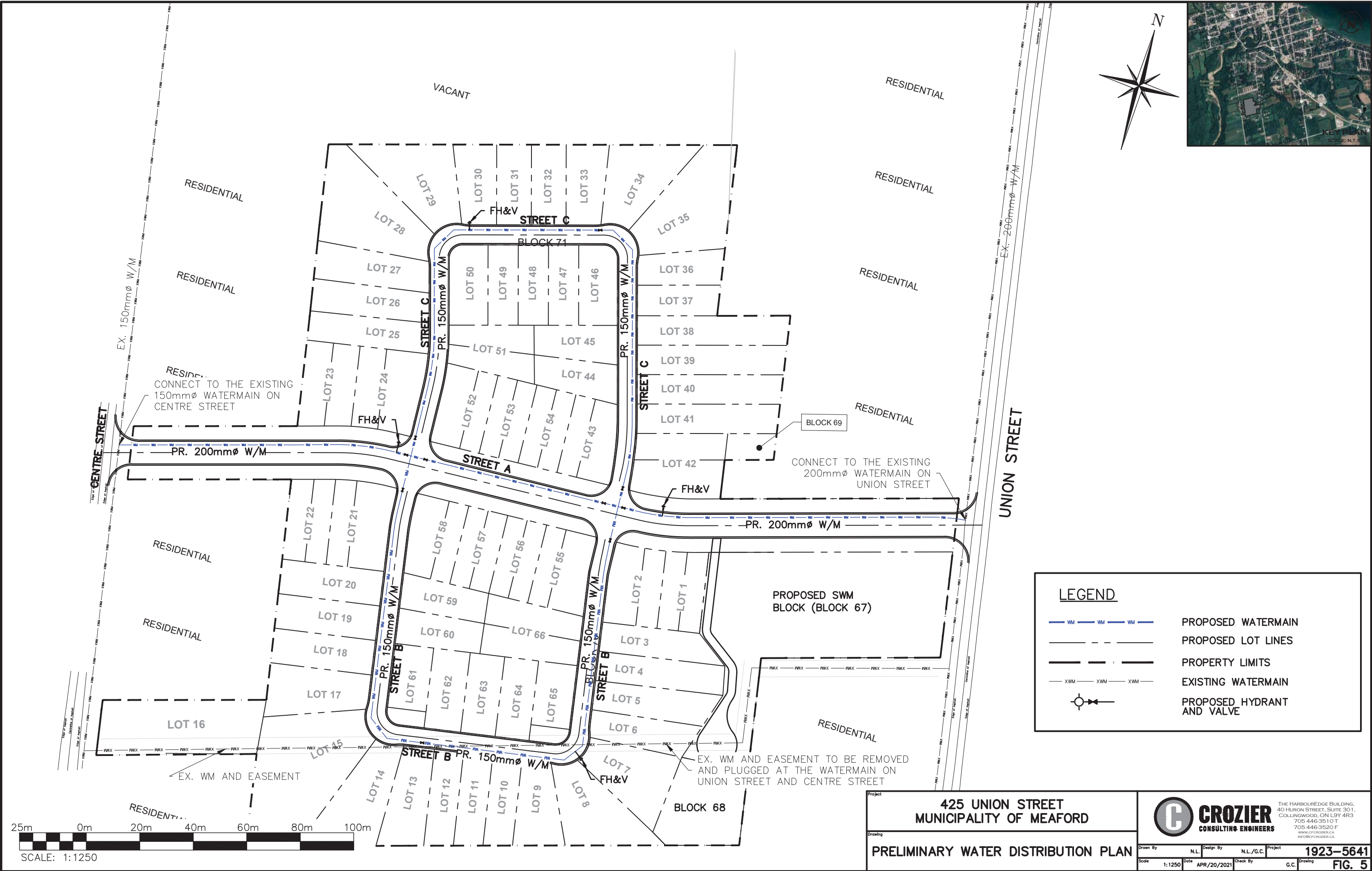
TYPICAL ROAD CROSS-SECTION AND SERVICE LOCATIONS

DRAWN: J.M.M.	SCALE: N.T.S.	
DESIGN: P.M.K.	PLOT: 1=1	
CHECKED: R.C.J.	DATE: NOV. 2015	STD.DWG.No.1

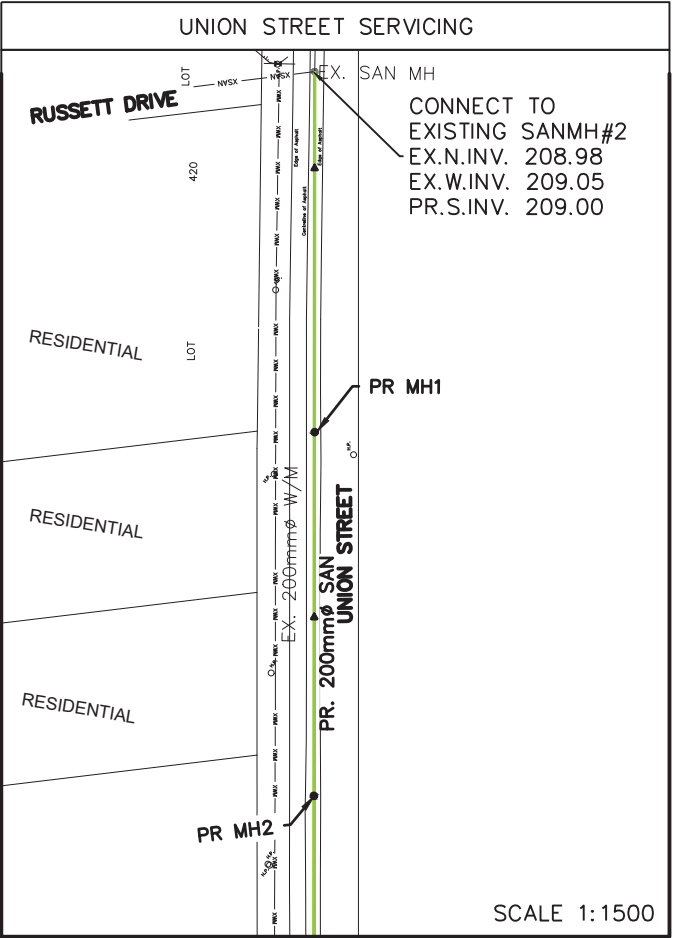
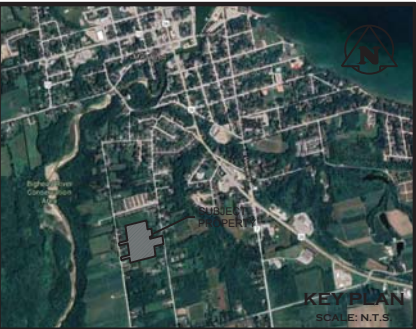
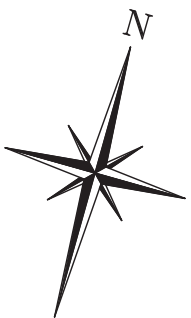


Project		425 UNION STREET MUNICIPALITY OF MEAFORD			
Drawing		CROSS SECTION (PRIVATE)			
Drawn By	N.L.	Design By	N.L./G.C.	Project	1923-5641
Scale	1:50	Date	APR/20/2021	Check By	G.C.
					FIG. 4


CROZIER
 CONSULTING ENGINEERS
 THE HARBOUREDGE BUILDING,
 40 HURON STREET, SUITE 301,
 COLLINGWOOD, ON L9Y 4R3
 705 446-3510 T
 705 446-3520 F
 WWW.CFCROZIER.CA
 INFO@CFCROZIER.CA



- NOTE:
1. THE PROPOSED SANITARY SYSTEM IS TO BE DESIGNED TO PROTECT AGAINST INFILTRATION. MANHOLES WILL BE INSTALLED WITH WATERPROOF MEMBRANES AND WATERTIGHT SEALS PER MUNICIPAL STANDARDS.
 2. SANITARY SEWERS INVERTS CALCULATED BASED ON MINIMUM 0.5% SLOPE AND 1% MINIMUM SLOPE ON THE FIRST LEG OF ANY SEWER AND STANDARDS DROPS AT STRUCTURES PER MUNICIPAL STANDARDS. PIPE LENGTH AND SLOPE SUBJECT TO DETAILED DESIGN.



LEGEND

- PROPOSED SANITARY SEWER (PUBLIC)
- PROPOSED SANITARY SEWER (PRIVATE)
- PROPOSED LOT LINES
- PROPERTY LIMITS
- EXISTING SANITARY SEWER

Project

425 UNION STREET
MUNICIPALITY OF MEAFORD

Drawing

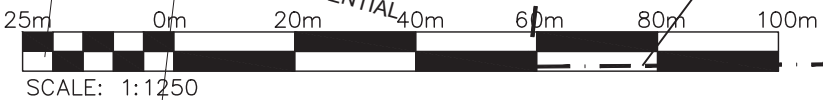
PRELIMINARY SANITARY SERVICE PLAN

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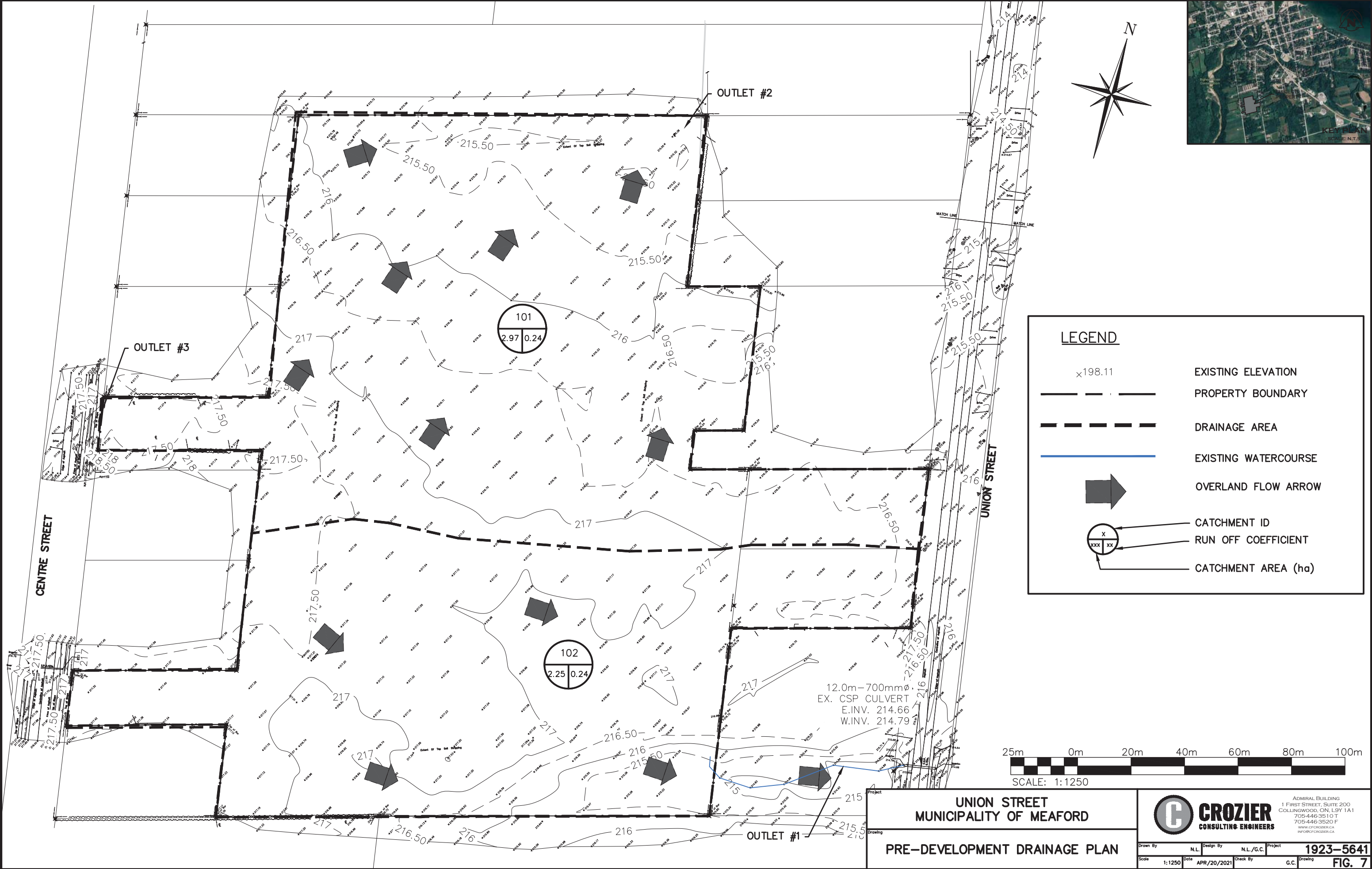
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
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INFO@CROZIER.CA

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Scale	1:1250	Date	APR/20/2021	Check By	G.C.

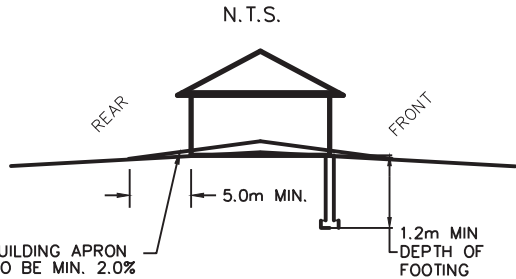
FIG. 6



SCALE: 1:1250



TYPICAL GRADING DETAILS



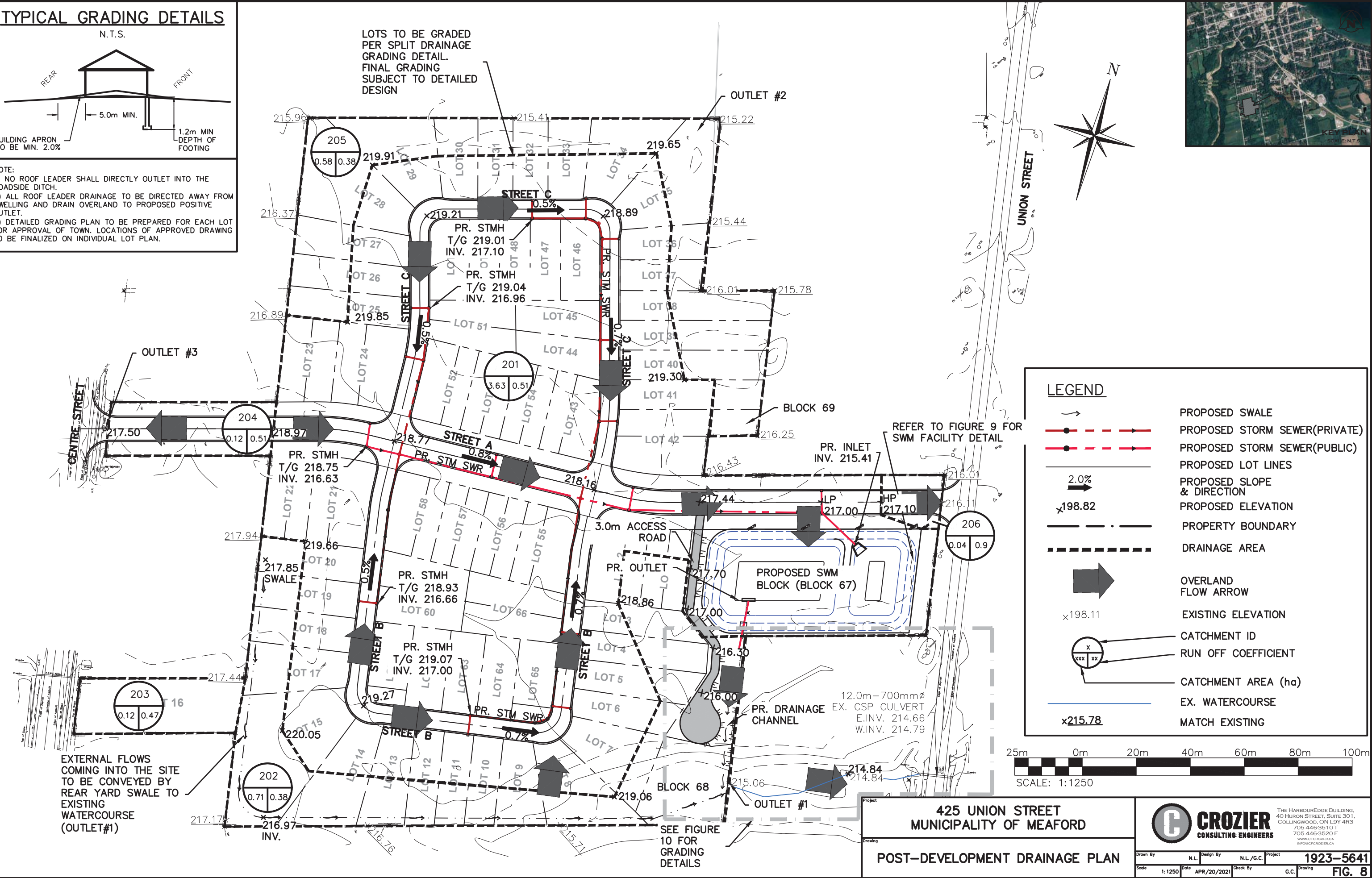
NOTE:

1) NO ROOF LEADER SHALL DIRECTLY OUTLET INTO THE ROADSIDE DITCH.

2) ALL ROOF LEADER DRAINAGE TO BE DIRECTED AWAY FROM DWELLING AND DRAIN OVERLAND TO PROPOSED POSITIVE OUTLET.

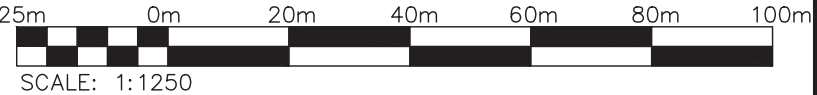
3) DETAILED GRADING PLAN TO BE PREPARED FOR EACH LOT FOR APPROVAL OF TOWN. LOCATIONS OF APPROVED DRAWING TO BE FINALIZED ON INDIVIDUAL LOT PLAN.

LOTS TO BE GRADED PER SPLIT DRAINAGE GRADING DETAIL. FINAL GRADING SUBJECT TO DETAILED DESIGN



LEGEND

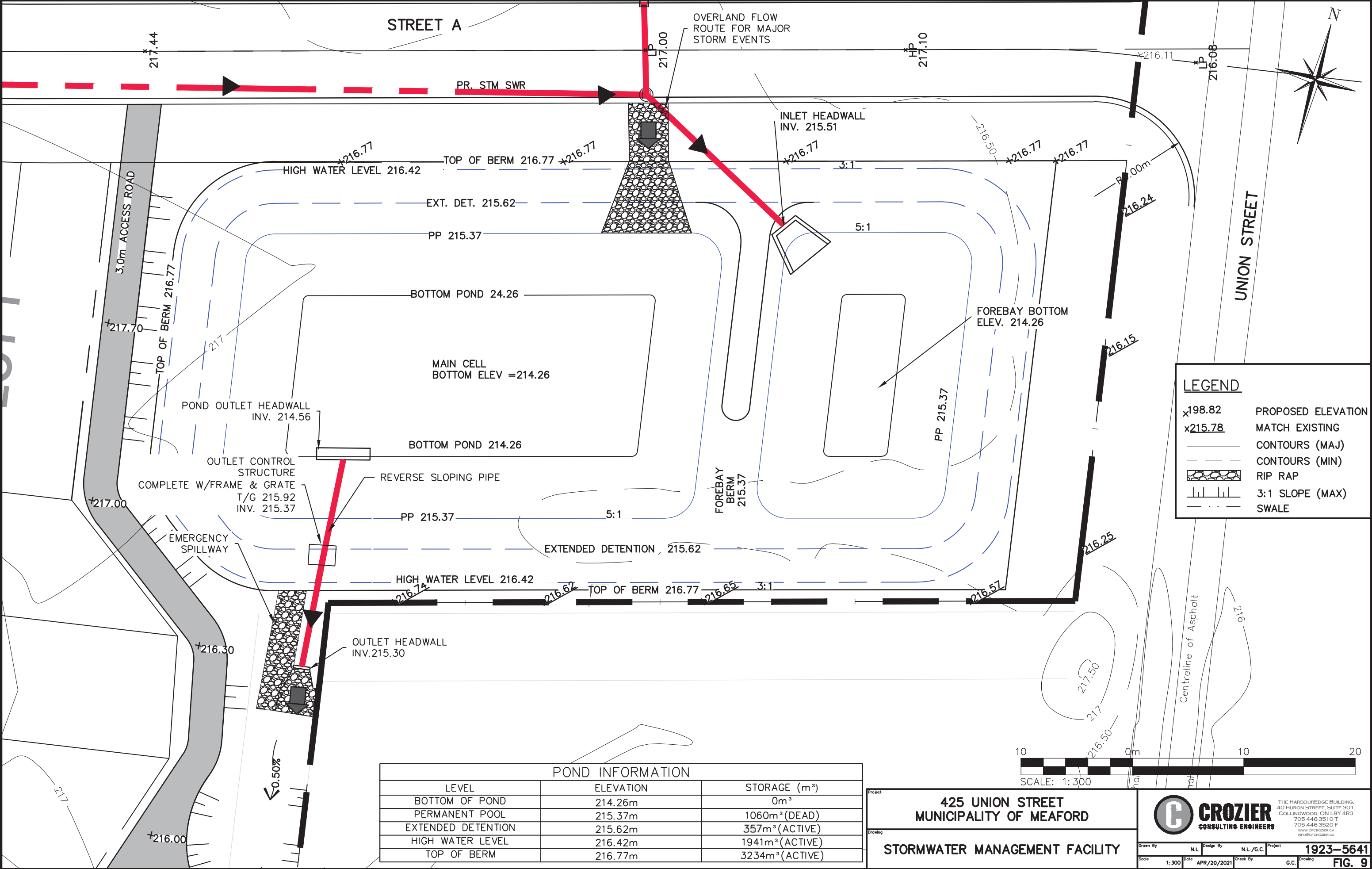
- PROPOSED SWALE
- PROPOSED STORM SEWER(PRIVATE)
- PROPOSED STORM SEWER(PUBLIC)
- PROPOSED LOT LINES
- PROPOSED SLOPE & DIRECTION
- PROPOSED ELEVATION
- PROPERTY BOUNDARY
- DRAINAGE AREA
- OVERLAND FLOW ARROW
- EXISTING ELEVATION
- CATCHMENT ID
- RUN OFF COEFFICIENT
- CATCHMENT AREA (ha)
- EX. WATERCOURSE
- MATCH EXISTING



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Drawn By N.L. Design By N.L./G.C. Project 1923-5641
Scale 1:1250 Date APR/20/2021 Check By G.C. Drawing FIG. 8



LEGEND

x198.82	PROPOSED ELEVATION
x215.78	MATCH EXISTING
—	CONTOURS (MAJ)
- - -	CONTOURS (MIN)
[Pattern]	RIP RAP
[Pattern]	3:1 SLOPE (MAX)
- . -	SWALE

POND INFORMATION		
LEVEL	ELEVATION	STORAGE (m³)
BOTTOM OF POND	214.26m	0m³
PERMANENT POOL	215.37m	1060m³ (DEAD)
EXTENDED DETENTION	215.62m	357m³ (ACTIVE)
HIGH WATER LEVEL	216.42m	1941m³ (ACTIVE)
TOP OF BERM	216.77m	3234m³ (ACTIVE)

Project
**425 UNION STREET
MUNICIPALITY OF MEAFORD**

Drawing
STORMWATER MANAGEMENT FACILITY



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Scale	1:300	Date	APR/20/2021	Check By	G.C.

FIG. 9

