

**FUNCTIONAL SERVICING & STORMWATER
MANAGEMENT REPORT**

**REVERIE TOWNHOUSES
TOWN OF COLLINGWOOD**

**PREPARED FOR:
SHERWOOD HOMES LTD.**

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Revision Number	Date	Comments
Rev. 0	August 2025	Issued for OPA & ZBA

1.0 EXECUTIVE SUMMARY

C.F. Crozier and Associates (Crozier) has been retained by Sherwood Homes Ltd. to prepare a Functional Servicing & Stormwater Management Report in support of Official Plan Amendment and Zoning By-Law Amendment for the Reverie Townhouses development located on 11403 Highway 26 in the Town of Collingwood, County of Simcoe.

The Subject Development was previously included as part of the Residences at Silver Creek project that was Site Plan Approved which had two phases: an apartment phase and a townhouse phase. The townhouse phase is the subject of this report which had Site Plan Approval for twelve bungalow townhome blocks totaling 60 units and has since been updated and includes twelve 1.5 storey stacked townhouse blocks totalling 124 units with street parking.

The Subject Development is bounded by a private condominium development to the south (Wyldeewood), The Residences at Silver Creek apartments to the west, Carmichael Water Reservoir and pumping station (Carmichael Reservoir) to the north, and Highway 26 to the east.

Utilities to service the Site are available from Highway 26 and will be extended to the Subject Development through coordination at the detailed design stage.

An existing 200 mm diameter sanitary sewer is located within Prince of Wales Drive and drains via gravity towards the 750 mm diameter trunk sewer on the north side of Highway 26. Two 200 mm diameter sanitary sewers will connect to the existing sewer on Prince of Wales Drive and extended north into the proposed side parking lots. Sanitary demand flows were calculated using the Town of Collingwood Engineering Standards and were determined to be 8.87 L/s.

An internal water distribution network will be looped to service the Site and connect to two existing watermains including a connection to the 300 mm diameter watermain within Highway 26 and a connection to the 200 mm diameter stub on the west side of Prince of Wales Drive. The watermain will be owned and operated by the Town of Collingwood, with an easement in favor of the Town. Water demand flows were calculated using the Town of Collingwood engineering standards and Fire Underwriters Survey and were determined to be 184.25 L/s (1.25 L/s max day and 183 L/s fire flow).

Quantity control of stormwater will be provided via a system of superpipes, underground storage, and inlet control devices to match pre-to-post development requirements. Quality control is provided via an oil/grit separator to achieve "Enhanced Protection" per the Ministry of the Environment, Conservation, and Parks. Detention of the 25mm storm event exceeds the 48-hour requirement.

Due to the high groundwater of the Site, the retention of 5mm of precipitation and stormwater infiltration practices are not suitable for water balance mitigation, and increased topsoil depth is recommended as a "best practice".

Underground storage and use of the oil/grit separator is provided as a "best efforts" approach to mitigate the change in phosphorous loading due to development constraints.

From the analysis contained within this report, there are no concerns with the updated Site Plan layout from engineering servicing and stormwater management perspectives and we recommend approval of the Official Plan Amendment and Zoning By-Law amendment for the Subject Lands.

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2.0 INTRODUCTION

C.F. Crozier and Associates (Crozier) has been retained by Sherwood Homes Ltd. to prepare a Functional Servicing & Stormwater Management Report in support of Official Plan Amendment and Zoning By-Law Amendment for the Reverie Townhouses development located on 11403 Highway 26 in the Town of Collingwood, County of Simcoe. Refer to **Figure 1** for the Site Location Plan. The purpose of this report is to outline the servicing and stormwater management strategies for the proposed development.

The proposed development consists of twelve 1.5-storey stacked townhouse blocks totaling 124 units with street parking. Refer to **Figure 2** for the Site Plan prepared by Stantec Consulting Ltd.

3.0 BACKGROUND & SITE DESCRIPTION

The Subject Development is approximately 2.35 ha in size and was previously included as part of the Site Plan Approved Residences at Silver Creek project. The site has been cleared and pre-graded in preparation for construction. The Subject Development is bounded by a private condominium development to the south (Wyldewood), The Residences at Silver Creek apartments to the west, Carmichael Water Reservoir and pumping station (Carmichael Reservoir) to the north, and Highway 26 to the east.

This report has been prepared based on the design framework established in the following reports and documents:

- Pre-Consultation – Servicing and Stormwater Management Technical Memo prepared by Crozier, dated September 2019;
- Residences at Silver Creek – Natural Hazards Study Addendum prepared by Crozier, dated November 2019;
- Preliminary Servicing and Stormwater Management Report – Rolling/Mundell Properties prepared by Crozier, dated August 2007;
- Collingwood Water and Sanitary Sewer Systems Master Plan prepared by Cole Engineering Group Ltd. (Cole), dated December 2019;
- Regional Stormwater Management Update & Master SWM Strategy – Tanglewood at Cranberry Trail / Cranberry Creek Watershed – Tanglewood (Sierra Homes) Inc., prepared by Crozier, final dated May 2007;
- Residences at Silver Creek – Servicing & Stormwater Management Implementation Report prepared by Crozier, dated September 2023.

4.0 SITE ACCESS, ROADWAY & SERVICING CORRIDOR

Based on the proposed concept plan, vehicular access to the site will be provided in one location from Prince of Wales Drive on the west side of the Subject Development. A secondary emergency access will be provided at the east end of the Subject Site, which will connect the internal private roadway to Highway 26. Two parking lots extend northwards from the extended Prince of Wales Drive and come to dead ends with no through access. The servicing corridor will consist of the following parameters:

- 3.6 m asphalt lanes with 6 m parking stalls,
- 2 m wide concrete sidewalks,
- 600.040 OPSD standard curb and gutter,
- A storm sewer system capable of capturing up to and including the 100-year storm event,

- The Regional Storm event being conveyed within the Right-of-Way (ROW) and discharged directly to designated overland flow routes,
- Storm sewer alignment generally following the gutter on one side of the roadway,
- Watermain along the opposite side of the roadway of the storm sewer, and
- Sanitary sewer alignment generally following the centerline.

Road grades have been designed in accordance with the Town Standards for geometric design. The road design and grading provide drainage for both minor and major storm events per Town Standards. The storm sewer is designed to capture the 100-year storm event, with any storm larger being conveyed overland via the road surface to Highway 26.

5.0 UTILITIES

As part of the previous Site Plan Approval process, it was confirmed that telephone, gas, cable, and electrical utilities are available in the local area. Our office has reached out to the various utility providers to request markups of the existing utilities from Bell, Rogers, Enbridge, and EPCOR. These markups are included in **Appendix A**. Coordination for extension of and connection to existing services will be undertaken as part detailed design and utility coordination.

6.0 SANITARY SEWAGE SYSTEM

6.1 Existing Sanitary Sewer Infrastructure

An existing 200 mm diameter sewer was installed within Prince of Wales Drive as part of the Residences at Silver Creek development. The existing sanitary sewer flows east towards the 750 mm diameter sanitary trunk sewer on the north side of Highway 26, which ultimately connects to the Black Ash Creek Sanitary Pumping Station (SPS). It is noted that upgrades to the Black Ash Creek SPS were recently completed, and it is assumed that sufficient capacity exists within the SPS and wastewater treatment plant to accommodate the proposed development, subject to the applicable Development Agreements.

6.2 Proposed Sanitary Servicing Strategy

The proposed stacked townhouses along Prince of Wales Drive will be serviced by the existing 200 mm diameter sanitary sewer with each townhouse unit being individually serviced. It is proposed that Townhouse Blocks A, B, D and E will be serviced by 200 mm diameter sanitary sewers that flow south through the parking lots and connects to the existing sanitary sewer along Prince of Wales Drive.

Sanitary flows for the site were computed using the following values, per the Town of Collingwood Standards.

- | | |
|----------------------|------------------|
| • Average Flow Rate | 250 L/cap/day |
| • Infiltration | 0.23 L/s/ha |
| • Peaking Factor | 4.12 (Harmon) |
| • Population Density | 1.9 Persons/Unit |

The Town's Engineering Design Standards require a population density of 2.4 persons/unit for townhouse units. However, stacked townhouses are not independently defined in the Town's Zoning By-Law and are similar in function to both townhouses and apartments. Given the compact nature of the stacked townhouse units, it is proposed to use the population density for Apartments.

Based on the above values with the addition of external flows from the apartments and amenity building west of the Subject Development, the peak sanitary flow from the site will be 8.87 L/s. The

existing 200 mm diameter sewer drains via gravity at a slope of 0.5% and has a total capacity of 23.2 L/s.

The proposed routing of the internal sanitary sewers will follow the internal roadways. The layout of these sewers is shown in **Figure 4** and sanitary demand calculations are included in **Appendix B**.

7.0 POTABLE WATER SUPPLY

7.1 Existing Water Infrastructure

The existing potable water distribution network fronting the Site includes a 300 mm diameter watermain along Highway 26 as well as an existing 200 mm diameter watermain that was extended from Highway 26 south along Prince of Wales Drive and stubbed at the entrance to the Subject Development. It is noted that the Town is currently completing upgrades to the Carmichael Water Reservoir.

The Town has identified that the Water Treatment Plant is currently operating at approximately 80% capacity and has begun construction for the upgrades to the Water Treatment Plant to increase the capacity to meet the demand of the planned and anticipated development in Collingwood. While the Water Treatment Plant upgrades are ongoing, the remaining capacity will be managed through the use of a Servicing Capacity Allocation Policy (SCAP). As part of the previous Residences at Silver Creek project, allocation was provided for 60 Townhouse units, but additional allocation will be required to reflect the current Single Dwelling Unit (SDU) equivalent.

7.2 Proposed Water Servicing Strategy

The internal watermain will be connected to the 300 mm diameter watermain along Highway 26 at the southeast corner of the site near the proposed emergency access and to the 200 mm diameter watermain stub on the west side of Prince of Wales Drive. The proposed 200 mm diameter internal watermain within the proposed development will become part of the public system to be maintained and operated by the Town. Therefore, the proposed water distribution system within the Subject Development is designed in accordance with Town of Collingwood Standards and MECP Guidelines for Drinking Water (2008).

Individual water services will be provided for each of the townhouse units. Fire protection for the site will be provided by a series of fire hydrants connected to the internal watermain. The sizing of the internal watermain will be confirmed through Town updates to the Municipal water system model.

Based on the current practices in the Town of Collingwood, it is assumed that the Municipality will assume ownership of the watermain distribution network located in the privately held portions of the development. This typically includes all watermains, hydrants, valves, and services up to and including curb stops. An easement in favour of the Town is to be provided along the alignment of the watermain through the privately held portions of the development.

Water demands for the site were estimated using the following criteria per the Town of Collingwood Standards:

- Average Flow Rate 260 L/cap/day
- Max Day/Peak Hour Factor 1.77/2.7
- Population Density 1.9 Persons/Unit

Based on these values it is estimated that water demands for the site are as follows:

- Average Daily Flow 0.71 L/s
- Max Day 1.25 L/s
- Peak Hour 1.91 L/s

The proposed routing of the internal watermain will follow the internal roadways. The proposed watermain is shown in **Figure 5**.

Preliminary fire flows required to service the subject site were determined to be 183 L/s per the Fire Underwriter's Survey, and 45 L/s required per Ontario Fire Marshal (OBC). The total design flow for the internal water distribution system (the sum of max day and fire flow) is 184.25 L/s. Water demand and fire flow calculations are included in **Appendix C**.

A Watermain Hydraulic Assessment was previously prepared by C3 Water Inc. (now CIMA+) in November 2022 for the Residences at Silver Creek development and concluded there was sufficient fire flow to service the entire development. However, due to the changes to the watermain layout within the Subject Development land area, an updated model will be prepared at the detailed design stages. Required fire flow rates are subject to refinement based on the building design and further coordination with the Architect which may include the use of additional firebreaks, inclusion of a fire pump, etc. Final hydrant placement and the locations of the fire line services to the building are subject to coordination with the building design.

8.0 STORMWATER MANAGEMENT AND SITE DRAINAGE

8.1 Stormwater Management Criteria

The stormwater management for this site will focus on the eastern lands being developed on the Subject Property. Management of stormwater and site drainage for the proposed development must comply with the following policies and standards:

- Town of Collingwood Development Standards (August 2022);
- NVCA Stormwater Technical Guide (December 2013); and
- The Ministry of Environment Stormwater Management Planning and Design Manual (March 2003).

The stormwater management criteria for the future development include:

- **Water Quantity Control:** Control post-development peak flow rates to pre-development flow rates for all 4-hour Chicago and 24-hour SCS Type II storm events up to and including the 100-year storm per Town of Collingwood and NVCA requirements.
- **Water Quality Control:** "Enhanced Protection" per Ministry of Environment, Conservation and Parks given Georgian Bay as the ultimate receiver.
- **Erosion Control:** 5mm retained on-site.
- **Water Balance:** Best efforts to achieve pre-development annual infiltration volumes.
- **Phosphorous Loading:** Best efforts to achieve pre-development phosphorous loading rates.
- **Development Standard:** Urban road cross-section complete with 100-year subsurface storm sewer system and overland flow routes for storms exceeding the 100-year event.

8.2 Existing Drainage Conditions

Prior to any construction on the Subject Site, it was predominately composed of wooded and vegetated areas. One residential dwelling located near Highway 26 was recently demolished. The topography of the land is predominately flat and drains overland east to Cranberry Creek, ultimately draining to Georgian Bay. The Subject Development falls entirely within the Cranberry Creek drainage area.

In the 2023 Servicing and Stormwater Management Implementation Report, Crozier undertook review of the topographic survey for the subject lands prepared by Van Harten Surveying Inc. (August 2019) to analyze the pre-development drainage conditions. The area draining to Cranberry Creek was characterized as 2.92 hectares of woodland with residential dwellings and a catchment slope of less than one percent.

8.3 Proposed Drainage Conditions

The proposed drainage under post-development conditions is intended to replicate the natural drainage patterns of the Subject Lands. The proposed approach is consistent with what was approved in the 2023 Servicing and Stormwater Management Implementation Report. Road grades have been proposed per the Town of Collingwood Development Standards. Lot grading is to have yard grades with minimum 2% and maximum 6% slopes. The post-development drainage has been discretized into three drainage areas and are described below.

- **Catchment 201 (2.12 ha):** Consists of the majority of the site including the roadways and stacked townhouses. This catchment drains through storm sewers within the roadways towards an oil/grit separator (OGS) prior to the outlet pipe located at the southeast corner of the Site.
- **Catchment 202 (0.21 ha):** Consists of the rear-yards of the stacked townhouses on the south side of Prince of Wales Drive. This catchment drains through rear-yard storm sewers towards the outlet pipe located at the southeast corner of the Site. This runoff from this catchment is considered clean water and does not need to be treated for water quality purposes.
- **Catchment 203 (0.02 ha):** Drains uncontrolled to the Highway 26 ditch and eventually drains to the ultimate receiver of Georgian Bay.

Please refer to **Figure 6** for the post-development drainage plan.

Stormwater runoff for storms up to and including the 100-year event are captured within the proposed storm sewer system. This system is composed of increased diameter sewer pipes (superpipes) and underground stormwater storage tanks to meet storage requirements. Catchment 201 and 202 each have a control manhole with inlet control devices within to control the outflow of stormwater from the system before being outlet to an external storm sewer. This proposed external storm sewer will connect to an existing box culvert approximately 100 m south of Cranberry Trail East, ultimately draining to Georgian Bay.

Any storm greater than the 100-year event will be safely conveyed via overland flow routes towards the Highway 26 ditch through the emergency access roadway. The preliminary site grading & drainage plan is illustrated in **Figure 3**.

A 450 mm diameter culvert is proposed under the emergency access at the east end of the Subject Development. The Rational Method was used to analyze the capacity of the culvert with the approximately 0.81 ha contributing runoff from the proposed site, Highway 26, and the eastern portion

of the Carmichael Reservoir. The proposed culvert at 0.5% will be able to accommodate up to and including the 50-year storm flows. Additional information can be found in **Appendix D**.

8.4 Hydrologic Parameterization

The NVCA Stormwater Technical Guide was referenced to determine the hydrologic parameters for the various catchment areas. The existing land cover under existing conditions was determined using satellite imagery and ground truthing. According to the Soil Survey of Simcoe County (1962), the soil on site is classified as Parkhill loam of Hydrologic Soil Group 'BC'. This was compared to the site-specific geotechnical investigation completed by Peto MacCallum Ltd. (2020). The geotechnical investigation determined that the site is underlain by shallow bedrock and high groundwater.

The detailed hydrologic parameter sheets for the catchments are included in **Appendix D. Table 1** provides a summary of the post-development hydrologic parameters used to model catchment areas of the Residences of Silver Creek lands.

Table 1: Post-Development Hydrologic Parameters

Catchment Description	201	202	203
Drainage Area (ha)	2.12	0.21	0.02
Total Imperviousness (%)	74	0	31
Directly Connected Imperviousness (%)	74	0	31
Curve Number (CN) ¹	74	74	74
Time to Peak (hrs)	---	0.18	---

1. Curve number presented as utilized in VO modeling. CN reflects composite curve number for rural catchments modeled using NASHYD routine and curve number for pervious areas only for urban catchments using STANDHYD routine.

8.5 Stormwater Quantity Controls

The stormwater quantity control is required for areas draining to Cranberry Creek and Highway 26. Peak flow control has been designed in conformance with the NVCA Stormwater Technical Guide and Town of Collingwood Development Standards. Based on these requirements, the post-development peak flow rates are to be controlled to pre-development peak flow rates for the 4-hour Chicago and 24-Hour SCS Type II storms for all return periods up to and including the 100-year event.

Visual OTTHYMO was selected as the hydrologic model used for modelling the project. This model software is an accepted model by the NVCA and is used on similar projects throughout Ontario. Post-development model scenarios were created to model the hydrology of the proposed site drainage. The model schematics, full modelling results and output files are included in **Appendix D**.

An existing conditions model was developed in the 2023 Servicing and Stormwater Management Implementation Report as part of the previous Site Plan Approval process to determine target release rates for post-development conditions. A summary of the pre-development peak flow rates for Cranberry Creek from the report is provided below in **Table 2**.

Table 2: Pre-Development Peak Flow Rates

Return Period	Pre-Development Peak Flow Rate (m ³ /s)	
	4-Hour Chicago	24-Hour SCS Type II
2-year	0.013	0.021
5-year	0.027	0.038
10-year	0.037	0.049
25-year	0.053	0.066
50-year	0.067	0.078
100-year	0.081	0.092

As discussed previously, the Subject Development drains towards the east side of the property limits via storm sewers and overland flow to the proposed storm sewer and ditch along Highway 26. The total drainage area is approximately 2.35 ha, and peak flow controls are provided through the use of a superpipe storage system and a pair of underground stormwater chamber systems.

The pre- and post-development peak flows for the Subject Development have been summarized below in **Table 3**.

Table 3: Peak Flow Rate Comparisons to Cranberry Creek

Event		Pre-Development (m ³ /s)	Post-Development (m ³ /s)	Difference (m ³ /s)
Chicago	2-year	0.013	0.006	-0.007
	5-year	0.027	0.016	-0.011
	10-year	0.037	0.03	-0.007
	25-year	0.053	0.049	-0.004
	50-year	0.067	0.062	-0.005
	100-year	0.081	0.071	-0.010
SCS Type II	2-year	0.021	0.008	-0.013
	5-year	0.038	0.027	-0.011
	10-year	0.049	0.042	-0.007
	25-year	0.066	0.06	-0.006
	50-year	0.078	0.069	-0.009
	100-year	0.092	0.082	-0.010

Control structures are located downstream of the stormwater storage. These devices include proprietary inlet control devices and orifice plates within the control structures. A summary of the specified control devices are shown in **Table 5** below. Detailed Stage-Storage Discharge tables and Ipx control device flow curves are included in **Appendix D**.

Table 4: Peak Flow Control Device

Outlet	Control Device
Catchment 201	Lower: Ipx Tempest LMF 40 Upper: Ipx Tempest HF-E
Catchment 202	75mm diameter orifice plate
Catchment 203	Uncontrolled

8.6 Stormwater Quality Controls

Runoff from Catchment 201 will be treated through an OGS prior to discharging out of the Subject Site. The OGS unit will be appropriately sized to provide enhanced level protection. A minimum of 80% total suspended solids removal and 90% treatment of total annual runoff volume will be provided in accordance with the Ministry of Environment Stormwater Management Planning & Design Manual (March 2003). Water will outlet from the OGS into the proposed external Highway 26 storm sewer. Vortechs units were chosen for this development due to the site's high bedrock, and their structures are designed to accommodate these conditions. The Vortechs unit will be sized in the detailed design stages.

The OGS will be privately owned and maintained. Once the OGS unit is installed and operating according to the manufacturer's specifications, the Owner will be required to inspect and service the unit on a regular basis to ensure long term efficiency. At a minimum, the unit should be inspected at least once every six months to measure the sediment depth and oil/floatable level. Once the sediment reaches a certain depth as specified by the manufacturer, the unit shall be serviced by a vacuum truck company licensed to dispose of solid waste. If any large presence of oil or floatable materials is evident, the material should be removed and disposed.

Catchment 202 consists of rear-yards only and is considered clean water that does not need to be treated for stormwater quality.

8.7 Stormwater Erosion Control

Per the NVCA's comments for the Residences at Silver Creek project, it was stated that the erosion control criteria for new developments within the NVCA's jurisdiction is that the first 5mm of precipitation from any storm event is required to be retained on-site and that the 25mm storm event is to be detained in a stormwater management facility for a minimum of 48 hours. It is generally accepted that these criteria are intended to mitigate the potential for increased erosion on downstream waterbodies caused by urbanization within the watershed. This erosion is typically associated with moving bodies of water such as streams, creeks, rivers, etc.

8.7.1 25 mm Storm Event Detention

A detention time in excess of 48 hours of the runoff generated from the 25 mm storm event has been provided via the superpipe and underground chamber system. Refer to **Appendix D** for the hydrograph output for the entire site.

8.7.2 5 mm Retention

With respect to the criterion regarding retaining 5mm of precipitation, the NVCA's Stormwater Technical Guide (December 2013) states the following:

"To deal with the issues resulting from additional volume of runoff produced as a result of urbanization, a minimum of the first 5 mm of rainfall should be retained on site. This requires Low-Impact-Development measures of sufficient size to store the volume of 5 mm across the entire development site. The volume of storage required should be calculated by multiplying the 5 mm depth over the entire area to be treated by the stormwater management treatment train. This could be done through infiltration, rainwater harvesting or evapotranspiration. In some sites the conditions make retention of 5mm impractical. For these sites the NVCA encourages a "best efforts" approach to try to meet this goal."

Further, the NVCA's Stormwater Technical Guide (December 2013) provides standard initial abstraction depths for various land covers in Table 10.2. The minimum initial abstraction depth for pervious landcovers is 5 mm. Therefore, the 5 mm retention criterion is achieved for all pervious areas. The initial abstraction depth for the impervious areas is stated in Table 10.2 as 2 mm and does not achieve this criterion.

The Subject Site is subject to shallow bedrock, high groundwater and non-native soils. Due to these constraints, groundwater separation could not be achieved for underground infiltration systems and site grading to match existing grades at the property lines did not allow for low-impact development methods that would retain 5mm through infiltration for the roadways and parking lots. Additionally, rainwater harvesting of stormwater runoff from these areas was deemed to be unsuitable since this runoff is likely to have a higher pollutant load from the paved surfaces which are subject to vehicular traffic. Therefore, 5 mm retention for the Subject Development is not feasible.

8.8 Water Balance

Per the NVCA pre-consultation comments for the Residences at Silver Creek project, every effort to maintain pre-development annual infiltration rates should be applied. Peto MacCallum Ltd. was retained by Skydevco Inc. to conduct monthly ground water level measurements over a period of one year starting in November 2019. This monitoring has determined that the site is subject to high ground water with readings showing ground water to generally be less than 1 metre below surface, and measured at ground surface in April, during the spring months. Summer and fall groundwater measurements are pending at this time. Based on the constraint imposed by the high ground water level, infiltration mitigation facilities are not feasible.

It is generally accepted that, infiltration into groundwater is quantified when there is a minimum 1.0 m separation from groundwater. Under pre- and post-development conditions, this separation is not met during the season of high groundwater. It is recommended that increased topsoil depths be provided in all landscaped areas as a best practice approach.

8.9 Phosphorous Loading

A Phosphorus Budget was completed using values from the Nottawasaga Valley Conservation Authority Phosphorus Tool which is consistent with the Hutchinson Environmental Sciences Ltd. Phosphorus Report. Per the NVCA's pre-consultation comments for the Residences at Silver Creek project, "best efforts" are required to achieve pre-development loading rates. The mitigation for the site includes underground storage which removes 25% of the phosphorus load from the stormwater leaving the site. **Table 6** summarizes the pre- and post-development, and post-development with mitigation phosphorus outputs from the site. Refer to **Appendix D** for phosphorus budget calculations.

Table 5: Phosphorus Budget Summary

	Land Use	Area (ha)	Phosphorus Coefficient ¹ (kg/ha)	BMP Reduction Factor	Phosphorus Load (kg/yr)
Pre-Development	Forest	2.35	0.06	-	0.14
Post-Development	Residential	2.35	0.99	-	2.33
Post-Development (with mitigation)	Residential	2.35	0.99	0.25	1.75

¹ Calculated per Hutchinson Report Equation 3

9.0 NATURAL HAZARDS

In the 2023 Servicing and Stormwater Management Implementation Report, consideration was given to the flooding and erosion hazards associated with Cranberry Marsh in which the Regional Floodline limit was updated and a 6 m buffer added. However, the Subject Development for this report is located well outside the floodplain limits and does not need to address floodplain concerns.

10.0 EROSION & SEDIMENT CONTROLS

Erosion and sediment controls will be implemented prior to the commencement of any site servicing works and maintained throughout construction until the site is stabilized or as directed by the Engineer, NVCA and/or the Town. Controls are to be inspected regularly, after each significant rainfall, and maintained in proper working condition. The proposed erosion and sediment controls will include a combination of silt fencing, silt sacks, dust suppression, and mud mats. The need for additional controls will be based on the field conditions, at the discretion of the Engineer and implemented as necessary.

- **Silt fencing:** Silt fence will be constructed in accordance with NVCA's Typical Detail of Silt/Sediment Fence (BSD-23 Draft). It should be noted that additional silt fence may be added based on field decisions by the Engineer and Developer prior to, during and following the earthworks.
- **Interceptor Swales:** Drainage will be conveyed by a series of interceptor ditches and swales. The drainage swales will be strategically placed onsite to direct runoff to the erosion and sediment controls. These swales will include flow check dams and rip-rap as required.
- **Flow Check Dams:** Temporary straw bale and rock check dams will be utilized on-site in order to prevent any silt mitigation off site during and after construction activities. These dams will promote settling of suspended solids and will reduce flow velocities. Sediment accumulation will be monitored and removed as necessary. The temporary rock check dams will be constructed in accordance with NVCA's Typical Rock Check Dam Erosion Control Device (BSD-24 Draft).
- **Excavated Sediment Trap:** Excavated sediment traps or basins may be required to remove sediment from runoff before the runoff discharges to receiving conveyance routes.
- **Mud Mat:** A mud mat has been proposed at the entrance to the development. This mud mat will be maintained at the site until base asphalt is placed to limit mud tracking from the site onto the surrounding Municipal roadway network. The Contractor shall ensure mud mat maintenance (cleaning / additional stone) is completed on an as-needed basis to ensure proper operation.
- **Dust Suppression:** During earthwork activities, the Contractor will be responsible for ensuring dust suppression is maintained using water, calcium chloride, or other methods approved by the Engineer.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The analysis presented above provides a comprehensive servicing and stormwater management assessment in support of the proposed Residences at Silver Creek development. The proposed development has sufficient servicing and stormwater capacity based on the new Site Plan layout.

- Site access is provided from Prince of Wales Drive off of Highway 26.
- Secondary emergency access is provided at the east side corner of the Site.
- Utilities for site servicing are available and will be extended to the Subject Development.
- The internal private sanitary sewer system within the parking lots will be connected to the existing 200 mm diameter gravity trunk sewer located within the Prince of Wales Drive right-of-way.
- The internal public water distribution network will be connected to two existing watermains including a connection to the existing 300 mm diameter located within the Highway 26 Right-of-Way and a connection to the existing 200 mm diameter stub on the west side of Prince of Wales Drive.
- The watermain internal to the site will be owned and operated by the Town of Collingwood and an easement will be provided in favour of the Town.
- The design of the Stacked Townhouse buildings will need to consider available fire flows as confirmed by the Town's water distribution model.
- Quantity control of stormwater is provided via superpipes, underground storage systems and inlet control devices.
- Quality control of stormwater is provided via an oil/grit separator to achieve "Enhanced Protection".
- Due to site grading constraints and high groundwater table, the retention of the 5mm of precipitation is not feasible.
- Detention of the 25mm Storm Event for greater than 48 hours is provided.
- Due to the high groundwater, infiltration practices are not suitable for water balance mitigation. Increased topsoil depth is recommended as a "best practice".
- Phosphorous loading calculations have been prepared to determine the change in loading due to development. Mitigation via underground storage is provided as a "Best Efforts" approach.
- Erosion and sediment controls will be implemented prior to construction to minimize the disturbance of adjacent lands and watercourse caused by construction activities.

Therefore, we recommend approval of the Official Plan Amendment and Zoning By-Law amendment for the subject lands from the perspective of engineering servicing and stormwater management requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Charles Buscher, E.I.T.
Engineering Intern

C.F. CROZIER & ASSOCIATES INC.



Rebecca Alexander, P.Eng.
Project Manager

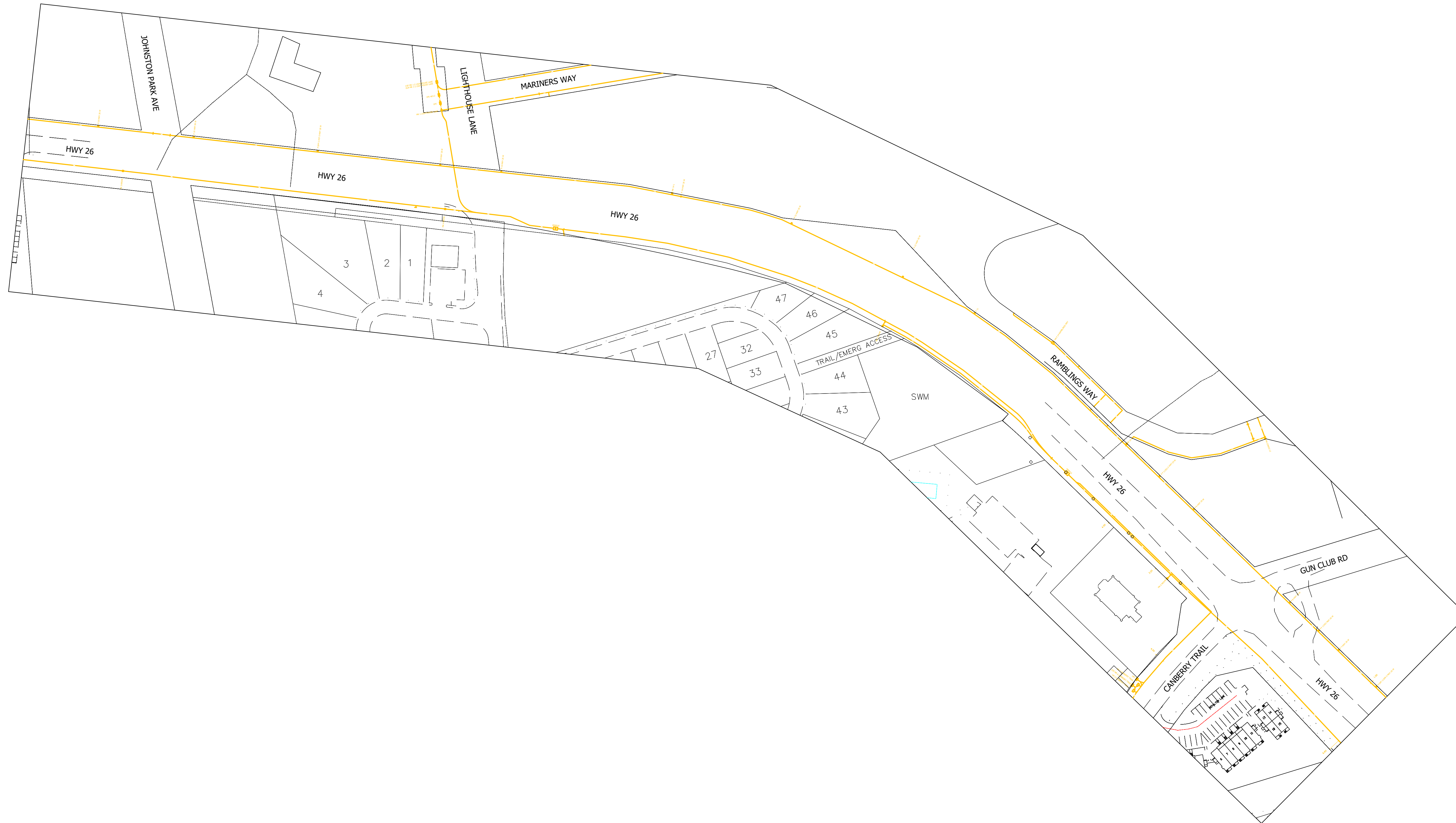
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APPENDIX A

Utility Markups and SUI Report

Bell Markup
Enbridge Markup
EPCOR Markup
Rogers Markup

Subsurface Utility Investigation Report Prepared by Planview Ltds. (May 2021)



PLEASE NOTE:
 THIS DRAWING IS FOR MARKUP ONLY - NOT FOR PERMIT TO PROCEED
 CONSTRUCTION. BELL CANADA PLANT LOCATION IS APPROXIMATE.

BELL CANADA
 Municipal Operations Department
 Floor 5 Blue, 100 Borough Drive
 Scarborough, Ontario, M1P 4W2
 Ph. 416-296-6929
 This plan or drawing is the property of Bell Canada and the
 copyright of which is owned by Bell Canada. This plan or
 drawing may not be copied or used by others without the
 written consent of Bell Canada, which may be withheld at
 Bell Canada's discretion.

Bell Canada Legend Info

	Existing Conduit
	Existing Buried Cable
	Existing Manhole
	Existing Handhole / GLB
	Existing GLB
	Existing Central Splitting Point
	Existing Interface
	Existing Bell Pole
	Existing Pedestal

CALL FOR LOCATES
 1-800-400-2255

HAND DIG
 if within 1m of Bell plant

HAND DIG
 when crossing Bell plant

Maintain clearance of 0.6m

If further details required
 You must acquire Locates or Test Pits



Dwg # - 1

Mark Up # - 81729

CAD Tech - Alexandra Dabu

EGD File Number: 23741711

Re: 1790-5382 - 11403, 11453, and 11453 Hwy 26 West, Collingwood - Markup Circulation

- By law utility locates must be obtained prior to starting any excavation or ground disturbance activity, such as pile driving, boring, auguring or digging.
- Contact Ontario One Call at 1-800-400-2255 or www.on1call.com at least 5 business days before beginning work to obtain utility locates.
- Please refer to the “**Third Party Requirements In the Vicinity of Natural Gas Facilities**” for requirements and precautions for working safely in the vicinity of natural gas pipelines. The most recent version of this document is available at: <https://www.enbridgegas.com/~media/Extranet-Pages/Safety/Before-you-dig/Third-Party-Requirements-in-the-Vicinity-of-Natural-Gas-Facilities>
- Enbridge’s responses are based on the information available and are valid for a period of 6 months from issue.

VITAL MAIN

- You are working within 3m of a Vital Main Pipeline. In order to accommodate Enbridge vital main standby requirements, our Damage Prevention department must be contacted a minimum of three business days prior to commencing any excavation at 1-866-922-3622 to schedule a site meeting.

NEB PERMIT REQUIRED

- When crossing or working within 30m of the right-of-way of an NEB regulated natural gas pipeline, a permit must be obtained from the pipeline company (attached).
 - Completed permit applications may be submitted to the Enbridge Gas Distribution Inc. NEB Engineer at nqt@enbridge.com
 - Completed permit applications may be submitted to the Enbridge Gas Distribution Inc. NEB Engineer at 2193914canadalimited@enbridge.com

CONFLICT

- We have an **OBJECTION** to your proposed plant as indicated. Please refer to the attached drawings for information on our existing or proposed gas plant.
- You must submit a revised design for our approval that meets the requirements detailed in the Third Party Requirement book before proceeding.
- If relocation of our plant is required, please contact:

<input type="checkbox"/>	Toronto Region	Jaclyn Mui	416-495-7222	jaclyn.mui@enbridge.com
<input type="checkbox"/>	Central Region West	Meetpal Chhina	905-458-2159	meetpal.chhina@enbridge.com
<input type="checkbox"/>	Central Region East	Ashu Kahol	905-927-3017	ashu.kahol@enbridge.com
<input type="checkbox"/>	Niagara Region	Rhonda Nicholson	905-641-4815	rhonda.nicholson@enbridge.com
<input type="checkbox"/>	Eastern Region Ottawa	Sonia Padamadan	613-748-6861	sonia.padamadan@enbridge.com
<input type="checkbox"/>	Easement Crossing	Anissa Trenholm	416-753-6937	anissa.trenholm@enbridge.com

NO-CONFLICT

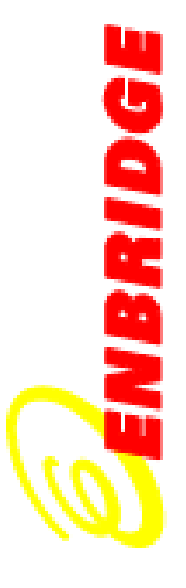
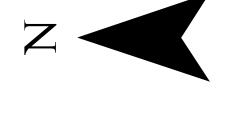
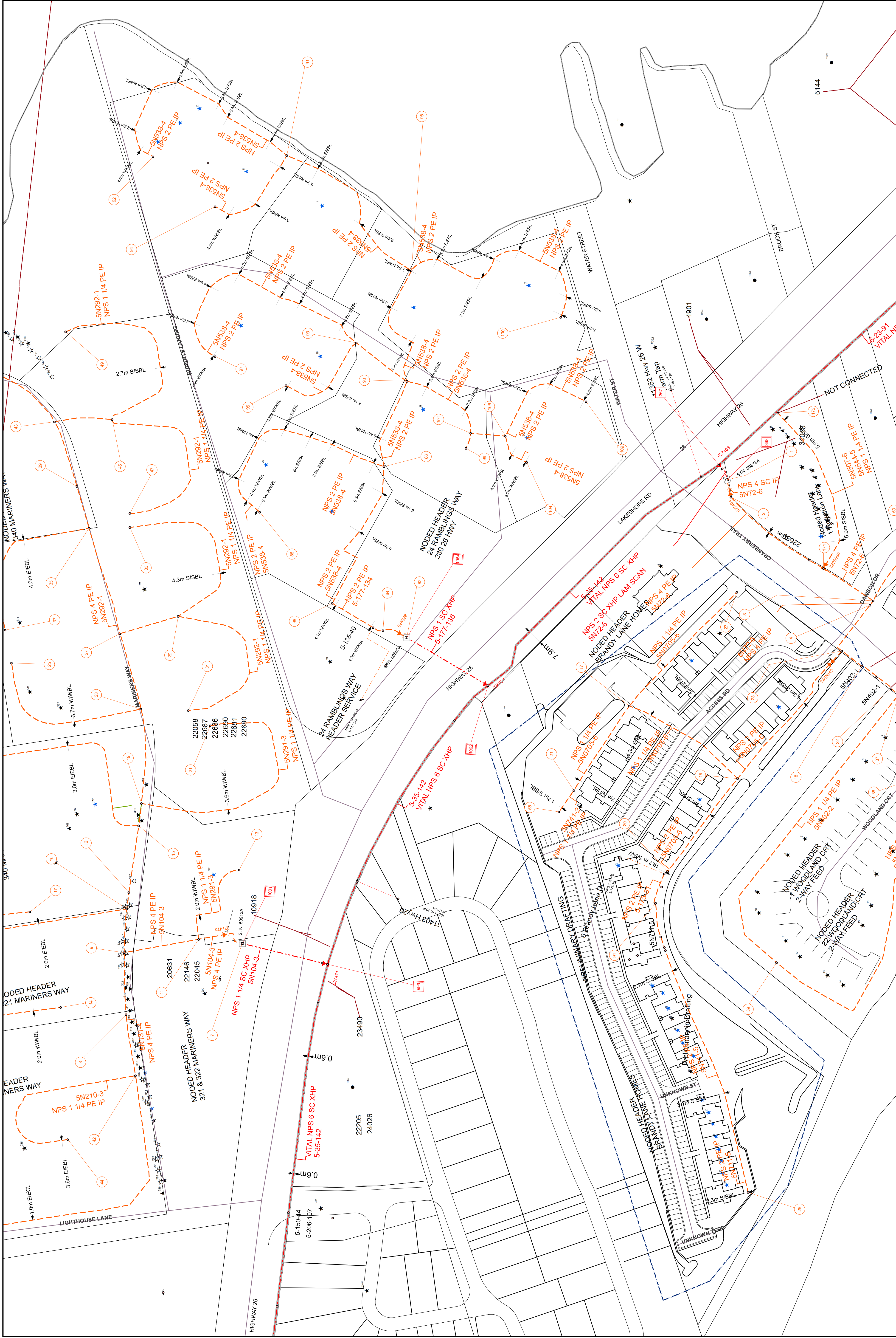
- We have **NO OBJECTION** to your proposed plant as indicated. Please refer to the attached drawings for information on our existing and/or proposed gas plant. GAS MAINS MUST BE FIELD LOCATED. Before digging, please call ONTARIO ONE CALL at 1-800-400-2255 for free gas locates.

GENERAL LOCATION

- Refer to the attached drawings for information on our existing and/or proposed gas plant within the road allowance.
- The information provided is for **GENERAL LOCATION ONLY** and is not an approval. Detailed plans must be submitted for our review before an approval will be granted.

Kind Regards,

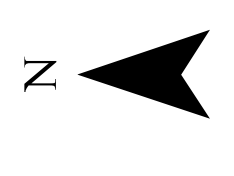
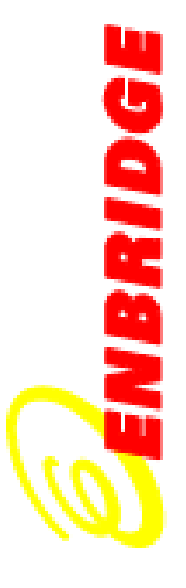
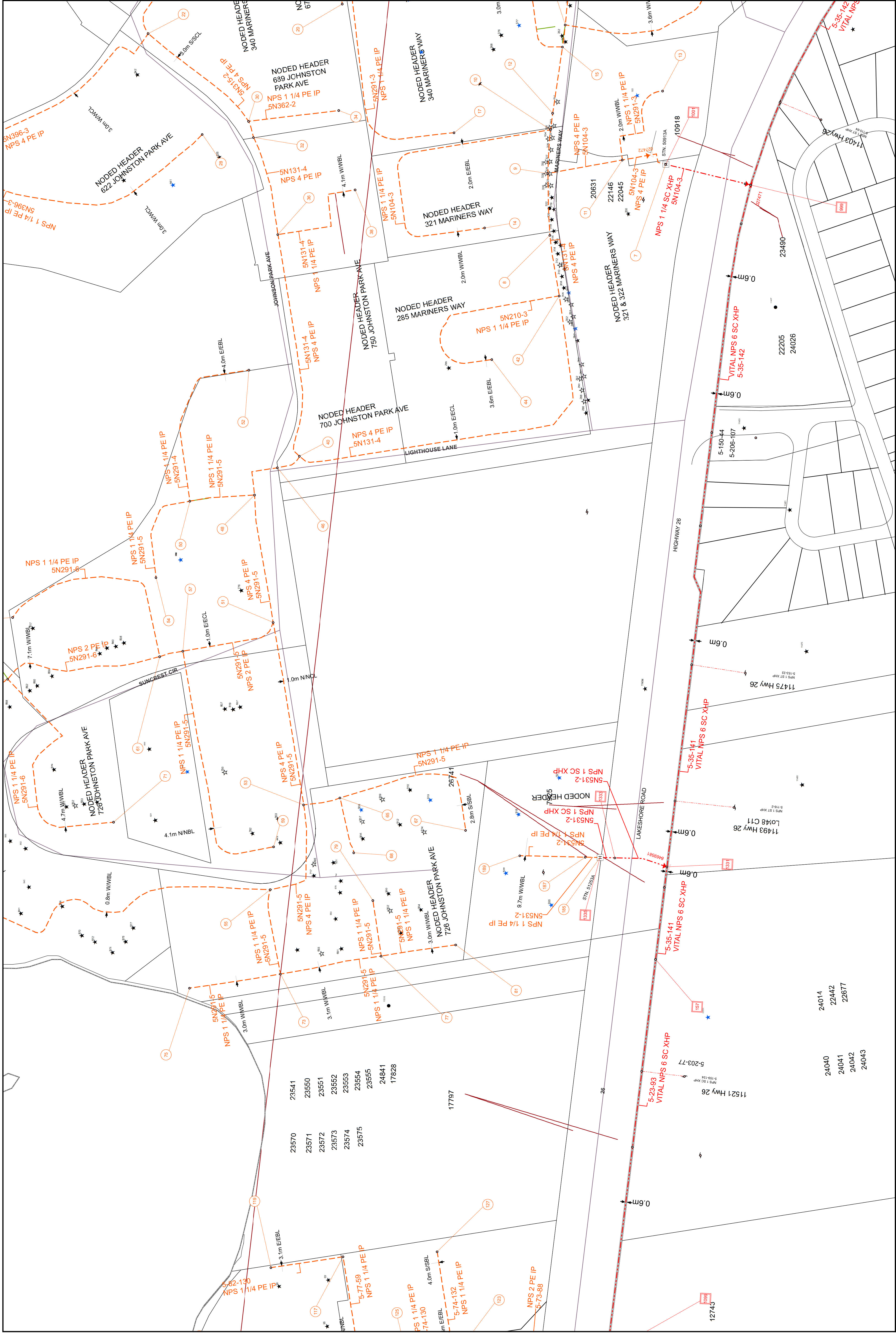
 Kishore RMSI
2019.12.02 17:25:38
+05'30'



Plotted By: Konda Rakesh Kumar

Date Plotted: 12/2/2019 2:49:36 AM

Note : Map is not to scale.

















Plotted By: Konda Rakesh Kumar

Date Plotted: 12/2/2019 2:53:03 AM

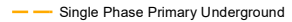

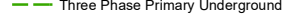
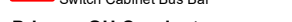
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Legend

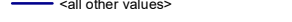
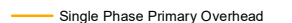

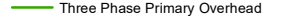
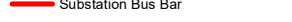
Transformer Bank

- Style, Phasing Code**
-  Padmount, B
 -  Padmount, R
 -  Padmount, RWB
 -  Padmount, W
 -  Polemount, B
 -  Polemount, R
 -  Polemount, RB
 -  Polemount, RW
 -  Polemount, RWB
 -  Polemount, W
 -  Poletrans, B
 -  Poletrans, R
 -  Poletrans, W
 -  Substation, RWB

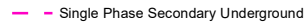
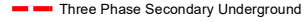
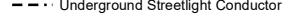
Primary UG Conductor

- SubtypeCode**
-  Single Phase Primary Underground
 -  Two Phase Primary Underground
 -  Three Phase Primary Underground
 -  Switch Cabinet Bus Bar


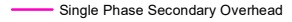
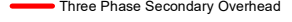
Primary OH Conductor

- SubtypeCode**
-  <all other values>
 -  Single Phase Primary Overhead
 -  Two Phase Primary Overhead
 -  Three Phase Primary Overhead
 -  Substation Bus Bar

Secondary UG Conductor

- SubtypeCode**
-  Single Phase Secondary Underground
 -  Three Phase Secondary Underground
 -  Underground Streetlight Conductor

Secondary OH Conductor

- SubtypeCode**
-  Overhead Streetlight Conductor
 -  Single Phase Secondary Overhead
 -  Three Phase Secondary Overhead

Pole

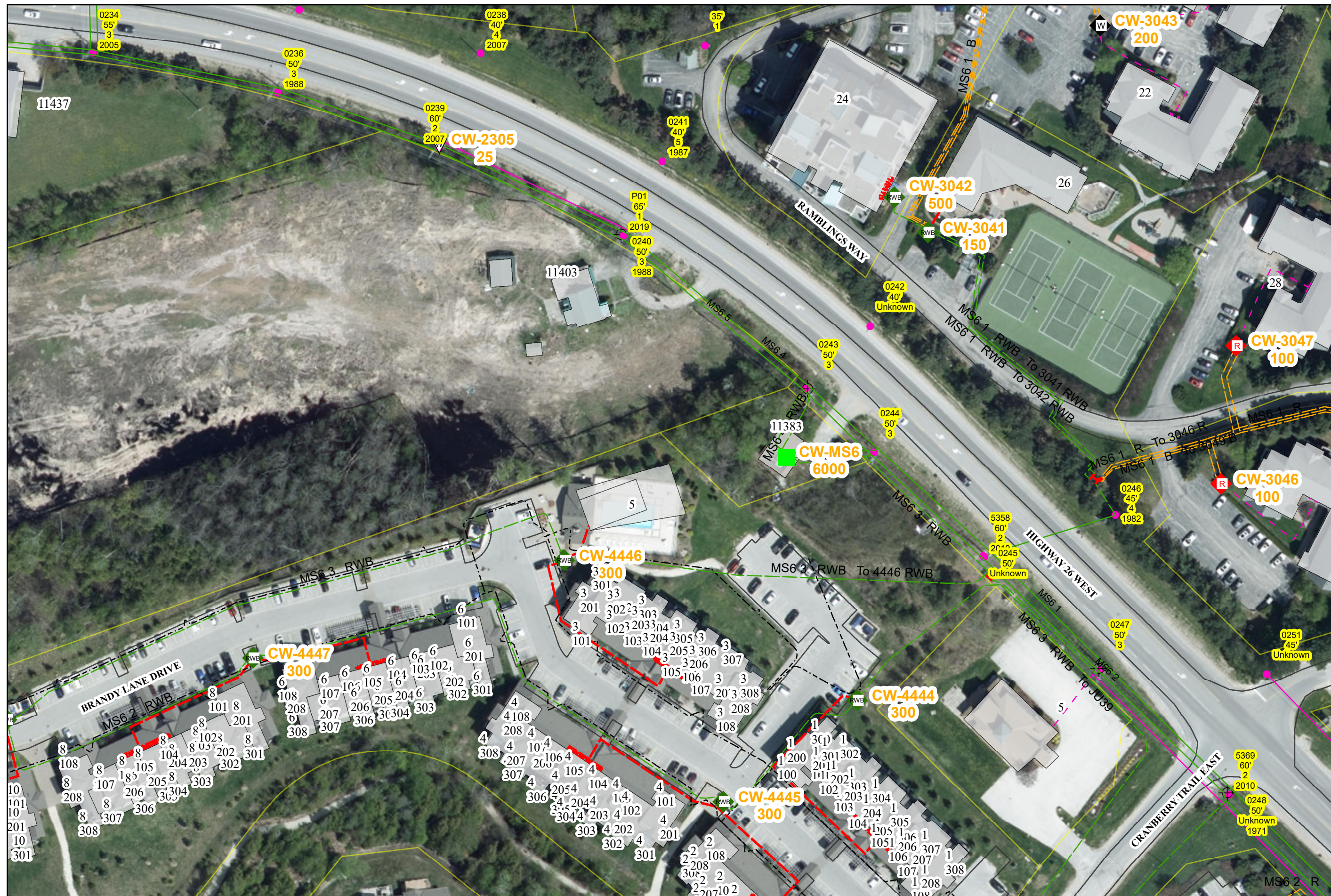
Workflow Status

-  Abandon
-  In Service

1:1,000



Date: 12/2/2019

















1 cm = 10 meters



Legend





Transformer Bank

Style, Phasing Code

-  Padmount, B
-  Padmount, R
-  Padmount, RWB
-  Padmount, W
-  Polemount, B
-  Polemount, R
-  Polemount, RB
-  Polemount, RW
-  Polemount, RWB
-  Polemount, W
-  Poletrans, B
-  Poletrans, R
-  Poletrans, W
-  Substation, RWB





Primary UG Conductor

SubtypeCode

-  Single Phase Primary Underground
-  Two Phase Primary Underground
-  Three Phase Primary Underground
-  Switch Cabinet Bus Bar

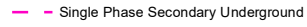
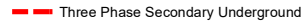
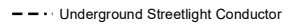
Primary OH Conductor

SubtypeCode

-  Single Phase Primary Overhead
-  Two Phase Primary Overhead
-  Three Phase Primary Overhead
-  Substation Bus Bar


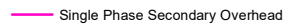
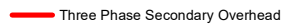
Secondary UG Conductor

SubtypeCode

-  Single Phase Secondary Underground
-  Three Phase Secondary Underground
-  Underground Streetlight Conductor

Secondary OH Conductor

SubtypeCode

-  Overhead Streetlight Conductor
-  Single Phase Secondary Overhead
-  Three Phase Secondary Overhead

Pole

Workflow Status

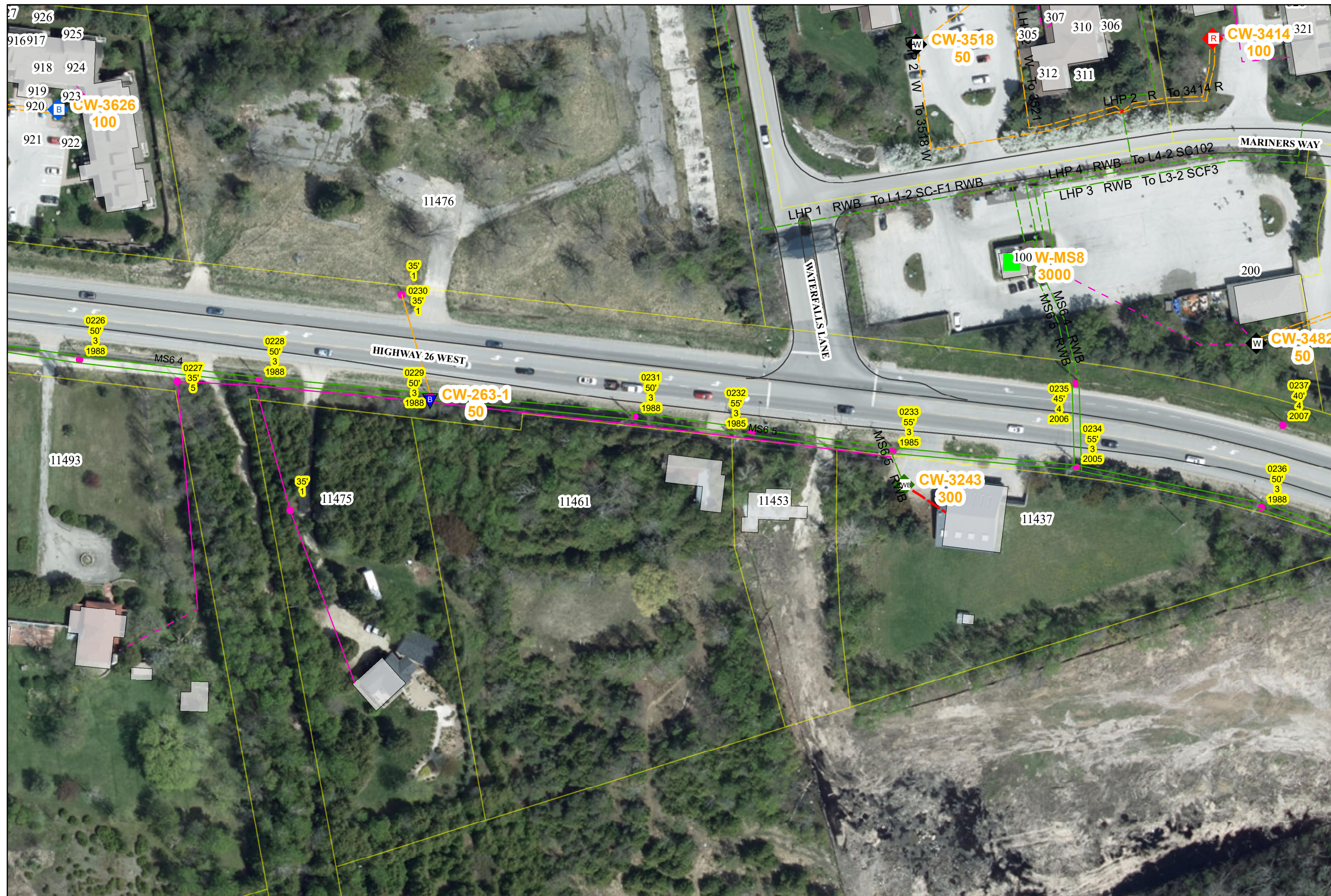
-  Abandon
-  In Service

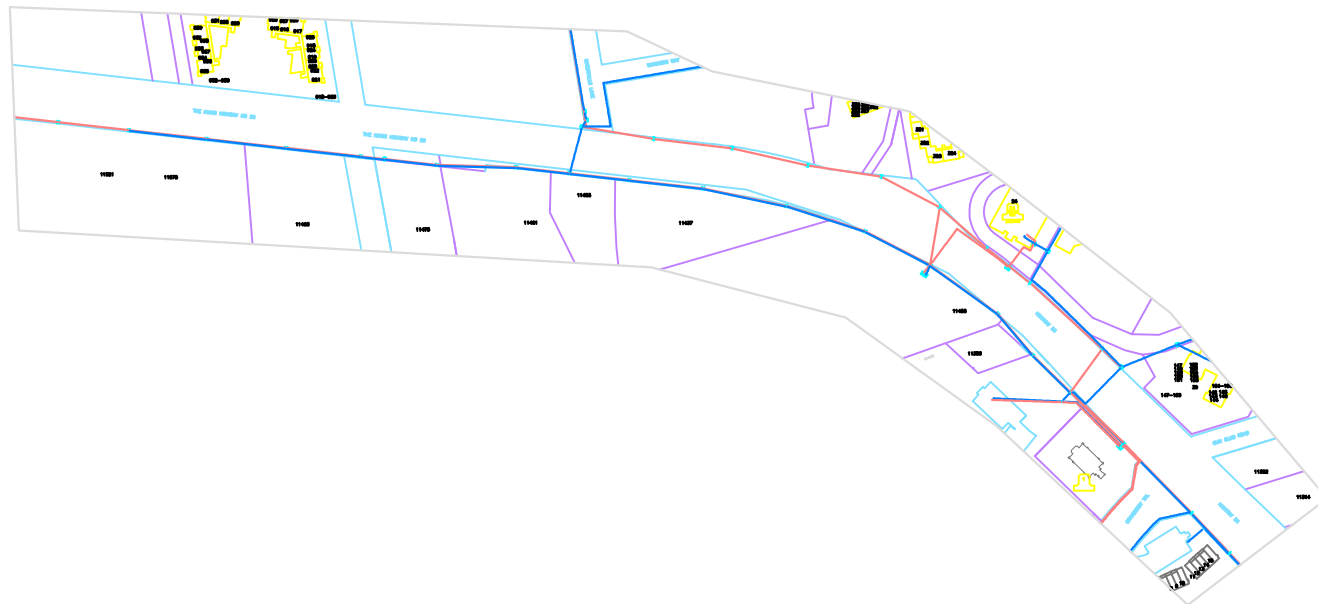
1:1,000







Date: 12/2/2019

1 cm = 10 meters





- Existing Buried Coaxial cable
- Existing Aerial Coaxial cable
- Existing Buried Fibre cable
- Existing Aerial Fibre cable
-  Existing Rogers Ground Level Box
-  Existing Rogers Pedestal
-  Existing Hydro Pole
-  Telephone Pole

CAUTION
 HAND DIG WHEN CROSSING ROGERS
 HAND DIG IF WITHIN 1M OF ROGERS PLANT

CALL FOR LOCATES
 1-800-738-7893

NOTE:
 PLANT IS TO APPROXIMATION
 PLAN NOT TO SCALE

Rogers File # - S192166
 CAD Tech - Rujin Dai





Subsurface Utility Investigation Report

Prepared for:



TEST PIT SURVEY

HIGHWAY 26 FROM CRANBERRY TRAIL EAST TO LIGHTHOUSE LANE

COLLINGWOOD, ONTARIO

RESIDENTIAL DEVELOPMENT PROJECT

PLANVIEW PROJECT #21-3-0041

MAY 27, 2021

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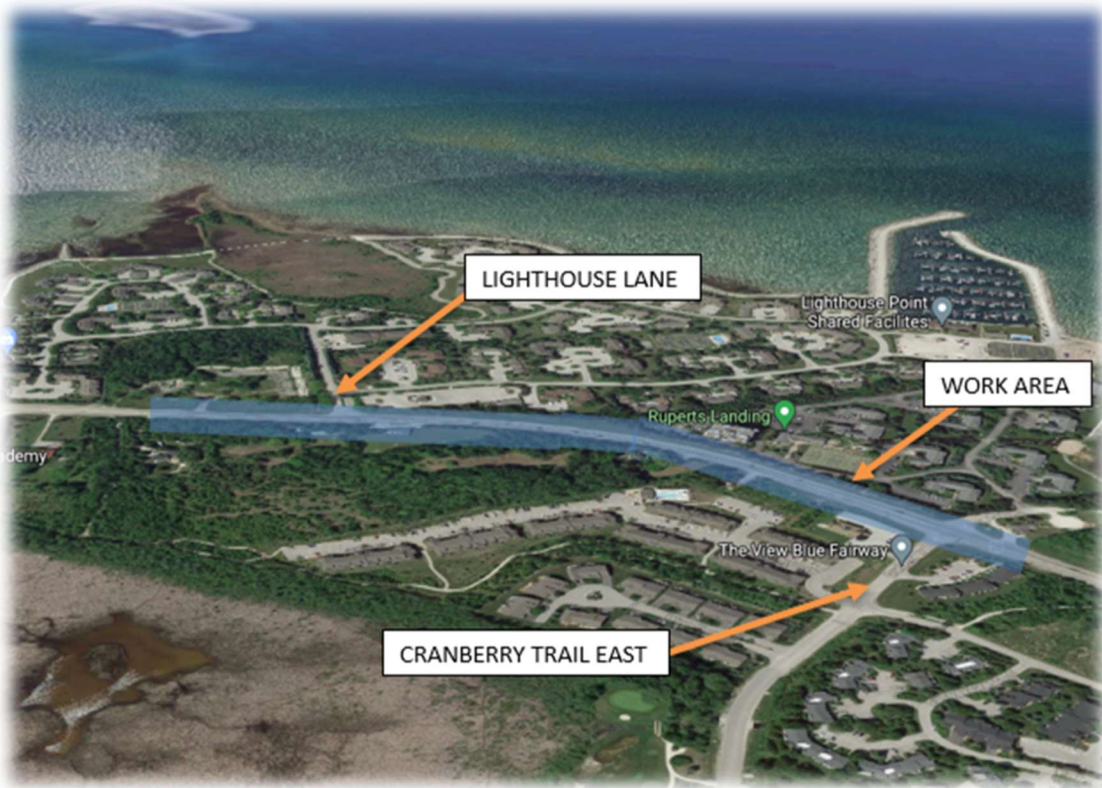
1 Project Details

1.1 Executive Summary

Planview Utility Services (Planview) was retained by Crozier to provide a Subsurface Utility Investigation in support of the Residential Development Project in the Town of Collingwood, Ontario.

1.2 Scope of Work

The scope of work was a Level B and Test Pit investigation at 24 locations within the proposed Residential Development construction area. Test pits were required to identify the horizontal and vertical locations of various utilities which may impact the design and construction of the new condominiums.



Test pit field work was completed on May 20, 2021. The results are documented within this report.

1.3 Project Background

Crozier provided a detailed plan illustrating the locations of the required test pits and invert data for this project.

1.4 Investigation Procedures

The following summarizes the procedures used by Planview to complete the utility investigation:

Step 1

The original site plan provided by Crozier was used to complete geophysical locates. Locate documentation is available at the Planview office.

Step 2

Once the utility locates were completed, the test pit locations were reviewed to ensure the pits were at correct locations. The test pit locations were selected based on the potential impact on the existing subsurface utilities within the area of the proposed construction.

Step 3

Upon receipt of all of the required permits, the daylighting excavation process began to determine vertical and horizontal positions of the desired underground utilities. Once the utilities were exposed, the vertical and horizontal locations were recorded using a Real Time Kinematic (RTK) Global Positioning System (GPS) survey instrument. This information has been included on the plans in Appendix B and in the CAD files delivered as part of the project deliverables. Some of the existing utilities were not found at the exact locations indicated on the markups, but instead in near proximity.

2 Test Pit Data (Level A)

2.1 Test Pit #1



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
1	21998	Gas	4929429.312	559745.569	178.794	1.054	150	N - S	Single 150 mm tar coated steel vital gas main.

2.2 Test Pit #2



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
2	22040	DNF	4929430.531	559746.869	179.124	0.900	Not Applicable	Not Applicable	Did not find the watermain due to heavy rocks.
2	22041	DNF	4929429.930	559746.150	179.129	0.895	Not Applicable	Not Applicable	Did not find the watermain due to heavy rocks.

2.3 Test Pit #3



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
3	21983	Hydro	4929419.452	559749.158	179.429	0.585	100	N - S	Eight 100 mm grey plastic hydro ducts. The coordinates are for the western duct. Rogers is believed to be in one of the ducts.
3	21982	Hydro	4929418.919	559748.657	179.346	0.668	100	N - S	Eight 100 mm grey plastic hydro ducts. The coordinates are for the eastern duct. Rogers is believed to be in one of the ducts.
3	21984	Hydro	4929419.252	559748.980	179.607	0.407	100	N - S	Eight 100 mm grey plastic hydro ducts. The coordinates are for the top duct. Rogers is believed to be in one of the ducts.

2.4 Test Pit #4



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
4	21986	Bell	4929419.510	559749.258	179.535	0.353	0.59 x 0.30	N - S	Two concrete Bell structures. The coordinates are for the top western edge of the western structure.
4	21987	Bell	4929419.882	559749.706	179.621	0.267	0.59 x 0.30	N - S	Two concrete Bell structures. The coordinates are for the top eastern edge of the western structure.

2.5 Test Pit #5



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
5	21988	Bell	4929419.967	559749.720	179.575	0.290	0.46 x 0.30	N - S	Two concrete Bell structures. The coordinates are for the top western edge of the eastern structure.
5	21989	Bell	4929420.261	559750.057	179.560	0.305	0.46 x 0.30	N - S	Two concrete Bell structures. The coordinates are for the top eastern edge of the eastern structure.

2.6 Test Pit #6



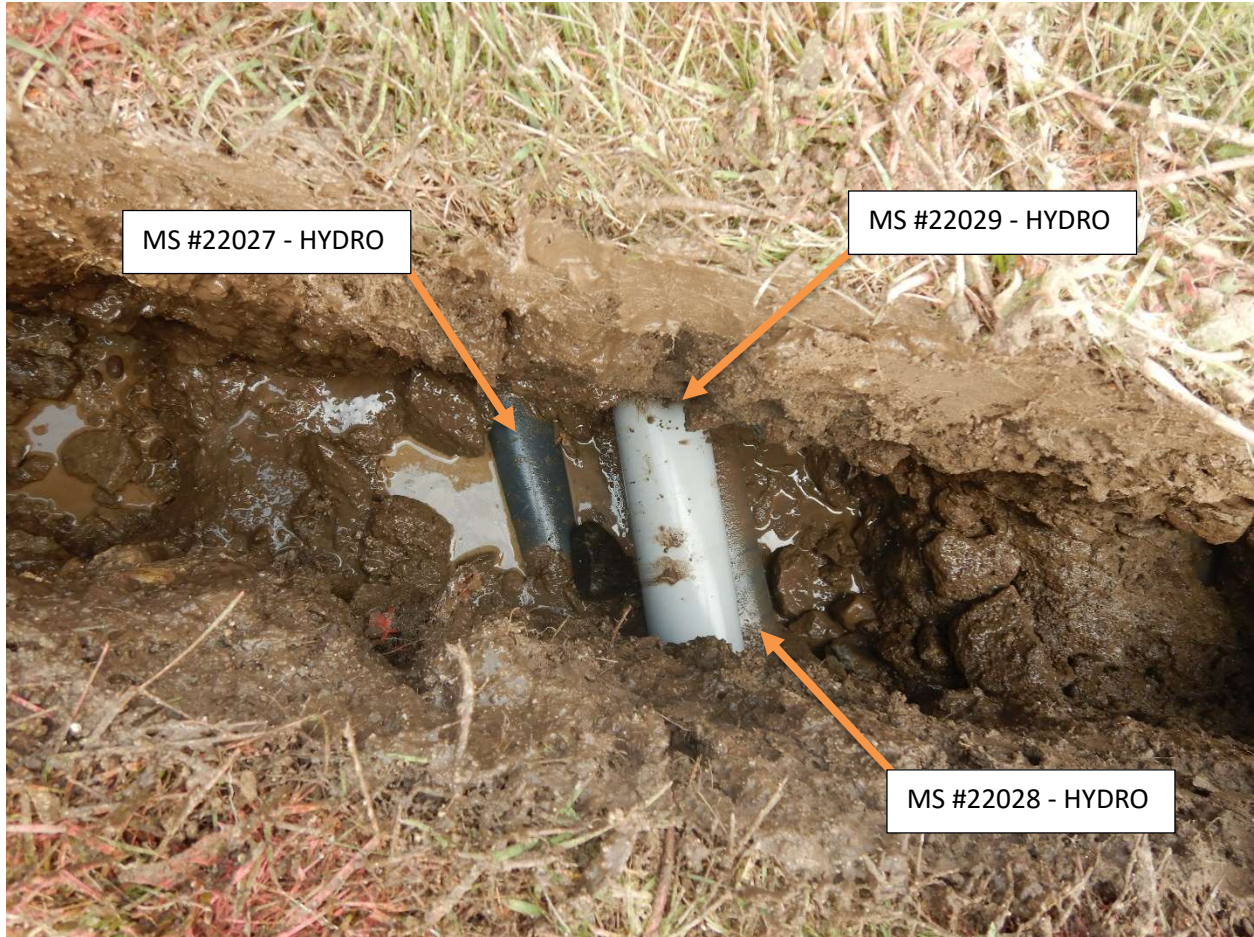
Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
6	22031	Bell	4929395.054	559774.142	179.100	0.517	0.54 x 0.25	N - S	Two concrete Bell structures. The coordinates are for the top of the western edge of the western structure.
6	22032	Bell	4929395.348	559774.605	179.078	0.539	0.54 x 0.25	N - S	Two concrete Bell structures. The coordinates are for the top of the eastern edge of the western structure.

2.7 Test Pit #7



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
7	22033	Bell	4929395.389	559774.598	179.028	0.496	0.55 x 0.25	N - S	Two concrete Bell structures. The coordinates are for the top of the western edge of the eastern structure.
7	22034	Bell	4929395.658	559775.133	178.973	0.551	0.55 x 0.25	N - S	Two concrete Bell structures. The coordinates are for the top of the eastern edge of the eastern structure.

2.8 Test Pit #8



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
8	22027	Hydro	4929394.620	559773.152	178.949	0.804	100	N - S	Three 100 mm grey plastic hydro ducts. The coordinates are for the western duct.
8	22028	Hydro	4929394.680	559773.381	178.960	0.793	100	N - S	Three 100 mm grey plastic hydro ducts. The coordinates are for the eastern duct.
8	22029	Hydro	4929394.648	559773.345	179.114	0.639	100	N - S	Single 100 mm grey plastic hydro duct. The coordinates are for the top duct.

2.9 Test Pit #9



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
9	21992	Rogers	4929386.917	559776.360	179.613	0.396	50	E - W	Two 50 mm black plastic Rogers conduits. The coordinates are for the top conduit.

2.10 Test Pit #10



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
10	21994	Bell	4929374.458	559768.784	179.430	0.544	0.53 x 0.20	E - W	Concrete Bell structure. The coordinates are for the top of the northern edge of the structure.
10	21995	Bell	4929374.072	559769.253	179.385	0.589	0.53 x 0.20	E - W	Concrete Bell structure. The coordinates are for the top of the southern edge of the structure.

2.11 Test Pit #10 Continued



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
10	21997	Sprinkler	4929374.009	559769.435	179.747	0.227	25	E - W	Single 25 mm rubber sprinkler line.

2.12 Test Pit #11



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
11	22000	Hydro	4929372.988	559769.851	179.203	0.491	1.16 x 0.26	E - W	Concrete hydro structure. The coordinates are for the top of the northern edge of the structure.
11	22001	Hydro	4929372.285	559770.655	179.164	0.530	1.16 x 0.26	E - W	Concrete hydro structure. The coordinates are for the top of the southern edge of the structure.

2.13 Test Pit #13



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
13	22043	Hydro	4929355.393	559785.031	178.746	1.412	100	E - W	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the northern duct.
13	22044	Hydro	4929355.489	559784.911	178.742	1.416	100	E - W	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the middle duct.
13	22045	Hydro	4929355.537	559784.820	178.754	1.404	100	E - W	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the southern duct.

2.14 Test Pit #14



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
14	22019	Gas	4929362.878	559807.523	178.053	1.448	150	N - S	Vital gas main 'T'. The coordinates are for the north to south 150 mm tar coated vital main section of the 'T'.
14	22020	Gas	4929362.740	559807.273	178.141	1.360	50	E - W	Vital gas main 'T'. The coordinates are for the western 50 mm yellow steel gas main section of the 'T'.

2.15 Test Pit #15



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
15	22037	Bell	4929355.726	559816.317	178.595	0.841	0.64 x 0.25	N - S	Concrete Bell structure. The coordinates are for the top of the eastern edge of the structure.
15	22038	Bell	4929355.209	559815.990	178.591	0.845	0.64 x 0.25	N - S	Concrete Bell structure. The coordinates are for the top of the western edge of the structure.

2.16 Test Pit #16



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
16	22025	DNF	4929328.834	559837.347	177.644	1.520	Not Applicable	Not Applicable	Did not find the vital gas main due to heavy rocks. The coordinates are for the bottom of the empty pit.

2.17 Test Pit #17



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
17	22049	Watermain	4929384.410	559827.677	177.585	2.082	250	N - S	Single 250 mm steel watermain.
17	22050	Gas	4929384.649	559827.650	177.903	1.764	50	E - W	Single 50 mm steel gas main.

2.18 Test Pit #18



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
18	22003	Gas	4929589.637	559403.629	178.739	0.883	150	E - W	Single 150 mm tar coated steel vital gas main.

2.19 Test Pit #19



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
19	22005	Bell	4929591.413	559402.955	178.806	0.643	0.47 x 0.25	E - W	Two concrete Bell structures. The coordinates are for the top of the northern edge of the southern structure.
19	22006	Bell	4929591.881	559402.999	178.842	0.607	0.47 x 0.25	E - W	Two concrete Bell structures. The coordinates are for the top of the southern edge of the southern structure.

2.20 Test Pit #20



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
20	22013	Bell	4929591.202	559408.901	178.897	1.135	W x H	E - W	Two concrete Bell structures. The coordinates are for the top of the northern edge of the southern structure. The width and height of the structure was not measured as it was not requested at this location.
20	22014	Bell	4929591.250	559408.900	178.772	1.260	0.61 x 0.30	E - W	Two concrete Bell structures. The coordinates are for the top of the southern edge of the northern structure.
20	22015	Bell	4929591.939	559408.954	178.870	1.162	0.61 x 0.30	E - W	Two concrete Bell structures. The coordinates are for the top of the northern edge of the northern structure.

2.21 Test Pit #21



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
21	22047	DNF	4929613.107	559433.326	178.099	1.457	Not Applicable	Not Applicable	Did not find the watermain due to heavy rocks.

2.22 Test Pit #22



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
22	22023	Unknown	4929521.019	559648.118	178.158	2.538	Not Applicable	N - S	Unknown concrete slab. The watermain is possibly within the concrete slab.

2.23 Test Pit #23



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Size W x H (m x m)	Direction	Comments
23	22010	Bell	4929518.380	559645.635	179.433	0.786	0.45 x 0.25	N - S	Concrete Bell structure. The coordinates are for the top of the western edge of the structure.
23	22011	Bell	4929518.778	559645.856	179.481	0.738	0.45 x 0.25	N - S	Concrete Bell structure. The coordinates are for the top of the eastern edge of the structure.

2.24 Test Pit #24



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
24	22008	Gas	4929517.509	559645.103	179.305	1.033	150	N - S	Single 150 mm tar coated steel vital gas main.

2.25 Test Pit #26



Test Pit #	Point #	Utility	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Direction	Comments
26	22017	Gas	4929473.758	559693.610	178.479	1.195	150	N - S	Single 150 mm tar coated steel vital gas main.

3 Additional Notes

Test Pit #12 This pit was not attempted since Bell was unlocatable and could not be field verified as per the locator. There were heavy rock and debris at the test pit area. The cable may be abandoned.

Test Pit #25 This pit was not attempted as the sanitary lead was unlocatable and heavy rock and debris were present at the test pit area.

4 Clarification Notes

- An Excel spreadsheet and a set of digital pictures have been provided as part of the project deliverables. The hyperlinks in the spreadsheet allow the user to view high quality pictures of each test pit should a more detailed examination be required.
- All pipe/utility materials are solely based on observations in the field. All utility materials must be confirmed by the specific utility company.
- Concrete encased structures are identified using a combination of as-built records, locate documentation and professional judgement. Due to the nature of these structures it is difficult to know exactly what is inside and the data given for these structures shall be utilized accordingly.
- All coordinates are based on UTM 17 NAD 83 CSRS 2010.
- All elevations are based on the control survey **5382_Base-Model.dwg** provided by Crozier. The elevation was measured from the top bolt of the fire hydrant at the entranceway for Royalton Lane townhouse complex (refer to **Figure 1.0**).



Figure 1.0

5 Statement of Limitations

This report contains information, including but not limited to, drawings, field observations and data that represent professional judgement. The information may be based upon facts that have been provided to Planview by third party organizations. The Information has not been independently verified.

The report was prepared for specific purposes as outlined in the scope of work in section 1.2 and must be read as a whole.

Planview accepts no responsibility for any municipal infrastructure and utility activity that may have occurred since the date this report was issued.

This report is to be treated as confidential and should not be shared with any third party without the consent of Planview. Planview denies any liability whatsoever, for any damage resulting from any third party using the Information in this report.

6 Conclusion

The Subsurface Utility Engineering Investigation along Highway 26 has been summarized within this report. The data captured in the field will provide essential utility data in support of the Residential Development Project in the Town of Collingwood, Ontario.



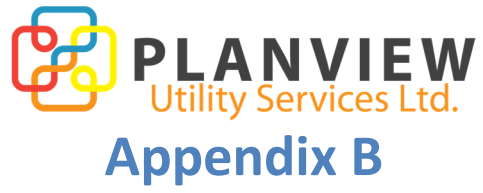
Appendix A

Test Pit Matrix

Test Pit #	Point #	Code	Utility	Utility Coordinates (m)			Natural Ground Coordinates (m)			Depth (m)	Diameter (mm)	Size W x H (m x m)	Direction	Ground Type	Picture #	Comments	
				Northing (m)	Easting (m)	Elevation (m)	Point #	Northing (m)	Easting (m)								Elevation (m)
1	21998	GAS 1	Gas	4929429.312	559745.569	178.794	21999	4929429.500	559745.392	179.848	1.054	150	-	N - S	Boulevard	DSCN1439.JPG	Single 150 mm tar coated steel vital gas main.
2	22040	DNF 2	DNF	4929430.531	559746.869	179.124	22042	4929430.070	559746.576	180.024	0.900	Not Applicable	-	Not Applicable	Boulevard	DSCN1456.JPG	Did not find the watermain due to heavy rocks.
2	22041	DNF 2	DNF	4929429.930	559746.150	179.129	22042	4929430.070	559746.576	180.024	0.895	Not Applicable	-	Not Applicable	Boulevard	DSCN1456.JPG	Did not find the watermain due to heavy rocks.
3	21983	HYD 3	Hydro	4929419.452	559749.158	179.429	21985	4929419.000	559749.172	180.014	0.585	100	-	N - S	Boulevard	DSCN1434.JPG	Eight 100 mm grey plastic hydro ducts. The coordinates are for the western duct. Rogers is believed to be in one of the ducts.
3	21982	HYD 3	Hydro	4929418.919	559748.657	179.346	21985	4929419.000	559749.172	180.014	0.668	100	-	N - S	Boulevard	DSCN1434.JPG	Eight 100 mm grey plastic hydro ducts. The coordinates are for the eastern duct. Rogers is believed to be in one of the ducts.
3	21984	HYD 3	Hydro	4929419.252	559748.980	179.607	21985	4929419.000	559749.172	180.014	0.407	100	-	N - S	Boulevard	DSCN1434.JPG	Eight 100 mm grey plastic hydro ducts. The coordinates are for the top duct. Rogers is believed to be in one of the ducts.
4	21986	BELL 4	Bell	4929419.510	559749.258	179.535	21990	4929419.762	559749.982	179.888	0.353	-	0.59 x 0.30	N - S	Boulevard	DSCN1435.JPG	Two concrete Bell structures. The coordinates are for the top western edge of the western structure.
4	21987	BELL 4	Bell	4929419.882	559749.706	179.621	21990	4929419.762	559749.982	179.888	0.267	-	0.59 x 0.30	N - S	Boulevard	DSCN1435.JPG	Two concrete Bell structures. The coordinates are for the top eastern edge of the western structure.
5	21988	BELL 5	Bell	4929419.967	559749.720	179.575	21991	4929419.999	559750.054	179.865	0.290	-	0.46 x 0.30	N - S	Boulevard	DSCN1436.JPG	Two concrete Bell structures. The coordinates are for the top western edge of the eastern structure.
5	21989	BELL 5	Bell	4929420.261	559750.057	179.560	21991	4929419.999	559750.054	179.865	0.305	-	0.46 x 0.30	N - S	Boulevard	DSCN1436.JPG	Two concrete Bell structures. The coordinates are for the top eastern edge of the eastern structure.
6	22031	BELL 6	Bell	4929395.054	559774.142	179.100	22036	4929395.061	559774.551	179.617	0.517	-	0.54 x 0.25	N - S	Boulevard	DSCN1454.JPG	Two concrete Bell structures. The coordinates are for the top of the western edge of the western structure.
6	22032	BELL 6	Bell	4929395.348	559774.605	179.078	22036	4929395.061	559774.551	179.617	0.539	-	0.54 x 0.25	N - S	Boulevard	DSCN1454.JPG	Two concrete Bell structures. The coordinates are for the top of the eastern edge of the western structure.
7	22033	BELL 7	Bell	4929395.389	559774.598	179.028	22035	4929395.290	559775.111	179.524	0.496	-	0.55 x 0.25	N - S	Boulevard	DSCN1454.JPG	Two concrete Bell structures. The coordinates are for the top of the western edge of the eastern structure.
7	22034	BELL 7	Bell	4929395.658	559775.133	178.973	22035	4929395.290	559775.111	179.524	0.551	-	0.55 x 0.25	N - S	Boulevard	DSCN1454.JPG	Two concrete Bell structures. The coordinates are for the top of the eastern edge of the eastern structure.
8	22027	HYD 8	Hydro	4929394.620	559773.152	178.949	22030	4929394.429	559773.307	179.753	0.804	100	-	N - S	Boulevard	DSCN1453.JPG	Three 100 mm grey plastic hydro ducts. The coordinates are for the western duct.
8	22028	HYD 8	Hydro	4929394.680	559773.381	178.960	22030	4929394.429	559773.307	179.753	0.793	100	-	N - S	Boulevard	DSCN1453.JPG	Three 100 mm grey plastic hydro ducts. The coordinates are for the eastern duct.
8	22029	HYD 8	Hydro	4929394.648	559773.345	179.114	22030	4929394.429	559773.307	179.753	0.639	100	-	N - S	Boulevard	DSCN1453.JPG	Single 100 mm grey plastic hydro duct. The coordinates are for the top duct.
9	21992	ROG 9	Rogers	4929386.917	559776.360	179.613	21993	4929387.090	559776.481	180.009	0.396	50	-	E - W	Boulevard	DSCN1437.JPG	Two 50 mm black plastic Rogers conduits. The coordinates are for the top conduit.
10	21994	BELL 10	Bell	4929374.458	559768.784	179.430	21996	4929374.479	559769.228	179.974	0.544	-	0.53 x 0.20	E - W	Boulevard	DSCN1438.JPG	Concrete Bell structure. The coordinates are for the top of the northern edge of the structure.
10	21995	BELL 10	Bell	4929374.072	559769.253	179.385	21996	4929374.479	559769.228	179.974	0.589	-	0.53 x 0.20	E - W	Boulevard	DSCN1438.JPG	Concrete Bell structure. The coordinates are for the top of the southern edge of the structure.
10	21997	SPR 10	Sprinkler	4929374.009	559769.435	179.747	21996	4929374.479	559769.228	179.974	0.227	25	-	E - W	Boulevard	DSCN1438.JPG	Single 25 mm rubber sprinkler line.
11	22000	HYD 11	Hydro	4929372.988	559769.851	179.203	22002	4929372.911	559770.422	179.694	0.491	-	1.16 x 0.26	E - W	Boulevard	DSCN1440.JPG	Concrete hydro structure. The coordinates are for the top of the northern edge of the structure.
11	22001	HYD 11	Hydro	4929372.285	559770.655	179.164	22002	4929372.911	559770.422	179.694	0.530	-	1.16 x 0.26	E - W	Boulevard	DSCN1440.JPG	Concrete hydro structure. The coordinates are for the top of the southern edge of the structure.
13	22043	HYD 13	Hydro	4929355.393	559785.031	178.746	22046	4929355.332	559784.775	180.158	1.412	100	-	E - W	Boulevard	DSCN1458.JPG	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the northern duct.
13	22044	HYD 13	Hydro	4929355.489	559784.911	178.742	22046	4929355.332	559784.775	180.158	1.416	100	-	E - W	Boulevard	DSCN1458.JPG	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the middle duct.

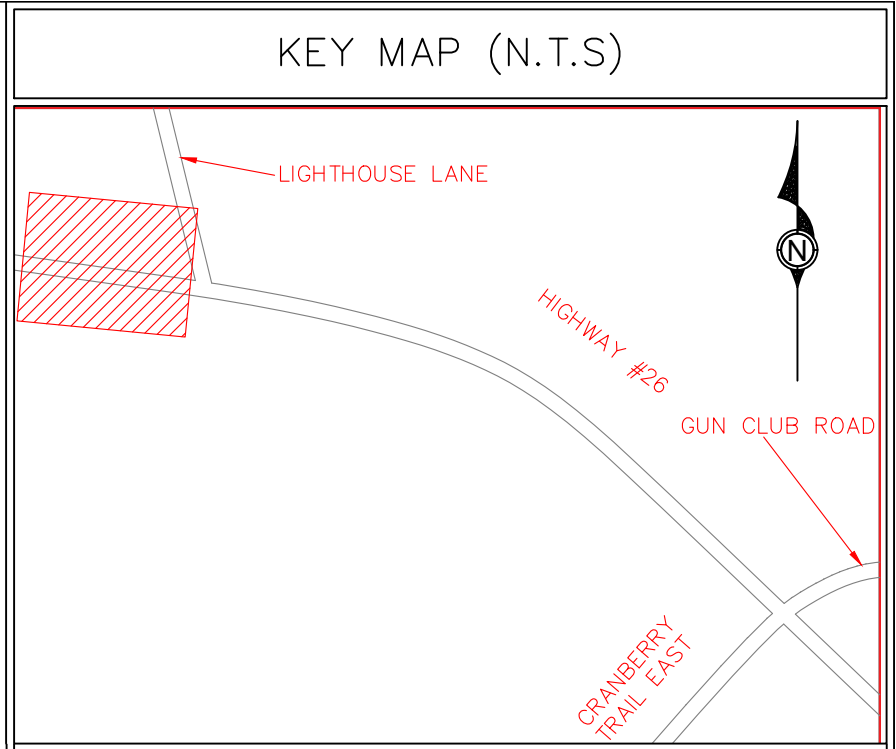
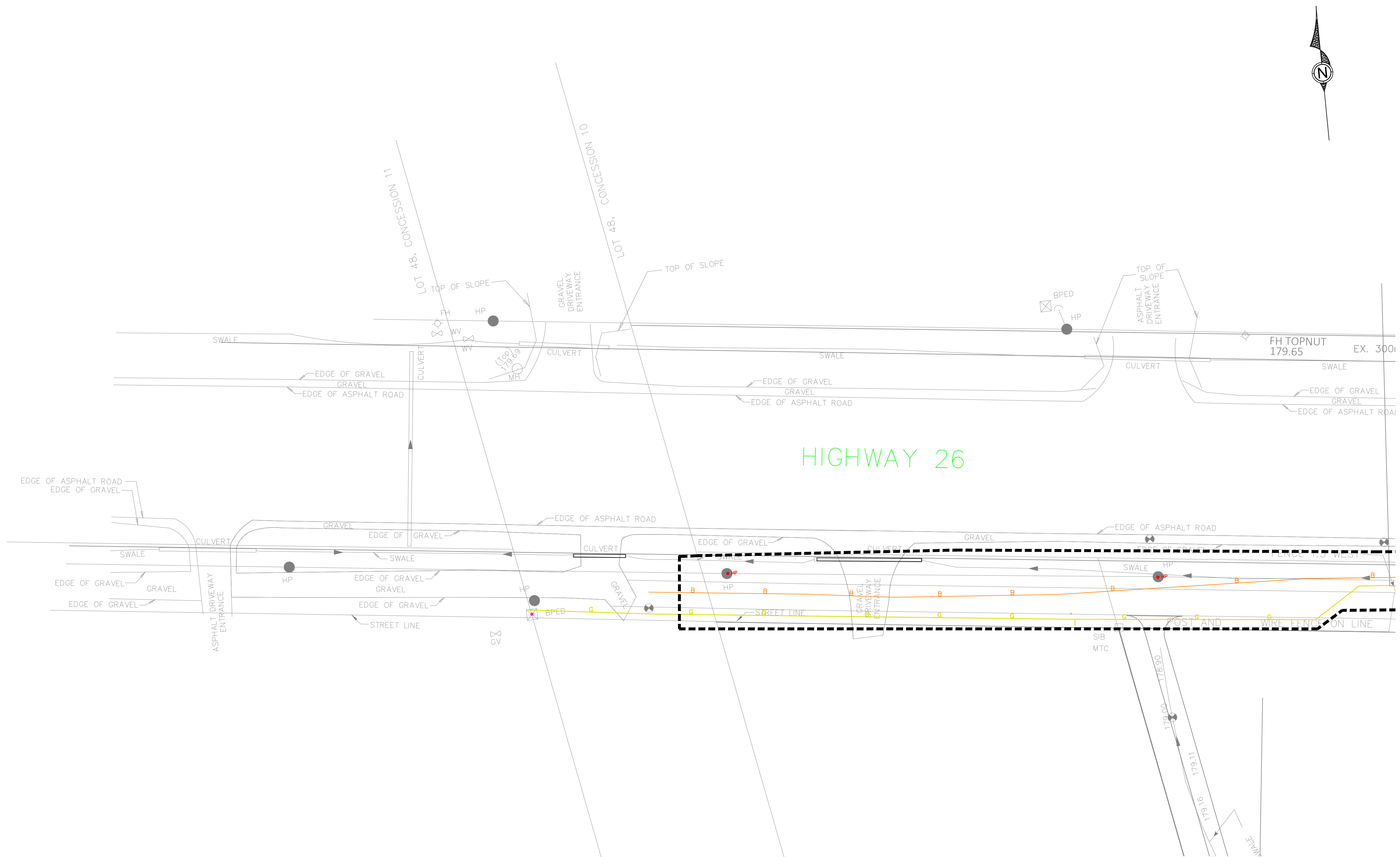
Test Pit #	Point #	Code	Utility	Northing (m)	Easting (m)	Elevation (m)	Point #	Northing (m)	Easting (m)	Elevation (m)	Depth (m)	Diameter (mm)	Size W x H (m x m)	Direction	Ground Type	Picture #	Comments
13	22045	HYD 13	Hydro	4929355.537	559784.820	178.754	22046	4929355.332	559784.775	180.158	1.404	100	-	E - W	Boulevard	DSCN1458.JPG	Three 100 mm white plastic hydro ducts. The coordinates are for the top of the southern duct.
14	22019	GAS 14	Gas	4929362.878	559807.523	178.053	22021	4929362.631	559807.420	179.501	1.448	150	-	N - S	Boulevard	DSCN1450.JPG	Vital gas main 'T'. The coordinates are for the north to south 150 mm tar coated vital main section of the 'T'.
14	22020	GAS 14	Gas	4929362.740	559807.273	178.141	22021	4929362.631	559807.420	179.501	1.360	50	-	E - W	Boulevard	DSCN1450.JPG	Vital gas main 'T'. The coordinates are for the western 50 mm yellow steel gas main section of the 'T'.
15	22037	BELL 15	Bell	4929355.726	559816.317	178.595	22039	4929355.358	559816.561	179.436	0.841	-	0.64 x 0.25	N - S	Boulevard	DSCN1455.JPG	Concrete Bell structure. The coordinates are for the top of the eastern edge of the structure.
15	22038	BELL 15	Bell	4929355.209	559815.990	178.591	22039	4929355.358	559816.561	179.436	0.845	-	0.64 x 0.25	N - S	Boulevard	DSCN1455.JPG	Concrete Bell structure. The coordinates are for the top of the western edge of the structure.
16	22025	DNF 16	DNF	4929328.834	559837.347	177.644	22026	4929329.128	559837.281	179.164	1.520	Not Applicable	-	Not Applicable	Boulevard	DSCN1453.JPG	Did not find the vital gas main due to heavy rocks. The coordinates are for the bottom of the empty pit.
17	22049	WM 17	Watermain	4929384.410	559827.677	177.585	22051	4929384.329	559827.489	179.667	2.082	250	-	N - S	Boulevard	DSCN1463.JPG	Single 250 mm steel watermain.
17	22050	GAS 17	Gas	4929384.649	559827.650	177.903	22051	4929384.329	559827.489	179.667	1.764	50	-	E - W	Boulevard	DSCN1463.JPG	Single 50 mm steel gas main.
18	22003	GAS 18	Gas	4929589.637	559403.629	178.739	22004	4929589.772	559403.371	179.622	0.883	150	-	E - W	Boulevard	DSCN1441.JPG	Single 150 mm tar coated steel vital gas main.
19	22005	BELL 19	Bell	4929591.413	559402.955	178.806	22007	4929591.656	559402.640	179.449	0.643	-	0.47 x 0.25	E - W	Boulevard	DSCN1442.JPG	Two concrete Bell structures. The coordinates are for the top of the northern edge of the southern structure.
19	22006	BELL 19	Bell	4929591.881	559402.999	178.842	22007	4929591.656	559402.640	179.449	0.607	-	0.47 x 0.25	E - W	Boulevard	DSCN1442.JPG	Two concrete Bell structures. The coordinates are for the top of the southern edge of the southern structure.
20	22013	BELL 20	Bell	4929591.202	559408.901	178.897	22016	4929591.325	559409.220	180.032	1.135	-	W x H	E - W	Boulevard	DSCN1448.JPG	Two concrete Bell structures. The coordinates are for the top of the northern edge of the southern structure. The width and height of the structure was not measured as it was not requested at this location.
20	22014	BELL 20	Bell	4929591.250	559408.900	178.772	22016	4929591.325	559409.220	180.032	1.260	-	0.61 x 0.30	E - W	Boulevard	DSCN1448.JPG	Two concrete Bell structures. The coordinates are for the top of the southern edge of the northern structure.
20	22015	BELL 20	Bell	4929591.939	559408.954	178.870	22016	4929591.325	559409.220	180.032	1.162	-	0.61 x 0.30	E - W	Boulevard	DSCN1448.JPG	Two concrete Bell structures. The coordinates are for the top of the northern edge of the northern structure.
21	22047	DNF 21	DNF	4929613.107	559433.326	178.099	22048	4929612.891	559433.109	179.556	1.457	Not Applicable	-	Not Applicable	Boulevard	DSCN1459.JPG	Did not find the watermain due to heavy rocks.
22	22023	UK 22	Unknown	4929521.019	559648.118	178.158	22024	4929521.142	559648.020	180.696	2.538	Not Applicable	-	N - S	Boulevard	DSCN1451.JPG	Unknown concrete slab. The watermain is possibly within the concrete slab.
23	22010	BELL 23	Bell	4929518.380	559645.635	179.433	22012	4929518.416	559645.892	180.219	0.786	-	0.45 x 0.25	N - S	Boulevard	DSCN1444.JPG	Concrete Bell structure. The coordinates are for the top of the western edge of the structure.
23	22011	BELL 23	Bell	4929518.778	559645.856	179.481	22012	4929518.416	559645.892	180.219	0.738	-	0.45 x 0.25	N - S	Boulevard	DSCN1444.JPG	Concrete Bell structure. The coordinates are for the top of the eastern edge of the structure.
24	22008	GAS 24	Gas	4929517.509	559645.103	179.305	22009	4929517.430	559645.316	180.338	1.033	150	-	N - S	Boulevard	DSCN1443.JPG	Single 150 mm tar coated steel vital gas main.
26	22017	GAS 26	Gas	4929473.758	559693.610	178.479	22018	4929473.496	559693.824	179.674	1.195	150	-	N - S	Boulevard	DSCN1449.JPG	Single 150 mm tar coated steel vital gas main.

1. All pipe/utility materials are solely based on observations in the field. All utility materials must be confirmed by the specific utility company.
2. In some instances the positions of the test pits were shifted from the original test pit drawing to avoid obstructions in the field.
3. Point # refers to the MicroSurvey Point number within the CAD drawing (MSPOINT layer). The point values can also be found on sheet two (Survey Points) of this digital Workbook.
4. All coordinates are based on UTM 17 NAD 83 CSRS 2010.
5. All GPS measurements were taken on the obvert of the duct/pipe unless noted otherwise.



Appendix B

Test Pit Location Plans



TOWN OF COLLINGWOOD

LEGEND

	GASMAIN
	BELL CANADA
	PEEL FIBER
	CN SIGNALS/COMMUNICATION
	360 NETWORKS
	FUTURE USE/CCTV
	CP SIGNALS/COMMUNICATION
	GROUP TELECOM/TELU
	WATERMAIN
	STREETLIGHT
	HYDRO
	STORM SEWER
	SANITARY/COMBINED SEWER
	LEVEL B
	LEVEL C
	LEVEL D
	WORK EXTENTS
	TEST PIT



CLIENT: **CROZIER & ASSOCIATES**
Consulting Engineers

NO.	DATE	DESCRIPTION	BY
4	27-MAY-21	LEVEL A SUBMITTED TO CLIENT	SM
3	20-MAY-21	LEVEL A FIELD WORK COMPLETED	SM
2	30-MAR-21	LEVEL B SUBMITTED TO THE CLIENT	SM
1	18-MAR-21	LEVEL B SURVEY COMPLETED	SM

GENERAL NOTES

1. THE COLLECTION AND DEPICTION OF INFORMATION SHOWN ON THIS DRAWING CONFORMS TO THE PROVISIONS OF C/ASCE 38-02, "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."
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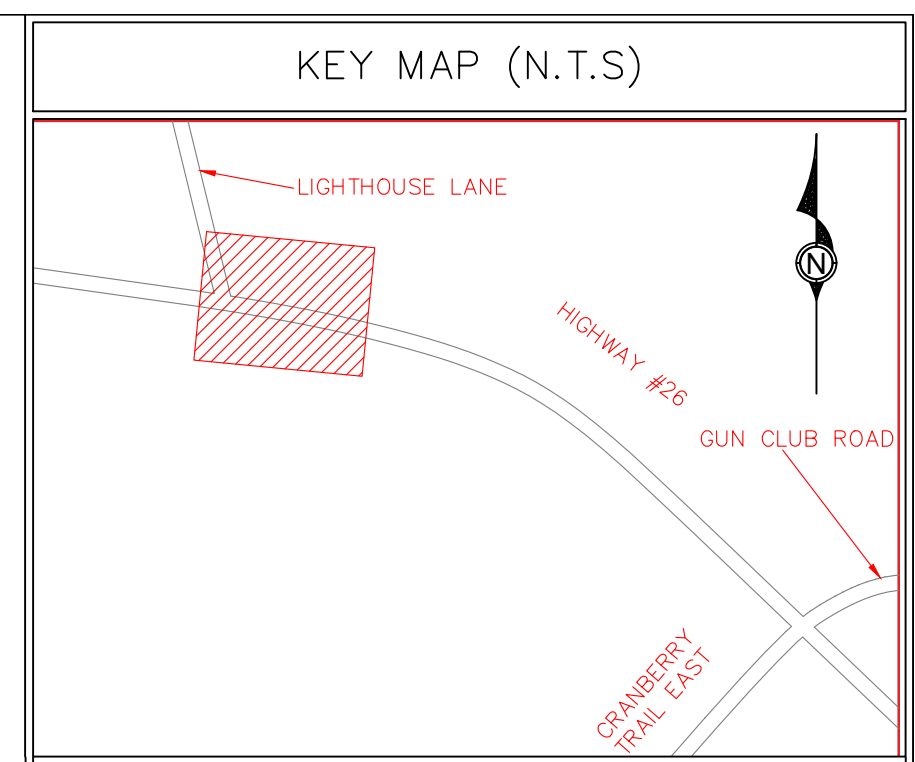
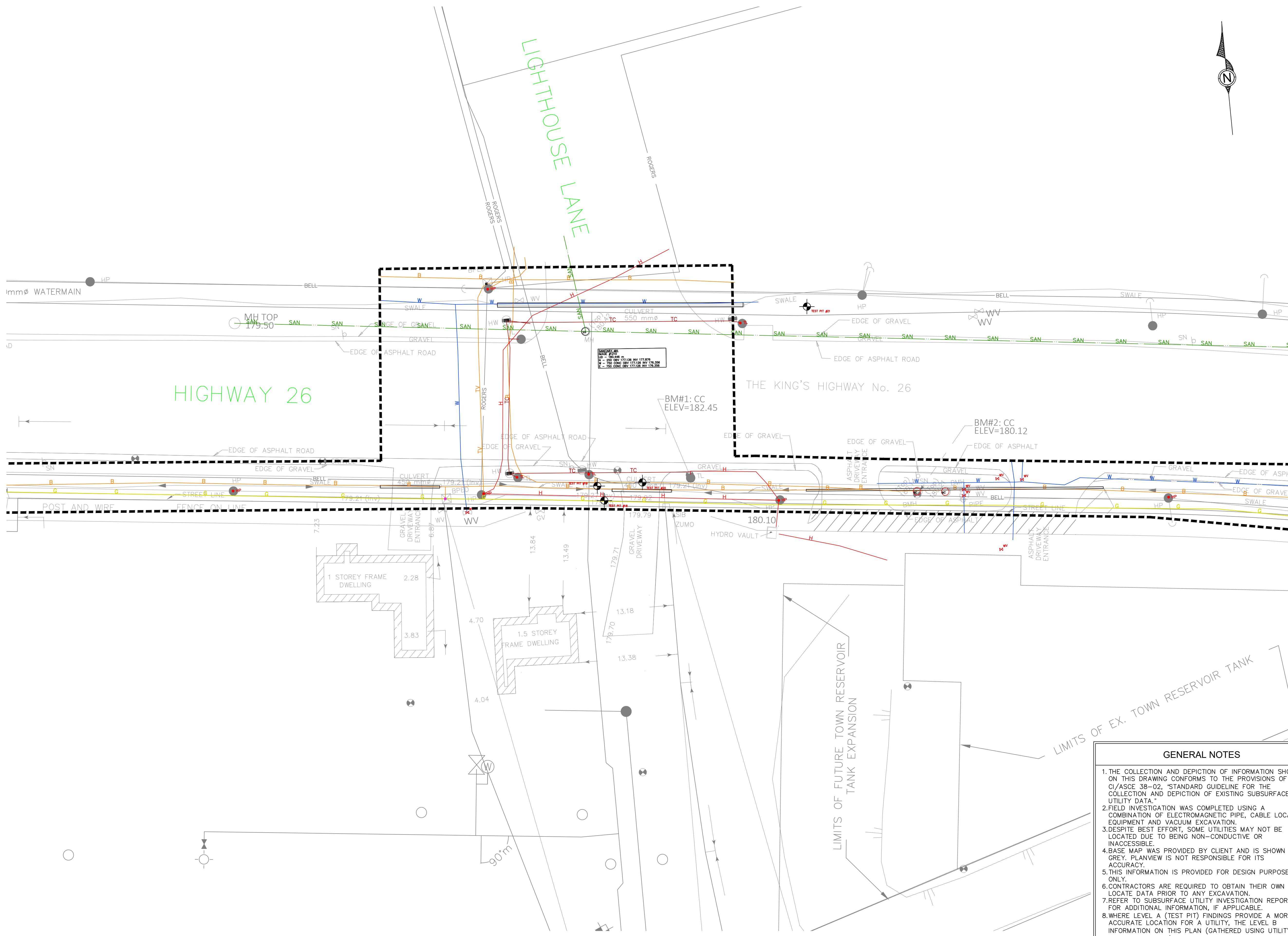


SUBSURFACE UTILITY INVESTIGATION

DESCRIPTION: LEVEL A SURVEY

AREA: HWY #26 AND CRANBERRY TRAIL EAST

DRAWN BY: PLANVIEW	PLANVIEW NO.: 21-3-0041	CLIENT NO.: -
DRAWING NO.: 1 of 5	REVISION: 0	SCALE: 1:250 SHEET SIZE: 22x34
		DATE: 27-MAY-21



TOWN OF COLLINGWOOD

LEGEND

G	GASMAIN
B	BELL CANADA
FO	PEEL FIBER
CN	CN SIGNALS/COMMUNICATION
360	360 NETWORKS
FUT/CCTV	FUTURE USE/CCTV
CP	CP SIGNALS/COMMUNICATION
GT	GROUP TELECOM/TELUS
W	WATERMAIN
SL	STREETLIGHT
H	HYDRO
STM	STORM SEWER
SAN/COM	SANITARY/COMBINED SEWER
---	LEVEL B
---	LEVEL C
---	LEVEL D
- - - -	WORK EXTENTS
⊙	TEST PIT



CLIENT: **CROZIER & ASSOCIATES**
Consulting Engineers

NO.	DATE	DESCRIPTION	BY
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3	20-MAY-21	LEVEL A FIELD WORK COMPLETED	SM
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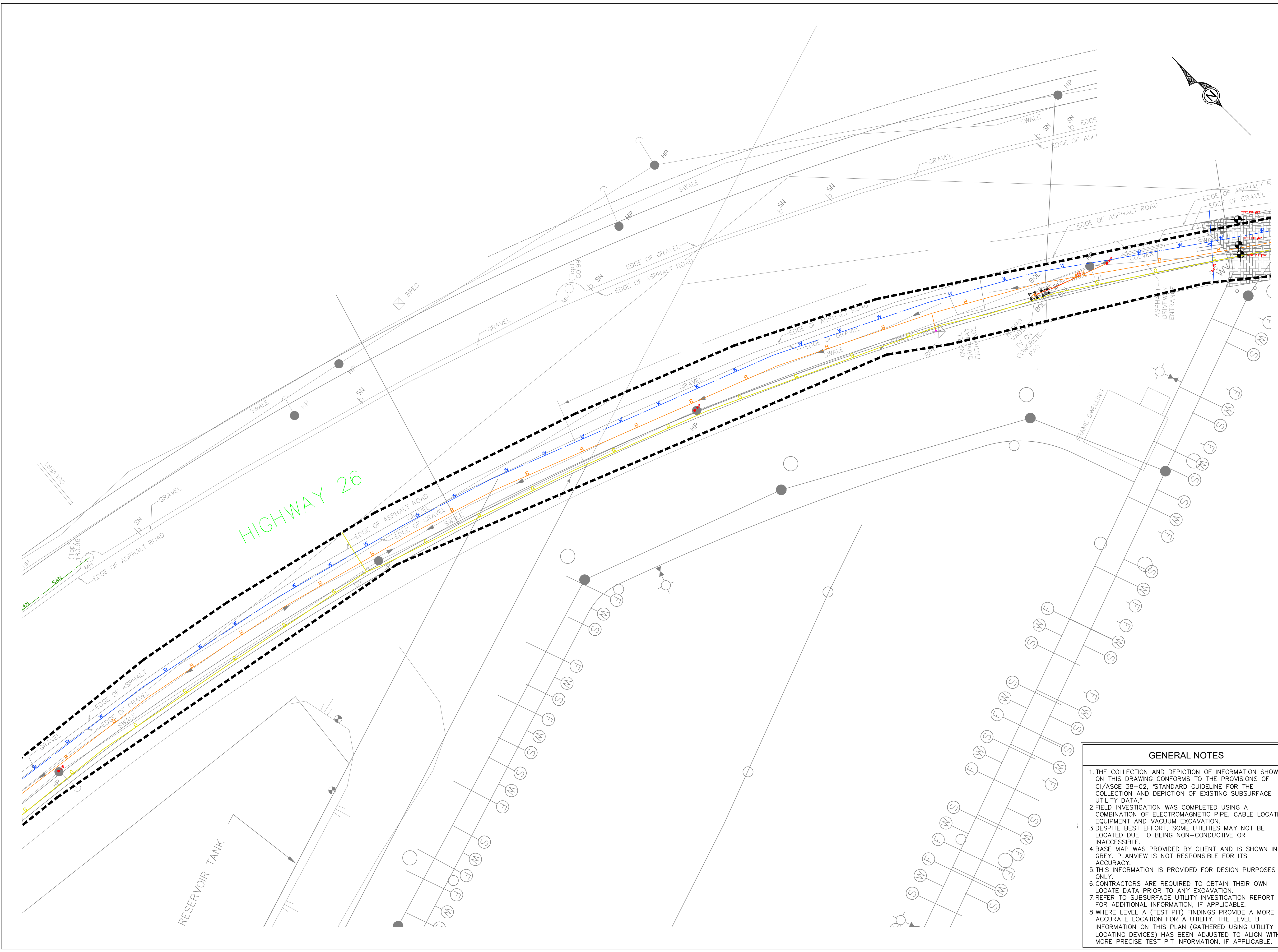


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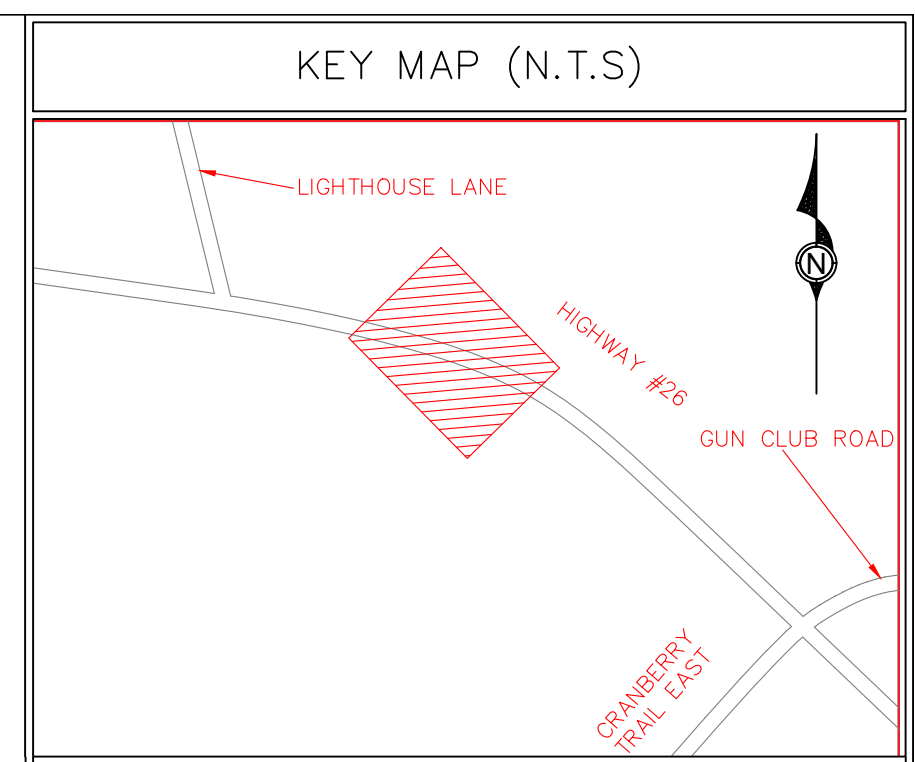
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DRAWING NO.: 2 of 5	REVISION: 0	SCALE: 1:250 SHEET SIZE: 22x34 DATE: 27-MAY-21



HIGHWAY 26

RESERVOIR TANK



TOWN OF COLLINGWOOD

LEGEND

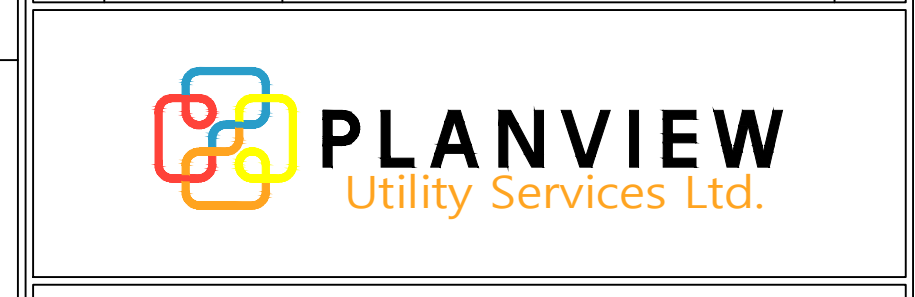
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---	LEVEL D
---	WORK EXTENTS
○	TEST PIT



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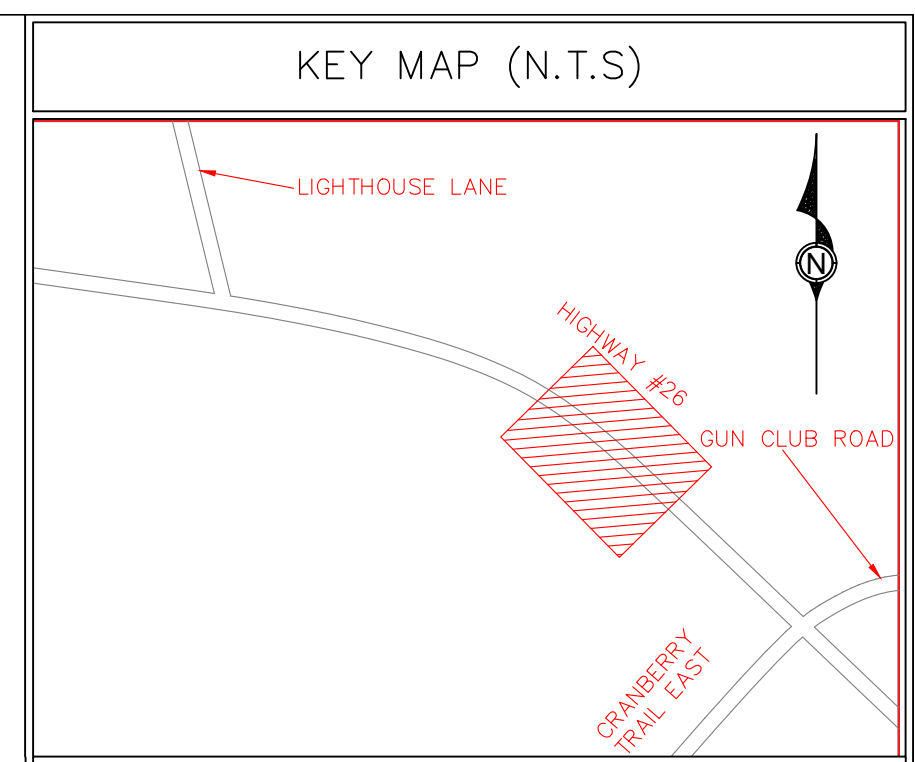
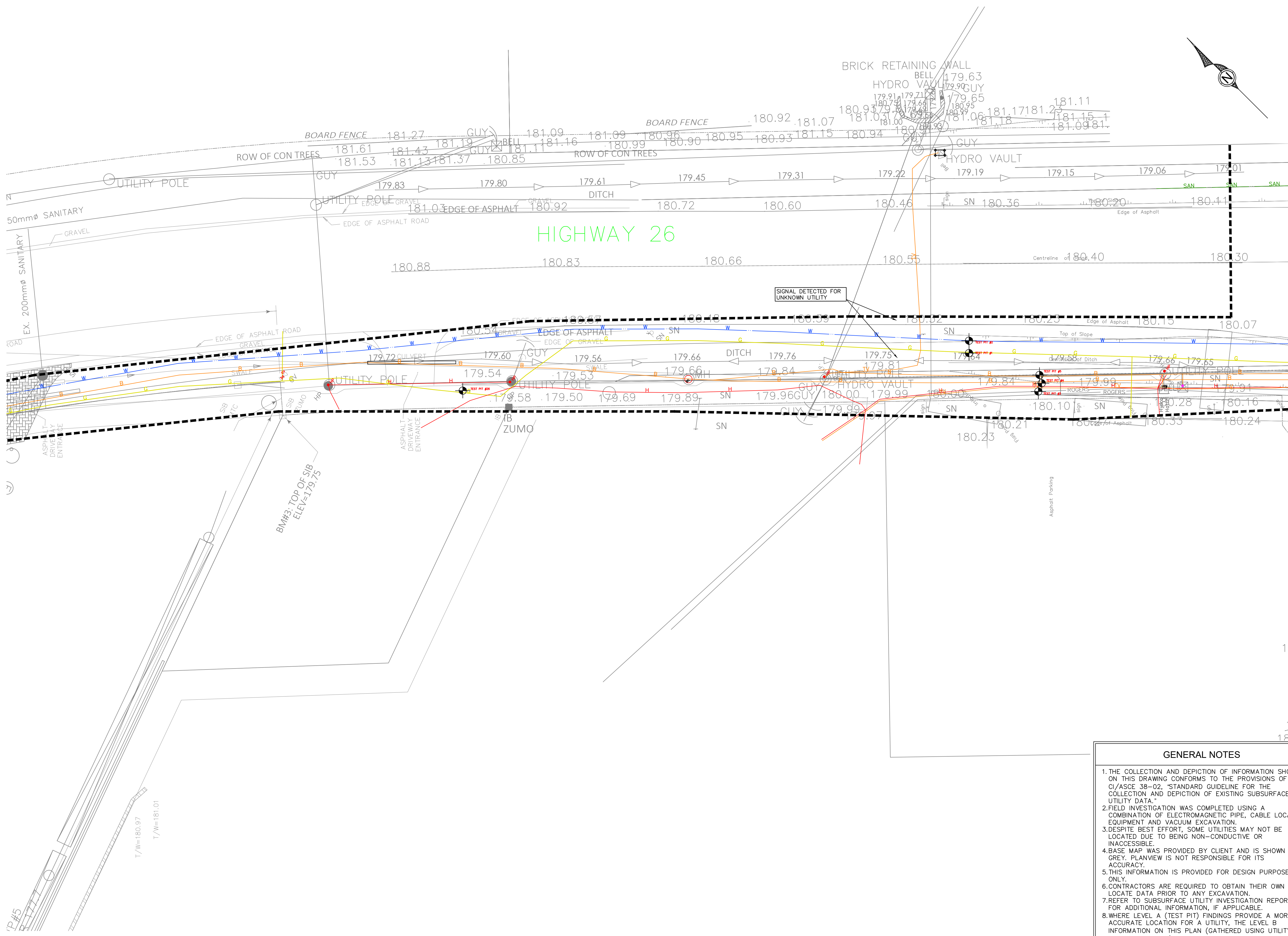


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AREA: HWY #26 AND CRANBERRY TRAIL EAST

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TOWN OF COLLINGWOOD

LEGEND

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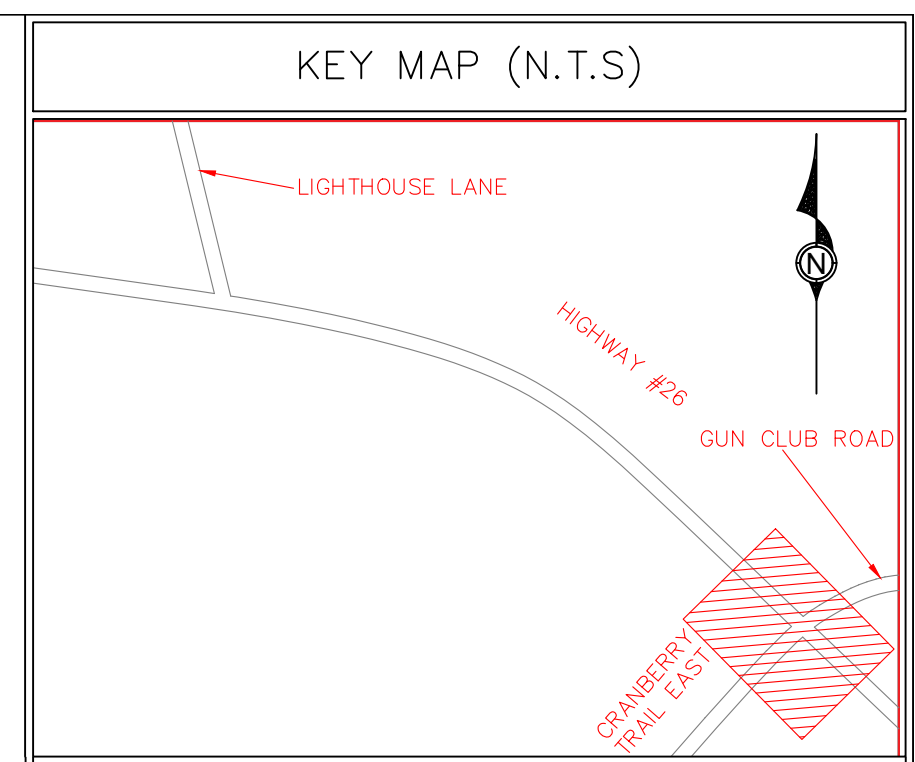
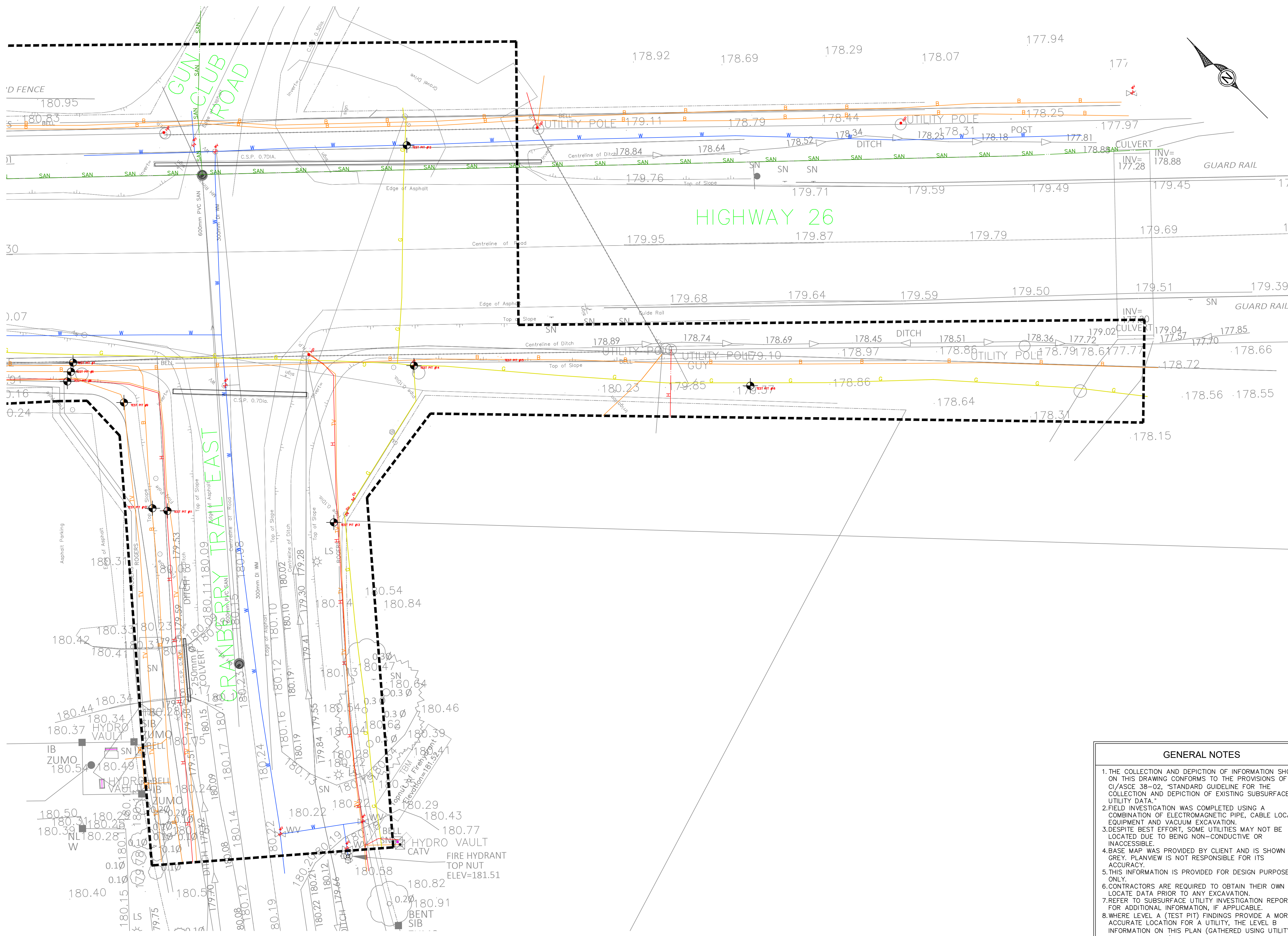
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TOWN OF COLLINGWOOD

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PLANVIEW
Utility Services Ltd.

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APPENDIX B

Sanitary Servicing Calculations

Sanitary Demand Calculations

Reverie Townhouses Sanitary Demand

Site Area	2.34	ha
Drainage Area to Sewer	2.34	ha
Number of Residential Units and Land Usage		
1) Apartments	-	Units
2) Stacked Townhomes*	124	Units
Population Density		
1) Apartments		persons/unit
2) Stacked Townhomes*	1.9	persons/unit
<i>* Given the nature of stacked townhouse units, it is proposed to use the population density for apartments.</i>		
Populations		
Residential Population (Apartments)	-	Persons
Residential Population (Townhomes)	236	Persons
Total Equivalent Residential Population	236	Persons
<u>Unit Sewage flows</u>		
Residential (Per Collingwood Engineering Standards, 2023)	260	L/C-day
Infiltration (Per Collingwood Engineering Standards, 2023)	0.23	L/s/ha
<u>Total Design Sewage Flows</u>		
Infiltration/Inflow (Total Site)		0.54 L/sec
Average Daily Flow (Apartments)	-	L/sec
Average Daily Flow (Townhomes)	0.71	L/sec
Total Average Daily Flow		0.71 L/sec
<u>Residential Peak Factor - Harmon Formula</u>		
Harmon Peaking Factor	4.12	Peak Factor
Peak Daily Flow		2.92 L/sec
Peak Daily Flow for Reverie Townhouses		3.46 L/sec
External Peak Daily Flows (Apartments)		5.41 L/sec
Total Peak Daily Flow		8.87 L/sec

APPENDIX C

Potable Water Calculations

Potable Water Demand Calculations
Fire Flow Calculations

Reverie Townhouses Water Demand

Number of Residential Units and Land Usage

1) Single Residential	Units
2) Semi-Detached Residential	Units
3) Stacked Townhouse	124 Units
4) Apartment	Units
5) Commercial	ha

Person Per Residential Unit

1) Single Residential	persons/unit
2) Semi-Detached Residential	persons/unit
3) Stacked Townhouse*	1.9 persons/unit
4) Apartment	persons/unit

* Given the nature of Stacked Townhouse units, it is proposed to use the population density for apartments.

Total Residential Population 235.6 Persons

Domestic Water Design Flows

Residential	260 L/C-day
Commercial	L/ha-day

Total Domestic Water Design Flows

Average Daily Residential Flow	0.71 L/sec
Average Daily Commercial Flow	0 L/sec

Max Daily Demand Factor **1.77**

Max Daily Demand Flow **1.25** L/sec

Peak Hour Demand Factor **2.7**

Peak Hour Demand Flow **1.91** L/sec

Max Fire Flow Demand (per Fire Underwriter's Survey) **183.00** L/sec

Total Max Day Flow + Fire Flow **184.25** L/sec

Water Supply for Public Fire Protection - 2020

Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flows for Public Fire Protection in Canada

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

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

where:

- RFF** = the required fire flow in litres per minute (L/min)
- C** = the construction coefficient is related to the type of construction of the building
 - = 1.5 for Type V Wood Frame Construction
 - = 0.8 for Type IV-A Mass Timber Construction
 - = 0.9 for Type IV-B Mass Timber Construction
 - = 1.0 for Type IV-C Mass Timber Construction
 - = 1.5 for Type IV-D Mass Timber Construction
 - = 1.0 for Type III Ordinary Construction
 - = 0.8 for Type II Non-combustible Construction
 - = 0.6 for Type I Fire Resistive Construction
- A** = the total effective floor area (effective building area) in square metres (excluding basements at least 50 percent below grade) in the building considered

Step A. Construction Coefficient (C)

1 Type III Ordinary Construction

Proposed Building: Stacked Townhouse

Yes/No/Unknown

Is basement at least 50% below grade? No If yes, basement floor area excluded
 Vertical openings protected? No *For consideration for effective area calculations

Calculate Effective Floor Area based on the highlighted cell

- C value from 1.0 to 1.5: 100% of all floor areas are used
- C value below 1 and vertical openings are not protected: Consider two largest floors plus 50% of all floor above to a max of eight
- C value below 1 and vertical openings are protected: Consider single largest floor plus 25% of the two immediately adjoining floors

Floors Above Grade	Total Floor Area (m ²)	% of Area Considered	Effective Floor Area (m ²)
Ground Floor	625	100%	625.0
Second Floor	625	100%	625.0
Total	625.0		1250.0

Total Effective Floor Area 1250.0 m²

Step C. Therefore RFF = 8,000 L/min (rounded to nearest 1000 L/min)

Step D. Occupancy Contents Adjustment Factor

The required fire flow may be reduced by as much as -25% for occupancies having contents with very low fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Type of Occupancy	Adjustment Factor	Occupancy and Contents Adjustment Factor
Residential Occupancy	Limited Combustible -15%	Non-Combustible -25%
	-1,200 L/min (reduction)	Limited Combustible -15%
		Combustible 0%
		Free Burning 15%
		Rapid Burning 25%
RFF =	6,800 L/min (not rounded)	

Step E. Automatic Sprinkler Protection

Sprinklers - The required fire flow may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of system.

	Yes/No/Unknown	*Possible Reduction Available	Actual Reduction Provided
Automatic sprinkler protection designed and installed in accordance with NFPA 13?	No	-30%	0%
Water supply is standard for both the system and Fire Department hose lines?	No	-10%	0%
Fully supervised system?	No	-10%	0%

Total Reduction % 0% (reduction)

*Reduction available assumes complete building coverage

*30% reduction typical for building requiring sprinkler system

Total Reduced Flow 0 L/min (reduction, not rounded)

Step F. Automatic Sprinkler Protection

Exposure - A percentage of water for the exposures should be added to the required fire flow for the subject building to provide adequate flow rates for hose streams used to reduce the spreading of fire from the subject building to exposed risks. The required fire flow of a subject building may be increased depending on the severity of exposed risks to the subject building and the distance between the exposed risks and the subject building. This charge considers the usage of water supplies to prevent exposed risks from igniting or being damaged during a major fire incident in the subject building.

Separation Distance	Maximum Exposure Adjustment Charge
0 to 3m	25%
3.1 to 10m	20%
10.1 to 20m	15%
20.1 to 30m	10%
Greater than 30m	0%

*If a vertical fire wall is properly constructed and has a rating of no less than 2 hours, then the boundary can be treated as protected with no exposure charge

*The maximum exposure adjustment charge to be applied to a subject building is 75%

*The distance in metres from the subject building facing wall to the exposed building facing wall, measured to the nearest metre, between the nearest points of the buildings. Where either the subject building or the exposed building is at a diagonal to the other building, the shortest distance should be increased by 3 metres and this adjusted value used as exposure distance.

Exposed buildings	Distance	Surcharge	
North Adjacent Dwelling	29	10%	680
East Adjacent Dwelling	4.5	20%	1360
South Adjacent Dwelling	23	10%	680
West Adjacent Dwelling	4.5	20%	1360
			4,080 L/min Surcharge (not rounded)

Step G. Final Required Fire Flow

Step D - Occupancy Adjusted Fire Flow Demand	6,800 L/min
Step E - Sprinkler (Reduction)	0 L/min
Step F - Exposure Charge	4,080 L/min
Final Required Fire Flow:	10,880 L/min
	11,000 L/min (rounded to nearest 1000L/min)
or	183 L/s
or	2,906 USGPM

Equivalent Fire Storage Volume (If Required)

Fire flow from above	11,000 L/min
Required duration	2.00 hours
*Refer to Table 1 for Duration	
Therefore:	1,320,000 Litres or
	1,320 m ³ is the required fire storage volume.

Table 1 - FUS 2020

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

*Interpolate for intermediate figures

OFM Guideline
Office of the Fire Marshall - Fire Protection Water Supply Guideline for Part 3 in the OBC (October 1999)

$$Q = KVS_{TOT}$$

Q = minimum supply of water in litres (L)
 K = water supply coefficient
 V = total building volume in cubic metres (all spaces below and above grade)
 S_{TOT} = total of spatial coefficient values from property line exposures on all sides as obtained from the formula

Water Supply Coefficient

Group and Division Classification = C Table 3.1.2.1.
 Type of Construction = Non-combustible construction Table 1
 K = 16.0 Table 1

Total Building Volume

Building Volume Calculation

	Height (m)	Area (m ²)	Volume (m ³)
1st Floor	2.75	625	1718.75
2nd Floor	2.75	625	1718.75
Total	5.5	1250	3438

V = **3,438** m³

Spatial Coefficient

Exposure Distance

*Exposure distances from a new building are measured from the exterior building faces to the property lines of the building. The distance from the face of the building to the property line shall be determined in accordance with Sentence 3.2.3.1.(3) of the Building Code. When facing a street, the property line shall be deemed to be the centre of the street.

*When facing an existing building greater than 10 m² on the same property, the exposure distance shall be the greater of either "limiting distance" of the new building face as obtained from Sentence 3.2.3.1.(1) of the Building Code, or the mid-point between the two buildings.

**For any building face facing an existing building greater than 10 m² on the same property, a simplified method (conservative) can be to assume the maximum spatial coefficient of 0.5. If conservative approach is not appropriate refer to detailed approach described above (section 7.3 of the Fire Protection Water Supply Guideline and section 3.2.3.1 of the Ontario Building Code for more information on how to calculate the spatial coefficient)

Spatial Coefficient

*Once the exposure distance for each building face has been determined, these values can be located along the horizontal arm at the bottom of **Figure 1**. By following straight up from these points, the graph line may be intersected providing a spatial coefficient (S_{Side}) value along the left vertical arm of **Figure 1**. Exposure distance values of at least 10 m (except F-1 occupancies, which require a minimum of 13 m) result in a spatial coefficient value of 0.

Exposure Distance (m)	All New Buildings (Except F-1 Occupancies)	All New F-1 Occupancy Buildings
North Face	0	NA
East Face	0.45	NA
South Face	0	NA
West Face	0.45	NA
Total	0.9	

$S_{TOT} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + (S_{Side4})]$ * S_{TOT} Need Not Exceed 2.0

$S_{TOT} =$ **1.9**

Q = **104,500** L **2700** L/min

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

APPENDIX D

Stormwater Management Calculations

Emergency Access Culvert Calculations
Post-Development Hydrologic Parameters
Stage-Storage-Discharge Tables
IPEX Tempest ICD Flow Curves
Post-Development Model Schematic
Post-Development VO Output
Cranberry Creek 25mm Storm Event Hydrograph
Phosphorous Loading Calculations

**Highway 26 Emergency Entrance Culvert Size Check
Modified Rational Method**

Peak Flow

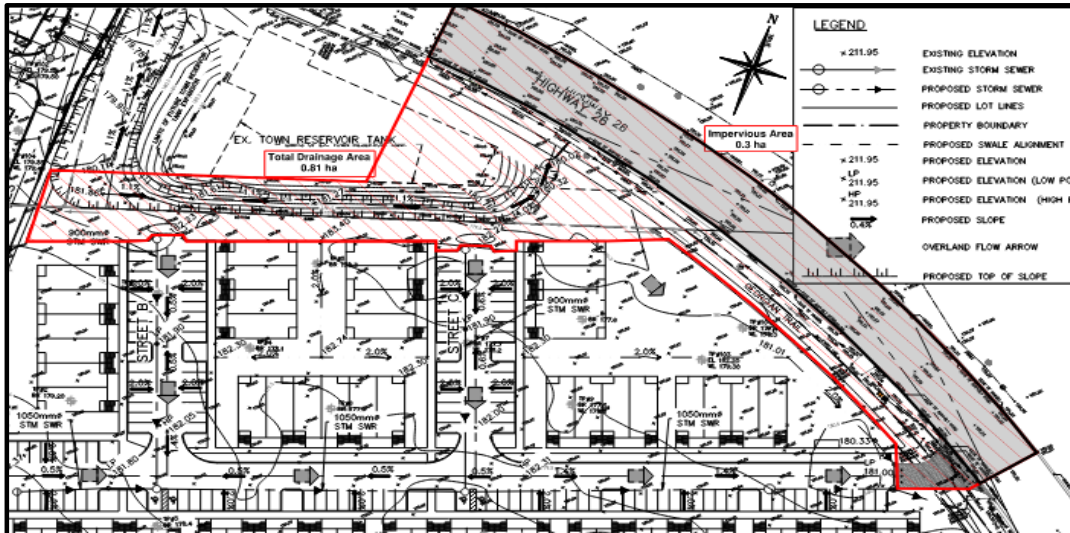
$$Q_{\text{post}} = 0.0028 \cdot C_{\text{post}} \cdot i_{(T_d)} \cdot A$$

Intensity

$$i_{(T_d)} = A / (T+B) ^c$$

	Catchment 1	
	Area (ha)	Runoff Coefficient
Pervious Area	0.51	0.2
Impervious Area	0.3	0.9
Total Catchment	0.81	0.46

Storm Event	Coeff A	Coeff B	Coeff C	Time of Concentration (min)	Intensity (mm/hr)	Runoff Coeff	Flow(m ³ /s)
2	807.44	6.75	0.828	10	78.3	0.46	0.082
5	1135.4	7.5	0.841	10	102.3	0.46	0.107
10	1387	7.97	0.852	10	118.4	0.46	0.123
25	1676.2	8.3	0.858	10	138.4	0.51	0.159
50	1973.1	9	0.868	10	153.2	0.55	0.191
100	2193.1	9.04	0.871	10	168.4	0.57	0.219



Culvert Calculator Report

Emergency Access

Comments: Culvert Under Emergency Access to Reverie Townhouses.

Solve For: Discharge

Culvert Summary			
Allowable HW Elevation	180.80 m	Headwater Depth/Height	1.60
Computed Headwater Elev.:	180.80 m	Discharge	0.2006 m ³ /s
Inlet Control HW Elev.	180.62 m	Tailwater Elevation	179.00 m
Outlet Control HW Elev.	180.80 m	Control Type	Outlet Control

Grades			
Upstream Invert	180.07 m	Downstream Invert	179.97 m
Length	20.00 m	Constructed Slope	0.005000 m/m

Hydraulic Profile			
Profile	CompositeM2PressureProfile	Depth, Downstream	0.31 m
Slope Type	Mild	Normal Depth	N/A m
Flow Regime	Subcritical	Critical Depth	0.31 m
Velocity Downstream	1.67 m/s	Critical Slope	0.023233 m/m

Section			
Section Shape	Circular	Mannings Coefficient	0.024
Section Material	CMP	Span	0.46 m
Section Size	450 mm	Rise	0.46 m
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev.	180.80 m	Upstream Velocity Head	0.08 m
Ke	0.90	Entrance Loss	0.07 m

Inlet Control Properties			
Inlet Control HW Elev.	180.62 m	Flow Control	N/A
Inlet Type	Projecting	Area Full	0.2 m ²
K	0.03400	HDS 5 Chart	2
M	1.50000	HDS 5 Scale	3
C	0.05530	Equation Form	1
Y	0.54000		



Project Name: Reverie Townhomes
 Project Number: 1790-5382-2
 Date: 2025-08-19
 By: CB

D.A. NAME 201
D.A. AREA (ha) 2.12

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

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Loam	Pal	BC	100	2.12
				0
				0
				0
Total Area Check				2.12

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
Pal	0.86	98	0.00	98	0.00	98	0.71	98	0.00	98	1.564	153.22
Subtotal Area	0.86		0.00		0.00		0.71		0.00			

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
Pal	0.00		0.00		0.00		0.55	74	0.00		0.552	40.811
Subtotal Area	0.00		0.00		0.00		0.55		0.00			

	Pervious Area Calculations	Total Pervious Area	0.552
		Composite Pervious Curve Number	74
	Impervious Area Calculations	Total Directly Connected Area	1.564
		Total Indirectly Connected Area	0
		Total Impervious Area	1.564
		% X imp	73.9
		% T imp	73.9
Total Area Check			2.115

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area	A * IA
Woodland	10	0.000	0.000
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.552	2.758
Cultivated	7	0	0

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	35	0.25
Impervious	2.0	1	119	0.013



Project Name: Reverie Townhomes
 Project Number: 1790-5382-2
 Date: 2025-08-19
 By: CB

D.A. NAME **202**
 D.A. AREA (ha) **0.21**

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

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Loam	Pal	BC	100	0.21
				0
				0
				0
Total Area				0.21

Impervious Landuses Present:												
Soils	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Pal	0.00	98	0.00	98	0.00	98	0.00	98	0.00	98	0	0.000
		98		98		98		98		98	0	0
		98		98		98		98		98	0	0
		98		98		98		98		98	0	0
Subtotal	0.00		0.00		0.00		0.00		0.00			

Pervious Landuses Present:												
Soils	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
	Area	CN	Area	CN	Area	CN	Area (ha)	CN	Area	CN	Area	A*CN
Pal	0.00		0.00		0.00		0.21	74	0.00		0.21	15.54
	0.00		0.00		0.00		0.00		0.00		0	0
	0.00		0.00		0.00		0.00		0.00		0	0
	0.00		0.00		0.00		0.00		0.00		0	0
Subtotal	0.00		0.00		0.00		0.21		0.00			

		Composite Area Calculations		Total Pervious Area		0.21	
				Total Impervious Area		0	
				% Impervious		0.00%	
				Composite Curve Number		74.0	
				Total Area Check		0.21	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Runoff Coefficient								
Landuse	IA (mm)	Area (ha)	A * IA	Loam		0		0		0		A*RC
				RC	Area	RC	Area	RC	Area	RC	Area	
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0.210	1.050	0.25	0.21		0		0		0	0.053
Cultivated	7	0	0		0		0		0		0	0
Impervious	2	0	0	0.90	0		0		0		0	0
Composite		0.21	5	Composite Runoff Coefficient								0.250

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path	Length	Drop	Slope	V/S ^{0.5}	Velocity	Tc (hr)	Tp (hr)	TOTAL	Tc (hr)	Tp (hr)	Tc (hr)	Tp (hr)
	50	0.85	1.70%		0.00				0.05	0.03	0.27	0.18

Appropriate calculated time to **Airport** Appropriate Method: **0.18**



Project Name: Reverie Townhomes
 Project Number: 1790-5382-2
 Date: 2025-08-19
 By: CB

D.A. NAME **203**
 D.A. AREA (ha) **0.02**

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

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic	% Area	Area
Loam	Pal	BC	100	0.0225
				0
				0
				0
Total Area Check				0.0225

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
Pal	0.007	98	0.00	98	0.00	98	0.00	98	0.00	98	0.007	0.69
Subtotal Area	0.007		0.00		0.00		0.00		0.00			

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
Pal	0.000		0.000		0.000		0.016	74	0.000		0.016	1.147
Subtotal Area	0.000		0		0		0.016		0			

	Pervious Area Calculations	Total Pervious Area	0.016
		Composite Pervious Curve Number	74
	Impervious Area Calculations	Total Directly Connected Area	0.007
		Total Indirectly Connected Area	0
		Total Impervious Area	0.007
		% X imp	31.1
		% T imp	31.1
Total Area Check			0.023

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area	A * IA
Woodland	10	0.000	0.000
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.016	0.078
Cultivated	7	0	0

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	35	0.25
Impervious	2.0	1	12	0.013



Project: Reverie Townhouses
 Project No.: 1790-5382-2
 Prepared By: CB
 Reviewed By: RAA
 Date: 2025-08-25

Reverie Townhouses - Stage-Storage-Discharge Table for Catchment 201 (Townhouses)

Minimum Invert Elevation: 178.20 m
 Minimum Top of Gate Elevation: 180.90 m
 Primary ICD: 40 LMF Tempest ICD
 Secondary ICD: E HF/HMF Tempest ICD
 Secondary ICD Invert: 179.60 m

Comment	Water Level Elevation (m)	Superpipe Storage (m ³)	Cupolex #1 Storage System (m ³)	Cupolex #2 Storage System (m ³)	Total Storage ha.m	Elevation Above Primary ICD Invert (m)	Tempest ICD 40 Discharge (m ³ /s)	Elevation Above Secondary ICD Invert (m)	Tempest ICD E Discharge (m ³ /s)	Total Discharge (m ³ /s)
Primary ICD	178.20	0.00	0.00	0.00	0.0000	0.00	0.0000	0.00	0.0000	0.0000
	178.30	0.41	0.00	0.00	0.0000	0.10	0.0002	0.00	0.0000	0.0002
Bottom of Cupolex #1	178.40	3.00	0.00	0.00	0.0003	0.20	0.0004	0.00	0.0000	0.0004
	178.50	9.00	18.02	0.00	0.0027	0.30	0.0006	0.00	0.0000	0.0006
	178.60	16.82	36.04	0.00	0.0053	0.40	0.0008	0.00	0.0000	0.0008
	178.70	25.41	54.07	0.00	0.0079	0.50	0.0010	0.00	0.0000	0.0010
	178.80	35.62	72.09	0.00	0.0108	0.60	0.0011	0.00	0.0000	0.0011
Bottom of Cupolex #2	178.90	50.54	90.11	0.00	0.0141	0.70	0.0012	0.00	0.0000	0.0012
	179.00	68.54	108.13	14.91	0.0192	0.80	0.0012	0.00	0.0000	0.0012
	179.10	88.35	126.16	29.81	0.0244	0.90	0.0013	0.00	0.0000	0.0013
	179.20	110.28	144.18	44.72	0.0299	1.00	0.0014	0.00	0.0000	0.0014
	179.30	135.45	162.20	59.63	0.0357	1.10	0.0014	0.00	0.0000	0.0014
	179.40	161.98	180.22	74.53	0.0417	1.20	0.0015	0.00	0.0000	0.0015
Secondary ICD	179.50	189.01	198.25	89.44	0.0477	1.30	0.0015	0.00	0.0000	0.0015
	179.60	216.13	216.27	104.35	0.0537	1.40	0.0016	0.00	0.0000	0.0016
	179.70	241.58	234.29	119.26	0.0595	1.50	0.0016	0.10	0.0091	0.0107
	179.80	263.12	252.31	134.16	0.0650	1.60	0.0017	0.20	0.0182	0.0199
	179.90	279.66	270.34	149.07	0.0699	1.70	0.0018	0.30	0.0273	0.0291
	180.00	294.31	288.36	163.98	0.0747	1.80	0.0018	0.40	0.0364	0.0382
	180.10	305.96	306.38	178.88	0.0791	1.90	0.0019	0.50	0.0455	0.0474
	180.20	314.31	324.40	193.79	0.0833	2.00	0.0020	0.60	0.0492	0.0512
	180.30	318.83	342.43	208.70	0.0870	2.10	0.0020	0.70	0.0529	0.0549
Top of Cupolex #1	180.40	322.44	360.45	223.60	0.0906	2.20	0.0021	0.80	0.0565	0.0586
	180.50	325.87	369.46	238.51	0.0934	2.30	0.0021	0.90	0.0602	0.0623
	180.60	329.30	369.46	253.42	0.0952	2.40	0.0022	1.00	0.0639	0.0661
	180.70	332.72	369.46	268.32	0.0971	2.50	0.0022	1.10	0.0668	0.0690
Top of Cupolex #2	180.80	336.15	369.46	283.23	0.0989	2.60	0.0022	1.20	0.0696	0.0718
	180.90	339.58	369.46	283.23	0.0992	2.70	0.0022	1.30	0.0725	0.0747



Project: Reverie Townhomes
Project No.: 1790-5382-2
Prepared By: CB
Reviewed By:
Date: 2025-08-19

Reverie Townhomes - Stage-Storage-Discharge Table for Catchment 202 (Rear-Yard Townhouses)

Minimum Invert Elevation: 178.11 m
 Minimum Top of Grate Elevation: 179.65 m
 Orifice Diameter: 0.075 m

Comment	Water Level Elevation	Superpipe Storage	Total Storage	Elevation Above Orifice Invert	Orifice Discharge	Total Discharge
	(m)	(m ³)	ha.m	(m)	(m ³ /s)	(m ³ /s)
Orifice Invert	178.11	0.00	0.0000	0.00	0.0000	0.0000
	178.21	0.70	0.0001	0.10	0.0031	0.0031
	178.31	2.16	0.0002	0.20	0.0050	0.0050
	178.41	4.62	0.0005	0.30	0.0064	0.0064
	178.51	7.27	0.0007	0.40	0.0075	0.0075
	178.61	10.07	0.0010	0.50	0.0085	0.0085
	178.71	13.08	0.0013	0.60	0.0094	0.0094
	178.81	15.83	0.0016	0.70	0.0102	0.0102
	178.91	17.83	0.0018	0.80	0.0109	0.0109
	179.01	18.89	0.0019	0.90	0.0116	0.0116
	179.11	19.69	0.0020	1.00	0.0123	0.0123
	179.21	20.48	0.0020	1.10	0.0129	0.0129
	179.31	21.27	0.0021	1.20	0.0135	0.0135
	179.41	22.06	0.0022	1.30	0.0141	0.0141
	179.51	22.85	0.0023	1.40	0.0146	0.0146
	179.61	23.64	0.0024	1.50	0.0151	0.0151
	179.71	24.44	0.0024	1.60	0.0157	0.0157

Chart 1: LMF 14 Preset Flow Curves

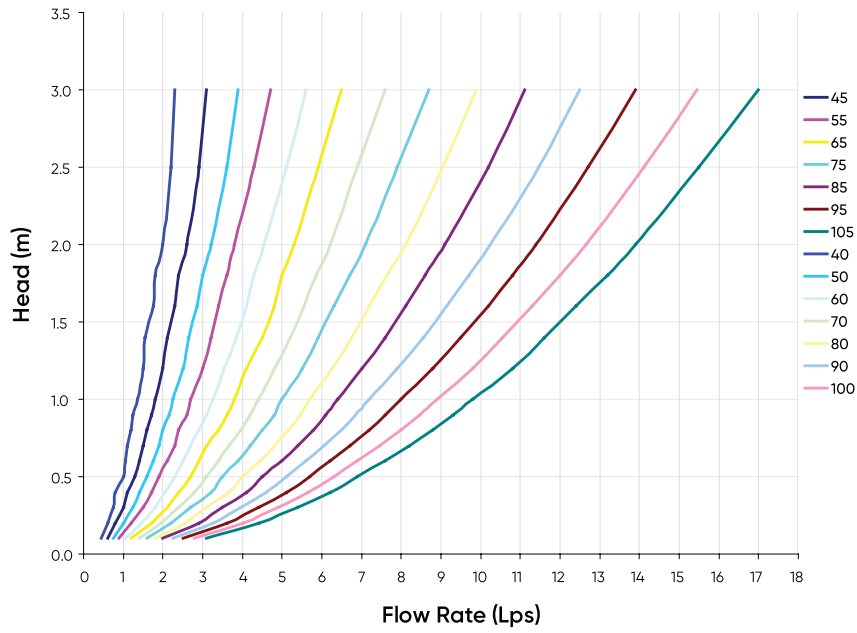


Chart 2: LMF Flow vs. ICD Alternatives

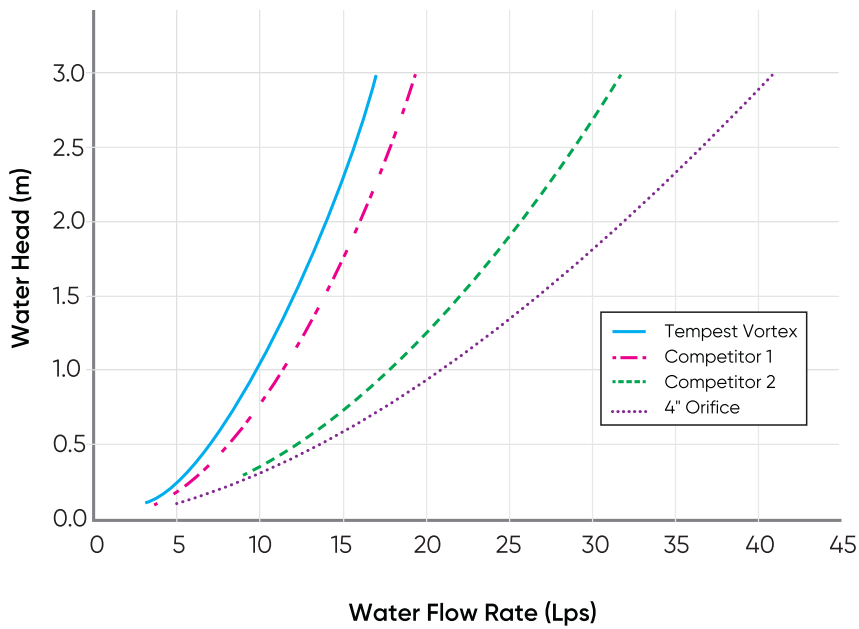
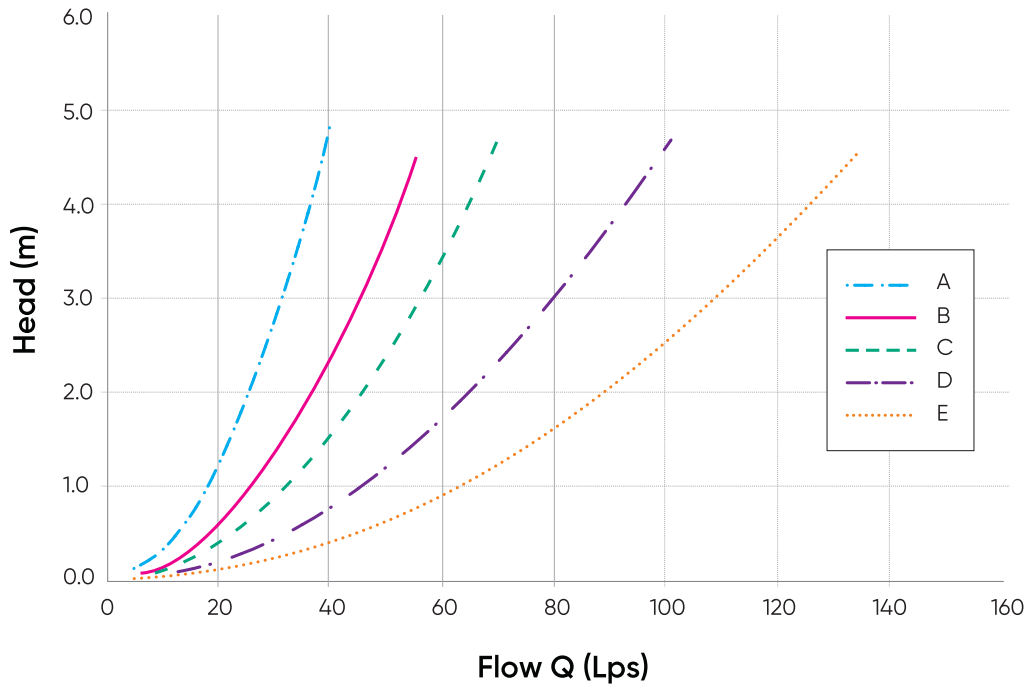
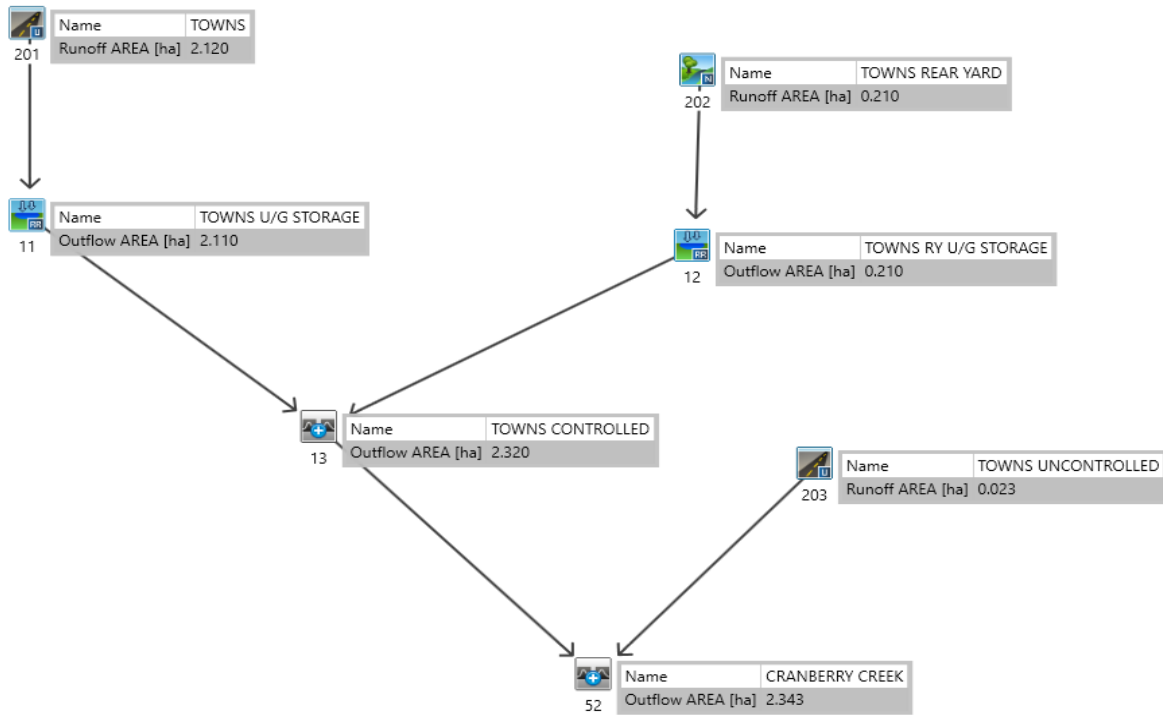


Chart 3: HF & MHF Preset Flow Curves



Visual OTTHYMO 6.2 Model Schematic

Post-Development



 ** SIMULATION: A. 2-yr Chicago **

CHICAGO STORM | IDF curve parameters: A= 807.440
 | Ptotal= 33.75 mm | B= 6.750
 C= 0.828

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
 Storm time step = 10.00 min
 Time to peak ratio = 0.33

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	1.90	1.00	18.51	2.00	4.92	3.00	2.30
0.17	2.21	1.17	78.28	2.17	4.11	3.17	2.12
0.33	2.64	1.33	24.65	2.33	3.53	3.33	1.97
0.50	3.32	1.50	12.40	2.50	3.11	3.50	1.84
0.67	4.51	1.67	8.22	2.67	2.78	3.67	1.73
0.83	7.17	1.83	6.14	2.83	2.51	3.83	1.63

CALIB | NASHYD (0202) | Area (ha)= 0.21 | Curve Number (CN)= 74.0
 | ID= 1 DT= 5.0 min | Ia (mm)= 5.00 | # of Linear Res.(N)= 3.00
 U.H. Tp(hrs)= 0.18

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

--- TRANSFORMED HYETOGRAPH ---

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	1.90	1.083	18.51	2.083	4.92	3.08	2.30
0.167	1.90	1.167	18.51	2.167	4.92	3.17	2.30
0.250	2.21	1.250	78.28	2.250	4.11	3.25	2.12
0.333	2.21	1.333	78.28	2.333	4.11	3.33	2.12
0.417	2.64	1.417	24.65	2.417	3.53	3.42	1.97
0.500	2.64	1.500	24.65	2.500	3.53	3.50	1.97
0.583	3.32	1.583	12.40	2.583	3.11	3.58	1.84
0.667	3.32	1.667	12.40	2.667	3.11	3.67	1.84
0.750	4.51	1.750	8.22	2.750	2.78	3.75	1.73
0.833	4.51	1.833	8.22	2.833	2.78	3.83	1.73
0.917	7.17	1.917	6.14	2.917	2.51	3.92	1.63
1.000	7.17	2.000	6.14	3.000	2.51	4.00	1.63

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.005 (i)
 TIME TO PEAK (hrs)= 1.500
 RUNOFF VOLUME (mm)= 6.982
 TOTAL RAINFALL (mm)= 33.748
 RUNOFF COEFFICIENT = 0.207

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

RESERVOIR(0012) | IN= 2---> OUT= 1 | DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0012)	0.210	0.005	1.50	6.98
	0.210	0.004	1.67	6.98

PEAK FLOW REDUCTION [Qout/Qin](%)= 86.89
 TIME SHIFT OF PEAK FLOW (min)= 10.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0002

CALIB | STANDHYD (0201) | Area (ha)= 2.12 | Dir. Conn.(%)= 73.90
 | ID= 1 DT= 5.0 min | Total Imp(%)= 73.90

Surface Area (ha)=	IMPERVIOUS	PERVIOUS (i)
Dep. Storage (mm)=	1.56	0.55
Average Slope (%)=	2.00	5.00
Length (m)=	1.00	2.00
Mannings n =	118.74	35.00
	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	1.90	1.083	18.51	2.083	4.92	3.08	2.30
0.167	1.90	1.167	18.51	2.167	4.92	3.17	2.30
0.250	2.21	1.250	78.28	2.250	4.11	3.25	2.12
0.333	2.21	1.333	78.28	2.333	4.11	3.33	2.12
0.417	2.64	1.417	24.65	2.417	3.53	3.42	1.97
0.500	2.64	1.500	24.65	2.500	3.53	3.50	1.97
0.583	3.32	1.583	12.40	2.583	3.11	3.58	1.84
0.667	3.32	1.667	12.40	2.667	3.11	3.67	1.84
0.750	4.51	1.750	8.22	2.750	2.78	3.75	1.73
0.833	4.51	1.833	8.22	2.833	2.78	3.83	1.73
0.917	7.17	1.917	6.14	2.917	2.51	3.92	1.63
1.000	7.17	2.000	6.14	3.000	2.51	4.00	1.63

Max. Eff. Inten. (mm/hr)= 78.28 | 12.37
 over (min)= 5.00 | 10.00
 Storage Coeff. (min)= 3.12 (ii) | 7.86 (ii)
 Unit Hyd. Tpeak (min)= 5.00 | 10.00
 Unit Hyd. peak (cms)= 0.27 | 0.13

PEAK FLOW (cms)= 0.33 | 0.01 | *TOTALS*
 TIME TO PEAK (hrs)= 1.33 | 1.42 | 0.339 (iii)
 RUNOFF VOLUME (mm)= 31.75 | 7.00 | 25.29
 TOTAL RAINFALL (mm)= 33.75 | 33.75 | 33.75
 RUNOFF COEFFICIENT = 0.94 | 0.21 | 0.75

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) | IN= 2---> OUT= 1 | DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0651	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0011)	2.115	0.339	1.33	25.29
	2.115	0.002	4.08	25.20

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.47
 TIME SHIFT OF PEAK FLOW (min)= 165.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0518

ADD HYD (0013) | 1 + 2 = 3

INFLOW : ID= 1 (0011):	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
+ ID2= 2 (0012):	2.12	0.002	4.08	25.20
	0.21	0.004	1.67	6.98

=====
 ID = 3 (0013): 2.33 0.005 1.67 23.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
 STANDHYD (0203)
 ID= 1 DT= 5.0 min | Area (ha)= 0.02
 Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.01 0.02
 Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 12.38 35.00
 Mannings n = 0.013 0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	1.90	1.083	18.51	2.083	4.92	3.08	2.30
0.167	1.90	1.167	18.51	2.167	4.92	3.17	2.30
0.250	2.21	1.250	78.28	2.250	4.11	3.25	2.12
0.333	2.21	1.333	78.28	2.333	4.11	3.33	2.12
0.417	2.64	1.417	24.65	2.417	3.53	3.42	1.97
0.500	2.64	1.500	24.65	2.500	3.53	3.50	1.97
0.583	3.32	1.583	12.40	2.583	3.11	3.58	1.84
0.667	3.32	1.667	12.40	2.667	3.11	3.67	1.84
0.750	4.51	1.750	8.22	2.750	2.78	3.75	1.73
0.833	4.51	1.833	8.22	2.833	2.78	3.83	1.73
0.917	7.17	1.917	6.14	2.917	2.51	3.92	1.63
1.000	7.17	2.000	6.14	3.000	2.51	4.00	1.63

Max. Eff. Inten. (mm/hr)= 78.28 9.78
 over (min) 5.00 20.00
 Storage Coeff. (min)= 0.80 (ii) 17.32 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.34 0.06

TOTALS
 PEAK FLOW (cms)= 0.00 0.00 0.002 (iii)
 TIME TO PEAK (hrs)= 1.33 1.58 1.33
 RUNOFF VOLUME (mm)= 32.75 7.00 13.66
 TOTAL RAINFALL (mm)= 32.75 33.75 33.75
 RUNOFF COEFFICIENT = 0.97 0.21 0.40

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)
 1 + 2 = 3 | AREA OPEAK TPEAK R.V.
 (ha) (cms) (hrs) (mm)
 ID1= 1 (0013): 2.33 0.005 1.67 23.55
 + ID2= 2 (0203): 0.02 0.002 1.33 13.66
 ID = 3 (0052): 2.35 0.006 1.67 23.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ** SIMULATION: B. 5-yr Chicago **

CHICAGO STORM | IDF curve parameters: A=1135.400
 Ptotal= 44.06 mm | B= 7.500
 C= 0.841
 used in: INTENSITY = A / (t + B)^AC
 Duration of storm = 4.00 hrs
 Storm time step = 10.00 min
 Time to peak ratio = 0.33

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	1.90	1.083	18.51	2.083	4.92	3.08	2.30
0.167	1.90	1.167	18.51	2.167	4.92	3.17	2.30
0.250	2.21	1.250	78.28	2.250	4.11	3.25	2.12
0.333	2.21	1.333	78.28	2.333	4.11	3.33	2.12
0.417	2.64	1.417	24.65	2.417	3.53	3.42	1.97
0.500	2.64	1.500	24.65	2.500	3.53	3.50	1.97
0.583	3.32	1.583	12.40	2.583	3.11	3.58	1.84
0.667	3.32	1.667	12.40	2.667	3.11	3.67	1.84
0.750	4.51	1.750	8.22	2.750	2.78	3.75	1.73
0.833	4.51	1.833	8.22	2.833	2.78	3.83	1.73
0.917	7.17	1.917	6.14	2.917	2.51	3.92	1.63
1.000	7.17	2.000	6.14	3.000	2.51	4.00	1.63

0.00	2.37	1.00	24.78	2.00	6.34	3.00	2.88
0.17	2.76	1.17	102.27	2.17	5.26	3.17	2.65
0.33	3.33	1.33	33.10	2.33	4.50	3.33	2.45
0.50	4.21	1.50	16.50	2.50	3.94	3.50	2.29
0.67	5.79	1.67	10.79	2.67	3.50	3.67	2.14
0.83	9.38	1.83	7.99	2.83	3.16	3.83	2.01

CALIB
 NASHYD (0202) | Area (ha)= 0.21 Curve Number (CN)= 74.0
 ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
 U.H. Tp(hrs)= 0.18

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.37	1.083	24.78	2.083	6.34	3.08	2.88
0.167	2.37	1.167	24.78	2.167	6.34	3.17	2.88
0.250	2.76	1.250	102.27	2.250	5.26	3.25	2.65
0.333	2.76	1.333	102.27	2.333	5.26	3.33	2.65
0.417	3.33	1.417	33.10	2.417	4.50	3.42	2.45
0.500	3.33	1.500	33.10	2.500	4.50	3.50	2.45
0.583	4.21	1.583	16.50	2.583	3.94	3.58	2.29
0.667	4.21	1.667	16.50	2.667	3.94	3.67	2.29
0.750	5.79	1.750	10.79	2.750	3.50	3.75	2.14
0.833	5.79	1.833	10.79	2.833	3.50	3.83	2.14
0.917	9.38	1.917	7.99	2.917	3.16	3.92	2.01
1.000	9.38	2.000	7.99	3.000	3.16	4.00	2.01

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.008 (i)
 TIME TO PEAK (hrs)= 1.500
 RUNOFF VOLUME (mm)= 11.856
 TOTAL RAINFALL (mm)= 44.063
 RUNOFF COEFFICIENT = 0.269

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

RESERVOIR (0012) | OVERFLOW IS OFF
 IN= 2--> OUT= 1 |
 DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	0.210	0.008	1.50	11.86
OUTFLOW: ID= 1 (0012)	0.210	0.006	1.75	11.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 70.78
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0004

CALIB
 STANDHYD (0201) | Area (ha)= 2.12
 ID= 1 DT= 5.0 min | Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 1.56 0.55
 Dep. Storage (mm)= 2.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 118.74 35.00
 Mannings n = 0.013 0.250

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

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.37	1.083	24.78	2.083	6.34	3.08	2.88
0.167	2.37	1.167	24.78	2.167	6.34	3.17	2.88
0.250	2.76	1.250	102.27	2.250	5.26	3.25	2.65
0.333	2.76	1.333	102.27	2.333	5.26	3.33	2.65
0.417	3.33	1.417	33.10	2.417	4.50	3.42	2.45
0.500	3.33	1.500	33.10	2.500	4.50	3.50	2.45
0.583	4.21	1.583	16.50	2.583	3.94	3.58	2.29
0.667	4.21	1.667	16.50	2.667	3.94	3.67	2.29
0.750	5.79	1.750	10.79	2.750	3.50	3.75	2.14
0.833	5.79	1.833	10.79	2.833	3.50	3.83	2.14
0.917	9.38	1.917	7.99	2.917	3.16	3.92	2.01
1.000	9.38	2.000	7.99	3.000	3.16	4.00	2.01

Max.Eff.Inten.(mm/hr)= 102.27 22.70
over (min) 5.00 10.00
Storage Coeff. (min)= 2.81 (ii) 7.06 (ii)
Unit Hyd. Tpeak (min)= 5.00 10.00
Unit Hyd. peak (cms)= 0.28 0.14

TOTALS

PEAK FLOW (cms)= 0.43 0.03 0.454 (iii)
TIME TO PEAK (hrs)= 1.33 1.42 1.33
RUNOFF VOLUME (mm)= 42.06 11.89 34.19
TOTAL RAINFALL (mm)= 44.06 44.06 44.06
RUNOFF COEFFICIENT = 0.95 0.27 0.78

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0011)				
IN= 2---> OUT= 1				
DT= 5.0 min				
OVERFLOW IS OFF				
OUTFLOW	STORAGE	OUTFLOW	STORAGE	
(cms)	(ha.m.)	(cms)	(ha.m.)	
0.0000	0.0000	0.0199	0.0650	
0.0004	0.0003	0.0382	0.0747	
0.0008	0.0053	0.0512	0.0833	
0.0011	0.0108	0.0586	0.0906	
0.0012	0.0192	0.0661	0.0952	
0.0014	0.0299	0.0718	0.0989	
0.0015	0.0417	0.0747	0.0992	
0.0016	0.0537	0.0000	0.0000	
INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0011)	2.115	0.454	1.33	34.19
	2.115	0.015	3.17	34.10

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.29
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 0.0619

ADD HYD (0013)				
1 + 2 = 3				
ID	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.015	3.17	34.10
+ ID2= 2 (0012):	0.21	0.006	1.75	11.85

ID = 3 (0013):	2.33	0.016	3.00	32.09

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203)			
ID= 1 DT= 5.0 min			
Area (ha)	Imp(%)	Dir. Conn.(%)	
Total	0.02	31.10	31.10
Surface Area (ha)	IMPERVIOUS	PERVIOUS (i)	
Dep. Storage (mm)=	0.01	0.02	
Average Slope (%)=	1.00	5.00	
Length (m)=	1.00	2.00	
	12.38	35.00	

Mannings n = 0.013 0.250

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

----- TRANSFORMED HYETOGRAPH -----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.37	1.083	24.78	2.083	6.34	3.08	2.88
0.167	2.37	1.167	24.78	2.167	6.34	3.17	2.88
0.250	2.76	1.250	102.27	2.250	5.26	3.25	2.65
0.333	2.76	1.333	102.27	2.333	5.26	3.33	2.65
0.417	3.33	1.417	33.10	2.417	4.50	3.42	2.45
0.500	3.33	1.500	33.10	2.500	4.50	3.50	2.45
0.583	4.21	1.583	16.50	2.583	3.94	3.58	2.29
0.667	4.21	1.667	16.50	2.667	3.94	3.67	2.29
0.750	5.79	1.750	10.79	2.750	3.50	3.75	2.14
0.833	5.79	1.833	10.79	2.833	3.50	3.83	2.14
0.917	9.38	1.917	7.99	2.917	3.16	3.92	2.01
1.000	9.38	2.000	7.99	3.000	3.16	4.00	2.01

Max.Eff.Inten.(mm/hr)= 102.27 19.09
over (min) 5.00 15.00
Storage Coeff. (min)= 0.72 (ii) 13.36 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.34 0.08

TOTALS

PEAK FLOW (cms)= 0.00 0.00 0.002 (iii)
TIME TO PEAK (hrs)= 1.33 1.50 1.33
RUNOFF VOLUME (mm)= 43.06 11.89 20.89
TOTAL RAINFALL (mm)= 44.06 44.06 44.06
RUNOFF COEFFICIENT = 0.98 0.27 0.47

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)				
1 + 2 = 3				
ID	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0013):	2.33	0.016	3.00	32.09
+ ID2= 2 (0203):	0.02	0.002	1.33	20.89

ID = 3 (0052):	2.35	0.016	3.00	31.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

***** SIMULATION:C. 10-yr Chicago *****

CHICAGO STORM IDF curve parameters: A=1387.000
Ptotal= 50.58 mm B= 7.970
C= 0.852

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	2.59	1.00	28.90	2.00	7.16	3.00	3.17
0.17	3.04	1.17	118.36	2.17	5.91	3.17	2.91
0.33	3.68	1.33	38.72	2.33	5.03	3.33	2.69
0.50	4.70	1.50	19.11	2.50	4.38	3.50	2.50
0.67	6.52	1.67	12.38	2.67	3.89	3.67	2.34
0.83	10.72	1.83	9.08	2.83	3.49	3.83	2.20

CALIB NASHYD (0202)			
ID= 1 DT= 5.0 min			
Area (ha)	Ia (mm)	Curve Number (CN)	# of Linear Res. (N)
0.21	5.00	74.0	3.00
U.H. Tp(hrs)=	0.18		

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

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.59	1.083	28.90	2.083	7.16	3.08	3.17
0.167	2.59	1.167	28.90	2.167	7.16	3.17	3.17
0.250	3.04	1.250	118.36	2.250	5.91	3.25	2.91
0.333	3.04	1.333	118.36	2.333	5.91	3.33	2.91
0.417	3.68	1.417	38.72	2.417	5.03	3.42	2.69
0.500	3.68	1.500	38.72	2.500	5.03	3.50	2.69
0.583	4.70	1.583	19.11	2.583	4.38	3.58	2.50
0.667	4.70	1.667	19.11	2.667	4.38	3.67	2.50
0.750	6.52	1.750	12.38	2.750	3.89	3.75	2.34
0.833	6.52	1.833	12.38	2.833	3.89	3.83	2.34
0.917	10.72	1.917	9.08	2.917	3.49	3.92	2.20
1.000	10.72	2.000	9.08	3.000	3.49	4.00	2.20

Unit Hyd Qpeak (cms) = 0.045

PEAK FLOW (cms) = 0.011 (i)
 TIME TO PEAK (hrs) = 1.500
 RUNOFF VOLUME (mm) = 15.364
 TOTAL RAINFALL (mm) = 50.580
 RUNOFF COEFFICIENT = 0.304

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

RESERVOIR (0012)
 IN= 2--> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	0.210	0.011	1.50	15.36
OUTFLOW: ID= 1 (0012)	0.210	0.007	1.75	15.36

PEAK FLOW REDUCTION [Qout/Qin] (%) = 64.49
 TIME SHIFT OF PEAK FLOW (min) = 15.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0006

CALIB
 STANDHYD (0201)
 ID= 1 DT= 5.0 min

Area (ha) = 2.12
 Total Imp (%) = 73.90
 Dir. Conn. (%) = 73.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)	1.56	0.55
Dep. Storage (mm)	2.00	3.00
Average Slope (%)	1.00	2.00
Length (m)	118.74	35.00
Mannings n	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.59	1.083	28.90	2.083	7.16	3.08	3.17
0.167	2.59	1.167	28.90	2.167	7.16	3.17	3.17
0.250	3.04	1.250	118.36	2.250	5.91	3.25	2.91
0.333	3.04	1.333	118.36	2.333	5.91	3.33	2.91
0.417	3.68	1.417	38.72	2.417	5.03	3.42	2.69
0.500	3.68	1.500	38.72	2.500	5.03	3.50	2.69
0.583	4.70	1.583	19.11	2.583	4.38	3.58	2.50
0.667	4.70	1.667	19.11	2.667	4.38	3.67	2.50
0.750	6.52	1.750	12.38	2.750	3.89	3.75	2.34
0.833	6.52	1.833	12.38	2.833	3.89	3.83	2.34
0.917	10.72	1.917	9.08	2.917	3.49	3.92	2.20

1.000 10.72 | 2.000 9.08 | 3.000 3.49 | 4.00 2.20

Max. Eff. Inten. (mm/hr)=	118.36	30.64
Storage over (min)	5.00	10.00
Storage Coeff. (min)=	2.65 (ii)	6.66 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.29	0.14
PEAK FLOW (cms)=	0.50	0.04
TIME TO PEAK (hrs)=	1.33	1.42
RUNOFF VOLUME (mm)=	48.58	15.41
TOTAL RAINFALL (mm)=	50.58	50.58
RUNOFF COEFFICIENT =	0.96	0.30

TOTALS
0.533 (iii)

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0011)
 IN= 2--> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	2.115	0.533	1.33	39.92
OUTFLOW: ID= 1 (0011)	2.115	0.025	2.50	39.83

PEAK FLOW REDUCTION [Qout/Qin] (%) = 4.77
 TIME SHIFT OF PEAK FLOW (min) = 70.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0679

ADD HYD (0013)
 1 + 2 = 3

ID1= 1 (0011):	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	2.12	0.025	2.50	39.83
+ ID2= 2 (0012):	0.21	0.007	1.75	15.36
ID = 3 (0013):	2.33	0.030	2.25	37.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
 STANDHYD (0203)
 ID= 1 DT= 5.0 min

Area (ha) = 0.02
 Total Imp (%) = 31.10
 Dir. Conn. (%) = 31.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)	0.01	0.02
Dep. Storage (mm)	1.00	5.00
Average Slope (%)	1.00	2.00
Length (m)	12.38	35.00
Mannings n	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.59	1.083	28.90	2.083	7.16	3.08	3.17
0.167	2.59	1.167	28.90	2.167	7.16	3.17	3.17
0.250	3.04	1.250	118.36	2.250	5.91	3.25	2.91
0.333	3.04	1.333	118.36	2.333	5.91	3.33	2.91
0.417	3.68	1.417	38.72	2.417	5.03	3.42	2.69
0.500	3.68	1.500	38.72	2.500	5.03	3.50	2.69
0.583	4.70	1.583	19.11	2.583	4.38	3.58	2.50

0.667	4.70	1.667	19.11	2.667	4.38	3.67	2.50
0.750	6.52	1.750	12.38	2.750	3.89	3.75	2.34
0.833	6.52	1.833	12.38	2.833	3.89	3.83	2.34
0.917	10.72	1.917	9.08	2.917	3.49	3.92	2.20
1.000	10.72	2.000	9.08	3.000	3.49	4.00	2.20

Max. Eff. Inten. (mm/hr)= 118.36 over (min)= 5.00
 Storage Coeff. (min)= 0.68 (ii)
 Unit Hyd. Tpeak (min)= 5.00
 Unit Hyd. peak (cms)= 0.34

TOTALS
 PEAK FLOW (cms)= 0.00
 TIME TO PEAK (hrs)= 1.33
 RUNOFF VOLUME (mm)= 49.58
 TOTAL RAINFALL (mm)= 50.58
 RUNOFF COEFFICIENT = 0.98

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0013):	2.33	0.030	2.25	37.62
+ ID2= 2 (0203):	0.02	0.003	1.33	25.81
=====				
ID = 3 (0052):	2.35	0.030	2.25	37.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ** SIMULATION:D. 25-yr Chicago **

CHICAGO STORM
 Ptotal= 59.07 mm

IDF curve parameters: A=1676.200
 B= 8.300
 C= 0.858

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
 Storm time step = 10.00 min
 Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.95	1.00	34.10	2.00	8.31	3.00	3.63
0.17	3.47	1.17	138.40	2.17	6.83	3.17	3.32
0.33	4.22	1.33	45.75	2.33	5.80	3.33	3.07
0.50	5.41	1.50	22.49	2.50	5.04	3.50	2.85
0.67	7.56	1.67	14.49	2.67	4.46	3.67	2.66
0.83	12.52	1.83	10.58	2.83	4.00	3.83	2.50

CALIB
 NASHYD (0202)
 ID= 1 DT= 5.0 min

Area (ha)= 0.21
 Ia (mm)= 5.00
 U.H. Tp(hrs)= 0.18

Curve Number (CN)= 74.0
 # of Linear Res.(N)= 3.00

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.95	1.083	34.10	2.083	8.31	3.08	3.63
0.167	2.95	1.167	34.10	2.167	8.31	3.17	3.63
0.250	3.47	1.250	138.40	2.250	6.83	3.25	3.32
0.333	3.47	1.333	138.40	2.333	6.83	3.33	3.32
0.417	4.22	1.417	45.75	2.417	5.80	3.42	3.07
0.500	4.22	1.500	45.75	2.500	5.80	3.50	3.07
0.583	5.41	1.583	22.49	2.583	5.04	3.58	2.85
0.667	5.41	1.667	22.49	2.667	5.04	3.67	2.85
0.750	7.56	1.750	14.49	2.750	4.46	3.75	2.66

0.833	7.56	1.833	14.49	2.833	4.46	3.83	2.66
0.917	12.52	1.917	10.58	2.917	4.00	3.92	2.50
1.000	12.52	2.000	10.58	3.000	4.00	4.00	2.50

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.015 (i)
 TIME TO PEAK (hrs)= 1.50
 RUNOFF VOLUME (mm)= 20.340
 TOTAL RAINFALL (mm)= 59.070
 RUNOFF COEFFICIENT = 0.344

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

RESERVOIR(0012) IN= 2---> OUT= 1 DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0116	0.0019
	0.0031	0.0001	0.0123	0.0020
	0.0050	0.0002	0.0129	0.0020
	0.0064	0.0005	0.0135	0.0021
	0.0075	0.0007	0.0141	0.0022
	0.0085	0.0010	0.0146	0.0023
	0.0094	0.0013	0.0151	0.0024
	0.0102	0.0016	0.0157	0.0024
	0.0109	0.0018	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0012)	0.210	0.015	1.50	20.34
	0.210	0.009	1.75	20.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 57.09
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0010

CALIB
 STANDHYD (0201)
 ID= 1 DT= 5.0 min

Area (ha)= 2.12
 Total Imp(%)= 73.90
 Dir. Conn.(%)= 73.90

IMPERVIOUS PERVIOUS (i)

Surface Area (ha)= 1.56
 Dep. Storage (mm)= 2.00
 Average Slope (%)= 1.00
 Length (m)= 118.74
 Mannings n = 0.013

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.95	1.083	34.10	2.083	8.31	3.08	3.63
0.167	2.95	1.167	34.10	2.167	8.31	3.17	3.63
0.250	3.47	1.250	138.40	2.250	6.83	3.25	3.32
0.333	3.47	1.333	138.40	2.333	6.83	3.33	3.32
0.417	4.22	1.417	45.75	2.417	5.80	3.42	3.07
0.500	4.22	1.500	45.75	2.500	5.80	3.50	3.07
0.583	5.41	1.583	22.49	2.583	5.04	3.58	2.85
0.667	5.41	1.667	22.49	2.667	5.04	3.67	2.85
0.750	7.56	1.750	14.49	2.750	4.46	3.75	2.66
0.833	7.56	1.833	14.49	2.833	4.46	3.83	2.66
0.917	12.52	1.917	10.58	2.917	4.00	3.92	2.50
1.000	12.52	2.000	10.58	3.000	4.00	4.00	2.50

Max. Eff. Inten. (mm/hr)= 138.40 over (min)= 5.00
 Storage Coeff. (min)= 2.49 (ii)
 Unit Hyd. Tpeak (min)= 5.00
 Unit Hyd. peak (cms)= 0.29

TOTALS
 PEAK FLOW (cms)= 0.59
 TIME TO PEAK (hrs)= 1.33
 RUNOFF VOLUME (mm)= 57.07
 TOTAL RAINFALL (mm)= 59.07
 RUNOFF COEFFICIENT = 0.97

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0011)
IN= 2--> QUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW : ID= 1 (0011)	2.115	0.632	1.33	47.50
	2.115	0.041	2.25	47.41

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.48
TIME SHIFT OF PEAK FLOW (min)= 55.00
MAXIMUM STORAGE USED (ha.m.)= 0.0766

ADD HYD (0013)
1 + 2 = 3

ID	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.041	2.25	47.41
+ ID2= 2 (0012):	0.21	0.009	1.75	20.34
ID = 3 (0013):	2.33	0.049	2.08	44.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDBYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.02
Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.01	0.02
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	12.38	35.00
Mannings n =	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.95	1.083	34.10	2.083	8.31	3.08	3.63
0.167	2.95	1.167	34.10	2.167	8.31	3.17	3.63
0.250	3.47	1.250	138.40	2.250	6.83	3.25	3.32
0.333	3.47	1.333	138.40	2.333	6.83	3.33	3.32
0.417	4.22	1.417	45.75	2.417	5.80	3.42	3.07
0.500	4.22	1.500	45.75	2.500	5.80	3.50	3.07
0.583	5.41	1.583	22.49	2.583	5.04	3.58	2.85
0.667	5.41	1.667	22.49	2.667	5.04	3.67	2.85
0.750	7.56	1.750	14.49	2.750	4.46	3.75	2.66
0.833	7.56	1.833	14.49	2.833	4.46	3.83	2.66
0.917	12.52	1.917	10.58	2.917	4.00	3.92	2.50
1.000	12.52	2.000	10.58	3.000	4.00	4.00	2.50

Max. Eff. Inten. (mm/hr)=	138.40	41.88
over (min)=	5.00	10.00
Storage Coeff. (min)=	0.64 (ii)	9.87 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.34	0.11

TOTALS
(iii)
PEAK FLOW (cms)= 0.00
TIME TO PEAK (hrs)= 1.33
RUNOFF VOLUME (mm)= 58.07

TOTAL RAINFALL (mm)= 59.07
RUNOFF COEFFICIENT = 0.98

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)
1 + 2 = 3

ID	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0013):	2.33	0.049	2.08	44.96
+ ID2= 2 (0203):	0.02	0.004	1.33	31.93
ID = 3 (0052):	2.35	0.049	2.08	44.84

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION: E. 50-yr Chicago **

CHICAGO STORM IDf curve parameters: A=1973.100
B= 9.000
C= 0.868
used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 10.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.16	1.00	38.66	2.00	9.18	3.00	3.91
0.17	3.73	1.17	153.18	2.17	7.50	3.17	3.57
0.33	4.57	1.33	51.95	2.33	6.33	3.33	3.28
0.50	5.90	1.50	25.44	2.50	5.48	3.50	3.04
0.67	8.33	1.67	16.25	2.67	4.83	3.67	2.84
0.83	13.99	1.83	11.77	2.83	4.32	3.83	2.66

CALIB NASHYD (0202)
ID= 1 DT= 5.0 min

Area (ha)= 0.21 Curve Number (CN)= 74.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.16	1.083	38.66	2.083	9.18	3.08	3.91
0.167	3.16	1.167	38.66	2.167	9.18	3.17	3.91
0.250	3.73	1.250	153.18	2.250	7.50	3.25	3.57
0.333	3.73	1.333	153.18	2.333	7.50	3.33	3.57
0.417	4.57	1.417	51.95	2.417	6.33	3.42	3.28
0.500	4.57	1.500	51.95	2.500	6.33	3.50	3.28
0.583	5.90	1.583	25.44	2.583	5.48	3.58	3.04
0.667	5.90	1.667	25.44	2.667	5.48	3.67	3.04
0.750	8.33	1.750	16.25	2.750	4.83	3.75	2.84
0.833	8.33	1.833	16.25	2.833	4.83	3.83	2.84
0.917	13.99	1.917	11.77	2.917	4.32	3.92	2.66
1.000	13.99	2.000	11.77	3.000	4.32	4.00	2.66

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 24.463
TOTAL RAINFALL (mm)= 65.642
RUNOFF COEFFICIENT = 0.373

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

RESERVOIR(0012)
IN= 2--> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0012)	0.210	0.018	1.50	24.46
	0.210	0.010	1.83	24.46

PEAK FLOW REDUCTION [Qout/Qin](%)= 52.69
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.0014

CALIB
STANDHYD (0201)
ID= 1 DT= 5.0 min

Area (ha)= 2.12
Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.56	0.55
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	118.74	35.00
Mannings n =	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.16	1.083	38.66	2.083	9.18	3.08	3.91
0.167	3.16	1.167	38.66	2.167	9.18	3.17	3.91
0.250	3.73	1.250	153.18	2.250	7.50	3.25	3.57
0.333	3.73	1.333	153.18	2.333	7.50	3.33	3.57
0.417	4.57	1.417	51.95	2.417	6.33	3.42	3.28
0.500	4.57	1.500	51.95	2.500	6.33	3.50	3.28
0.583	5.90	1.583	25.44	2.583	5.48	3.58	3.04
0.667	5.90	1.667	25.44	2.667	5.48	3.67	3.04
0.750	8.33	1.750	16.25	2.750	4.83	3.75	2.84
0.833	8.33	1.833	16.25	2.833	4.83	3.83	2.84
0.917	13.99	1.917	11.77	2.917	4.32	3.92	2.66
1.000	13.99	2.000	11.77	3.000	4.32	4.00	2.66

Max. Eff. Inten. (mm/hr)=	153.18	51.10
over (min)	5.00	10.00
Storage Coeff. (min)=	2.39 (ii)	6.01 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.30	0.15
PEAK FLOW (cms)=	0.66	0.06
TIME TO PEAK (hrs)=	1.33	0.707 (iii)
RUNOFF VOLUME (mm)=	63.64	24.54
TOTAL RAINFALL (mm)=	65.64	65.64
RUNOFF COEFFICIENT =	0.97	0.37

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)
IN= 2--> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747

0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0011)	2.115	0.707	1.33	53.43
	2.115	0.052	2.08	53.35

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.36
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= 0.0841

ADD HYD (0013)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.052	2.08	53.35
+ ID2= 2 (0012):	0.21	0.010	1.83	24.46
ID = 3 (0013):	2.33	0.061	2.00	50.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.02
Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.01	0.02
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	12.38	35.00
Mannings n =	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.16	1.083	38.66	2.083	9.18	3.08	3.91
0.167	3.16	1.167	38.66	2.167	9.18	3.17	3.91
0.250	3.73	1.250	153.18	2.250	7.50	3.25	3.57
0.333	3.73	1.333	153.18	2.333	7.50	3.33	3.57
0.417	4.57	1.417	51.95	2.417	6.33	3.42	3.28
0.500	4.57	1.500	51.95	2.500	6.33	3.50	3.28
0.583	5.90	1.583	25.44	2.583	5.48	3.58	3.04
0.667	5.90	1.667	25.44	2.667	5.48	3.67	3.04
0.750	8.33	1.750	16.25	2.750	4.83	3.75	2.84
0.833	8.33	1.833	16.25	2.833	4.83	3.83	2.84
0.917	13.99	1.917	11.77	2.917	4.32	3.92	2.66
1.000	13.99	2.000	11.77	3.000	4.32	4.00	2.66

Max. Eff. Inten. (mm/hr)=	153.18	51.10
over (min)	5.00	10.00
Storage Coeff. (min)=	0.62 (ii)	9.14 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.34	0.12
PEAK FLOW (cms)=	0.00	0.00
TIME TO PEAK (hrs)=	1.33	1.42
RUNOFF VOLUME (mm)=	64.64	24.54
TOTAL RAINFALL (mm)=	65.64	65.64
RUNOFF COEFFICIENT =	0.98	0.37

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)

1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0013):	2.33	0.061	2.00	50.74
+ ID2= 2 (0203):	0.02	0.004	1.33	36.81

ID = 3 (0052):	2.35	0.062	2.00	50.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION:F. 100-yr Chicago **

CHICAGO STORM Ptotal= 71.75 mm	IDF curve parameters: A=2193.100 B= 9.040 C= 0.871 used in: INTENSITY = A / (t + B)^C Duration of storm = 4.00 hrs Storm time step = 10.00 min Time to peak ratio = 0.33
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TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.40	1.00	42.35	2.00	9.96	3.00	4.21
0.17	4.02	1.17	168.45	2.17	8.12	3.17	3.84
0.33	4.93	1.33	56.97	2.33	6.85	3.33	3.53
0.50	6.38	1.50	27.80	2.50	5.92	3.50	3.27
0.67	9.03	1.67	17.71	2.67	5.21	3.67	3.05
0.83	15.23	1.83	12.80	2.83	4.66	3.83	2.85

CALIB NASHYD (0202) ID= 1 DT= 5.0 min	Area (ha)= 0.21 Ia (mm)= 5.00 U.H. Tp(hrs)= 0.18	Curve Number (CN)= 74.0 # of Linear Res.(N)= 3.00
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NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.40	1.083	42.35	2.083	9.96	3.08	4.21
0.167	3.40	1.167	42.35	2.167	9.96	3.17	4.21
0.250	4.02	1.250	168.45	2.250	8.12	3.25	3.84
0.333	4.02	1.333	168.45	2.333	8.12	3.33	3.84
0.417	4.93	1.417	56.97	2.417	6.85	3.42	3.53
0.500	4.93	1.500	56.97	2.500	6.85	3.50	3.53
0.583	6.38	1.583	27.80	2.583	5.92	3.58	3.27
0.667	6.38	1.667	27.80	2.667	5.92	3.67	3.27
0.750	9.03	1.750	17.71	2.750	5.21	3.75	3.05
0.833	9.03	1.833	17.71	2.833	5.21	3.83	3.05
0.917	15.23	1.917	12.80	2.917	4.66	3.92	2.85
1.000	15.23	2.000	12.80	3.000	4.66	4.00	2.85

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.022 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 28.481
TOTAL RAINFALL (mm)= 71.753
RUNOFF COEFFICIENT = 0.397

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

RESERVOIR(0012) IN= 2--> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF
--	-----------------

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

INFLOW : ID= 2 (0202)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0012)	0.210	0.022	1.50	28.48
	0.210	0.011	1.83	28.48

PEAK FLOW REDUCTION [Qout/Qin](%)= 49.99
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.0018

CALIB STANDHYD (0201) ID= 1 DT= 5.0 min	Area (ha)= 2.12 Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90
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	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.56	0.55
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	118.74	35.00
Mannings n =	0.013	0.250

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.40	1.083	42.35	2.083	9.96	3.08	4.21
0.167	3.40	1.167	42.35	2.167	9.96	3.17	4.21
0.250	4.02	1.250	168.45	2.250	8.12	3.25	3.84
0.333	4.02	1.333	168.45	2.333	8.12	3.33	3.84
0.417	4.93	1.417	56.97	2.417	6.85	3.42	3.53
0.500	4.93	1.500	56.97	2.500	6.85	3.50	3.53
0.583	6.38	1.583	27.80	2.583	5.92	3.58	3.27
0.667	6.38	1.667	27.80	2.667	5.92	3.67	3.27
0.750	9.03	1.750	17.71	2.750	5.21	3.75	3.05
0.833	9.03	1.833	17.71	2.833	5.21	3.83	3.05
0.917	15.23	1.917	12.80	2.917	4.66	3.92	2.85
1.000	15.23	2.000	12.80	3.000	4.66	4.00	2.85

Max. Eff. Inten. (mm/hr)= 168.45
over (min)= 5.00
Storage Coeff. (min)= 2.30 (ii)
Unit Hyd. Tpeak (min)= 5.00
Unit Hyd. peak (cms)= 0.30

PEAK FLOW (cms)= 0.72
TIME TO PEAK (hrs)= 1.33
RUNOFF VOLUME (mm)= 69.75
TOTAL RAINFALL (mm)= 71.75
RUNOFF COEFFICIENT = 0.97

TOTALS
0.08 0.08 0.785 (iii)
1.33
59.00
71.75
0.82

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) IN= 2--> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF
--	-----------------

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

INFLOW : ID= 2 (0201)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
OUTFLOW: ID= 1 (0011)	2.115	0.785	1.33	59.00
	2.115	0.061	2.08	58.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.71
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= 0.0918

ADD HYD (0013)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0011):	2.12	0.061	2.08	58.92
+ ID2= 2 (0012):	0.21	0.011	1.83	28.48
=====				
ID = 3 (0013):	2.33	0.071	2.00	56.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203)	Area (ha)	Imp(%)	Dir. Conn.(%)
ID= 1 DT= 5.0 min	0.02	31.10	31.10

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	0.01	0.02
Dep. Storage	1.00	5.00
Average Slope	1.00	2.00
Length	12.38	35.00
Mannings n	0.013	0.250

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

--- TRANSFORMED HYETOGRAPH ---							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.40	1.083	42.35	2.083	9.96	3.08	4.21
0.167	3.40	1.167	42.35	2.167	9.96	3.17	4.21
0.250	4.02	1.250	168.45	2.250	8.12	3.25	3.84
0.333	4.02	1.333	168.45	2.333	8.12	3.33	3.84
0.417	4.93	1.417	56.97	2.417	6.85	3.42	3.53
0.500	4.93	1.500	56.97	2.500	6.85	3.50	3.53
0.583	6.38	1.583	27.80	2.583	5.92	3.58	3.27
0.667	6.38	1.667	27.80	2.667	5.92	3.67	3.27
0.750	9.03	1.750	17.71	2.750	5.21	3.75	3.05
0.833	9.03	1.833	17.71	2.833	5.21	3.83	3.05
0.917	15.23	1.917	12.80	2.917	4.66	3.92	2.85
1.000	15.23	2.000	12.80	3.000	4.66	4.00	2.85

Max. Eff. Inten. (mm/hr) over (min)	168.45	60.77	10.00
Storage Coeff. (min)	0.59 (ii)	8.54 (ii)	
Unit Hyd. Tpeak (min)	5.00	10.00	
Unit Hyd. peak (cms)	0.34	0.12	

TOTALS		
PEAK FLOW (cms)	0.00	0.00
TIME TO PEAK (hrs)	1.33	1.42
RUNOFF VOLUME (mm)	70.75	28.56
TOTAL RAINFALL (mm)	71.75	71.75
RUNOFF COEFFICIENT	0.99	0.40

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES: CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0013):	2.33	0.071	2.00	56.17
+ ID2= 2 (0203):	0.02	0.005	1.33	41.48
=====				
ID = 3 (0052):	2.35	0.071	2.00	56.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION: G, 2-Year SCS **

MASS STORM | Filename: C:\Users\cbuscher\AppData\Local\Temp\

Ptotal= 46.80 mm

2b624af5-e1eb-44a2-a15e-c8c57a06a611\8dbbd218
Comments: SCS Type II Distribution 24 Hour Storm (

Duration of storm = 24.00 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.51	6.00	0.94	12.00	6.74	18.00	0.84
0.25	0.51	6.25	0.94	12.25	6.74	18.25	0.84
0.50	0.51	6.50	0.94	12.50	3.46	18.50	0.84
0.75	0.51	6.75	0.94	12.75	3.46	18.75	0.84
1.00	0.51	7.00	0.94	13.00	0.66	19.00	0.84
1.25	0.51	7.25	0.94	13.25	0.66	19.25	0.84
1.50	0.51	7.50	0.94	13.50	3.84	19.50	0.84
1.75	0.51	7.75	0.94	13.75	3.84	19.75	0.84
2.00	0.61	8.00	1.26	14.00	1.40	20.00	0.56
2.25	0.61	8.25	1.26	14.25	1.40	20.25	0.56
2.50	0.61	8.50	1.26	14.50	1.40	20.50	0.56
2.75	0.61	8.75	1.26	14.75	1.40	20.75	0.56
3.00	0.61	9.00	1.50	15.00	1.40	21.00	0.56
3.25	0.61	9.25	1.50	15.25	1.40	21.25	0.56
3.50	0.61	9.50	1.68	15.50	1.40	21.50	0.56
3.75	0.61	9.75	1.68	15.75	1.40	21.75	0.56
4.00	0.75	10.00	2.15	16.00	0.84	22.00	0.56
4.25	0.75	10.25	2.15	16.25	0.84	22.25	0.56
4.50	0.75	10.50	2.90	16.50	0.84	22.50	0.56
4.75	0.75	10.75	2.90	16.75	0.84	22.75	0.56
5.00	0.75	11.00	4.49	17.00	0.84	23.00	0.56
5.25	0.75	11.25	4.49	17.25	0.84	23.25	0.56
5.50	0.75	11.50	19.47	17.50	0.84	23.50	0.56
5.75	0.75	11.75	51.67	17.75	0.84	23.75	0.56

CALIB NASHYD (0202)	Area (ha)	Curve Number (CN)
ID= 1 DT= 5.0 min	0.21	74.0
	Ia (mm)= 5.00	# of Linear Res. (N)= 3.00
	U.H. Tp(hrs)= 0.18	

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

--- TRANSFORMED HYETOGRAPH ---							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.51	6.083	0.94	12.083	6.74	18.08	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.250	0.51	6.250	0.94	12.250	6.74	18.25	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.417	0.51	6.417	0.94	12.417	6.74	18.42	0.84
0.500	0.51	6.500	0.94	12.500	6.74	18.50	0.84
0.583	0.51	6.583	0.94	12.583	3.46	18.58	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.750	0.51	6.750	0.94	12.750	3.46	18.75	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.917	0.51	6.917	0.94	12.917	3.46	18.92	0.84
1.000	0.51	7.000	0.94	13.000	3.46	19.00	0.84
1.083	0.51	7.083	0.94	13.083	0.66	19.08	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.250	0.51	7.250	0.94	13.250	0.66	19.25	0.84
1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.417	0.51	7.417	0.94	13.417	0.66	19.42	0.84
1.500	0.51	7.500	0.94	13.500	0.66	19.50	0.84
1.583	0.51	7.583	0.94	13.583	3.84	19.58	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.750	0.51	7.750	0.94	13.750	3.84	19.75	0.84
1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84
1.917	0.51	7.917	0.94	13.917	3.84	19.92	0.84
2.000	0.51	8.000	0.94	14.000	3.84	20.00	0.84
2.083	0.61	8.083	1.26	14.083	1.40	20.08	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.250	0.61	8.250	1.26	14.250	1.40	20.25	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.417	0.61	8.417	1.26	14.417	1.40	20.42	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.583	0.61	8.583	1.26	14.583	1.40	20.58	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.750	0.61	8.750	1.26	14.750	1.40	20.75	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.917	0.61	8.917	1.26	14.917	1.40	20.92	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.083	0.61	9.083	1.50	15.083	1.40	21.08	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56

3.250	0.61	9.250	1.50	15.250	1.40	21.25	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.417	0.61	9.417	1.50	15.417	1.40	21.42	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.583	0.61	9.583	1.68	15.583	1.40	21.58	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.750	0.61	9.750	1.68	15.750	1.40	21.75	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56
3.917	0.61	9.917	1.68	15.917	1.40	21.92	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.083	0.75	10.083	2.15	16.083	0.84	22.08	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.250	0.75	10.250	2.15	16.250	0.84	22.25	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.417	0.75	10.417	2.15	16.417	0.84	22.42	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.583	0.75	10.583	2.90	16.583	0.84	22.58	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.750	0.75	10.750	2.90	16.750	0.84	22.75	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.917	0.75	10.917	2.90	16.917	0.84	22.92	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.083	0.75	11.083	4.49	17.083	0.84	23.08	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.250	0.75	11.250	4.49	17.250	0.84	23.25	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.417	0.75	11.417	4.49	17.417	0.84	23.42	0.56
5.500	0.75	11.500	4.49	17.500	0.84	23.50	0.56
5.583	0.75	11.583	19.47	17.583	0.84	23.58	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.750	0.75	11.750	19.47	17.750	0.84	23.75	0.56
5.833	0.75	11.833	51.66	17.833	0.84	23.83	0.56
5.917	0.75	11.917	51.67	17.917	0.84	23.92	0.56
6.000	0.75	12.000	51.67	18.000	0.84	24.00	0.56

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.007 (i)
 TIME TO PEAK (hrs)= 12.083
 RUNOFF VOLUME (mm)= 13.294
 TOTAL RAINFALL (mm)= 46.800
 RUNOFF COEFFICIENT = 0.284

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

RESERVOIR (0012)				
IN= 2--> QUT= 1				
DT= 5.0 min				
OVERFLOW IS OFF				
OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
0.0000	0.0000	0.0116	0.0019	
0.0031	0.0001	0.0123	0.0020	
0.0050	0.0002	0.0129	0.0020	
0.0064	0.0005	0.0135	0.0021	
0.0075	0.0007	0.0141	0.0022	
0.0085	0.0010	0.0146	0.0023	
0.0094	0.0013	0.0151	0.0024	
0.0102	0.0016	0.0157	0.0024	
0.0109	0.0018	0.0000	0.0000	
AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
INFLOW : ID= 2 (0202)	0.210	0.007	12.08	13.29
OUTFLOW: ID= 1 (0012)	0.210	0.005	12.17	13.29
PEAK FLOW REDUCTION [Qout/Qin](%)= 75.67				
TIME SHIFT OF PEAK FLOW (min)= 5.00				
MAXIMUM STORAGE USED (ha.m.)= 0.0003				

CALIB STANDHYD (0201)			
ID= 1 DT= 5.0 min			
Area (ha)=	2.12	Dir. Conn.(%)=	73.90
Total Imp(%)=	73.90		
IMPERVIOUS PERVIOUS (i)			
Surface Area (ha)=	1.56	0.55	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	118.74	35.00	
Mannings n =	0.013	0.250	

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

--- TRANSFORMED HYETOGRAPH ---							
TIME (hrs)	RAIN (mm/hr)	TIME (hrs)	RAIN (mm/hr)	TIME (hrs)	RAIN (mm/hr)	TIME (hrs)	RAIN (mm/hr)
0.083	0.51	6.083	0.94	12.083	6.74	18.08	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.250	0.51	6.250	0.94	12.250	6.74	18.25	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.417	0.51	6.417	0.94	12.417	6.74	18.42	0.84
0.500	0.51	6.500	0.94	12.500	6.74	18.50	0.84
0.583	0.51	6.583	0.94	12.583	3.46	18.58	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.750	0.51	6.750	0.94	12.750	3.46	18.75	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.917	0.51	6.917	0.94	12.917	3.46	18.92	0.84
1.000	0.51	7.000	0.94	13.000	3.46	19.00	0.84
1.083	0.51	7.083	0.94	13.083	0.66	19.08	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.250	0.51	7.250	0.94	13.250	0.66	19.25	0.84
1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.417	0.51	7.417	0.94	13.417	0.66	19.42	0.84
1.500	0.51	7.500	0.94	13.500	0.66	19.50	0.84
1.583	0.51	7.583	0.94	13.583	3.84	19.58	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.750	0.51	7.750	0.94	13.750	3.84	19.75	0.84
1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84
1.917	0.51	7.917	0.94	13.917	3.84	19.92	0.84
2.000	0.51	8.000	0.94	14.000	3.84	20.00	0.84
2.083	0.61	8.083	1.26	14.083	1.40	20.08	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.250	0.61	8.250	1.26	14.250	1.40	20.25	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.417	0.61	8.417	1.26	14.417	1.40	20.42	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.583	0.61	8.583	1.26	14.583	1.40	20.58	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.750	0.61	8.750	1.26	14.750	1.40	20.75	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.917	0.61	8.917	1.26	14.917	1.40	20.92	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.083	0.61	9.083	1.50	15.083	1.40	21.08	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56
3.250	0.61	9.250	1.50	15.250	1.40	21.25	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.417	0.61	9.417	1.50	15.417	1.40	21.42	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.583	0.61	9.583	1.68	15.583	1.40	21.58	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.750	0.61	9.750	1.68	15.750	1.40	21.75	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56
3.917	0.61	9.917	1.68	15.917	1.40	21.92	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.083	0.75	10.083	2.15	16.083	0.84	22.08	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.250	0.75	10.250	2.15	16.250	0.84	22.25	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.417	0.75	10.417	2.15	16.417	0.84	22.42	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.583	0.75	10.583	2.90	16.583	0.84	22.58	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.750	0.75	10.750	2.90	16.750	0.84	22.75	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.917	0.75	10.917	2.90	16.917	0.84	22.92	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.083	0.75	11.083	4.49	17.083	0.84	23.08	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.250	0.75	11.250	4.49	17.250	0.84	23.25	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.417	0.75	11.417	4.49	17.417	0.84	23.42	0.56
5.500	0.75	11.500	4.49	17.500	0.84	23.50	0.56
5.583	0.75	11.583	19.47	17.583	0.84	23.58	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.750	0.75	11.750	19.47	17.750	0.84	23.75	0.56
5.833	0.75	11.833	51.66	17.833	0.84	23.83	0.56
5.917	0.75	11.917	51.67	17.917	0.84	23.92	0.56
6.000	0.75	12.000	51.67	18.000	0.84	24.00	0.56

Max. Eff. Inten. (mm/hr)= 51.67 16.79
 over (min)= 5.00 20.00
 Storage Coeff. (min)= 3.69 (ii) 16.99 (ii)
 Unit Hyd. Tpeak (min)= 5.00 20.00
 Unit Hyd. peak (cms)= 0.25 0.06

TOTALS

PEAK FLOW (cms)= 0.22 0.01 0.232 (iii)
 TIME TO PEAK (hrs)= 12.00 12.17 12.00
 RUNOFF VOLUME (mm)= 44.80 13.33 36.58
 TOTAL RAINFALL (mm)= 46.80 46.80 46.80
 RUNOFF COEFFICIENT = 0.96 0.28 0.78

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR (0011)
 IN= 2--> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	2.115	0.232	12.00	36.58
OUTFLOW: ID= 1 (0011)	2.115	0.007	14.67	36.50

PEAK FLOW REDUCTION [Qout/Qin](%)= 3.17
 TIME SHIFT OF PEAK FLOW (min)=160.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0572

ADD HYD (0013)
 1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.007	14.67	36.50
+ ID2= 2 (0012):	0.21	0.005	12.17	13.29
ID = 3 (0013):	2.33	0.008	14.17	34.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203)
 ID= 1 DT= 5.0 min

Area (ha)= 0.02
 Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	0.01	0.02
Dep. Storage	1.00	5.00
Average Slope	1.00	2.00
Length	12.38	35.00
Mannings n	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.51	6.083	0.94	12.083	6.74	18.08	0.84
0.167	0.51	6.167	0.94	12.167	6.74	18.17	0.84
0.250	0.51	6.250	0.94	12.250	6.74	18.25	0.84
0.333	0.51	6.333	0.94	12.333	6.74	18.33	0.84
0.417	0.51	6.417	0.94	12.417	6.74	18.42	0.84
0.500	0.51	6.500	0.94	12.500	6.74	18.50	0.84
0.583	0.51	6.583	0.94	12.583	3.46	18.58	0.84
0.667	0.51	6.667	0.94	12.667	3.46	18.67	0.84
0.750	0.51	6.750	0.94	12.750	3.46	18.75	0.84
0.833	0.51	6.833	0.94	12.833	3.46	18.83	0.84
0.917	0.51	6.917	0.94	12.917	3.46	18.92	0.84
1.000	0.51	7.000	0.94	13.000	3.46	19.00	0.84
1.083	0.51	7.083	0.94	13.083	0.66	19.08	0.84
1.167	0.51	7.167	0.94	13.167	0.66	19.17	0.84
1.250	0.51	7.250	0.94	13.250	0.66	19.25	0.84

1.333	0.51	7.333	0.94	13.333	0.66	19.33	0.84
1.417	0.51	7.417	0.94	13.417	0.66	19.42	0.84
1.500	0.51	7.500	0.94	13.500	0.66	19.50	0.84
1.583	0.51	7.583	0.94	13.583	3.84	19.58	0.84
1.667	0.51	7.667	0.94	13.667	3.84	19.67	0.84
1.750	0.51	7.750	0.94	13.750	3.84	19.75	0.84
1.833	0.51	7.833	0.94	13.833	3.84	19.83	0.84
1.917	0.51	7.917	0.94	13.917	3.84	19.92	0.84
2.000	0.51	8.000	0.94	14.000	3.84	20.00	0.84
2.083	0.61	8.083	1.26	14.083	1.40	20.08	0.56
2.167	0.61	8.167	1.26	14.167	1.40	20.17	0.56
2.250	0.61	8.250	1.26	14.250	1.40	20.25	0.56
2.333	0.61	8.333	1.26	14.333	1.40	20.33	0.56
2.417	0.61	8.417	1.26	14.417	1.40	20.42	0.56
2.500	0.61	8.500	1.26	14.500	1.40	20.50	0.56
2.583	0.61	8.583	1.26	14.583	1.40	20.58	0.56
2.667	0.61	8.667	1.26	14.667	1.40	20.67	0.56
2.750	0.61	8.750	1.26	14.750	1.40	20.75	0.56
2.833	0.61	8.833	1.26	14.833	1.40	20.83	0.56
2.917	0.61	8.917	1.26	14.917	1.40	20.92	0.56
3.000	0.61	9.000	1.26	15.000	1.40	21.00	0.56
3.083	0.61	9.083	1.50	15.083	1.40	21.08	0.56
3.167	0.61	9.167	1.50	15.167	1.40	21.17	0.56
3.250	0.61	9.250	1.50	15.250	1.40	21.25	0.56
3.333	0.61	9.333	1.50	15.333	1.40	21.33	0.56
3.417	0.61	9.417	1.50	15.417	1.40	21.42	0.56
3.500	0.61	9.500	1.50	15.500	1.40	21.50	0.56
3.583	0.61	9.583	1.68	15.583	1.40	21.58	0.56
3.667	0.61	9.667	1.68	15.667	1.40	21.67	0.56
3.750	0.61	9.750	1.68	15.750	1.40	21.75	0.56
3.833	0.61	9.833	1.68	15.833	1.40	21.83	0.56
3.917	0.61	9.917	1.68	15.917	1.40	21.92	0.56
4.000	0.61	10.000	1.68	16.000	1.40	22.00	0.56
4.083	0.75	10.083	2.15	16.083	0.84	22.08	0.56
4.167	0.75	10.167	2.15	16.167	0.84	22.17	0.56
4.250	0.75	10.250	2.15	16.250	0.84	22.25	0.56
4.333	0.75	10.333	2.15	16.333	0.84	22.33	0.56
4.417	0.75	10.417	2.15	16.417	0.84	22.42	0.56
4.500	0.75	10.500	2.15	16.500	0.84	22.50	0.56
4.583	0.75	10.583	2.90	16.583	0.84	22.58	0.56
4.667	0.75	10.667	2.90	16.667	0.84	22.67	0.56
4.750	0.75	10.750	2.90	16.750	0.84	22.75	0.56
4.833	0.75	10.833	2.90	16.833	0.84	22.83	0.56
4.917	0.75	10.917	2.90	16.917	0.84	22.92	0.56
5.000	0.75	11.000	2.90	17.000	0.84	23.00	0.56
5.083	0.75	11.083	4.49	17.083	0.84	23.08	0.56
5.167	0.75	11.167	4.49	17.167	0.84	23.17	0.56
5.250	0.75	11.250	4.49	17.250	0.84	23.25	0.56
5.333	0.75	11.333	4.49	17.333	0.84	23.33	0.56
5.417	0.75	11.417	4.49	17.417	0.84	23.42	0.56
5.500	0.75	11.500	4.49	17.500	0.84	23.50	0.56
5.583	0.75	11.583	19.47	17.583	0.84	23.58	0.56
5.667	0.75	11.667	19.47	17.667	0.84	23.67	0.56
5.750	0.75	11.750	19.47	17.750	0.84	23.75	0.56
5.833	0.75	11.833	51.66	17.833	0.84	23.83	0.56
5.917	0.75	11.917	51.67	17.917	0.84	23.92	0.56
6.000	0.75	12.000	51.67	18.000	0.84	24.00	0.56

Max.Eff.Inten.(mm/hr)= 51.67 16.79
 over (min) 5.00 15.00
 Storage Coeff. (min)= 0.95 (ii) 14.25 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.34 0.08

PEAK FLOW (cms)= 0.00 0.00 *TOTALS*
 TIME TO PEAK (hrs)= 12.00 12.08 0.001 (iii)
 RUNOFF VOLUME (mm)= 45.80 13.33 17.56
 TOTAL RAINFALL (mm)= 46.80 46.80 46.80
 RUNOFF COEFFICIENT = 0.98 0.28 0.38

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)
 1 + 2 = 3

AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
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CALIB
STANDHYD (0201)
ID= 1 DT= 5.0 min

Area (ha)= 2.12
Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 1.56 0.55
Dep. Storage (mm)= 2.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 118.74 35.00
Mannings n = 0.013 0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.66	6.083	1.20	12.083	8.63	18.08	1.08
0.167	0.66	6.167	1.20	12.167	8.63	18.17	1.08
0.250	0.66	6.250	1.20	12.250	8.63	18.25	1.08
0.333	0.66	6.333	1.20	12.333	8.63	18.33	1.08
0.417	0.66	6.417	1.20	12.417	8.63	18.42	1.08
0.500	0.66	6.500	1.20	12.500	8.63	18.50	1.08
0.583	0.66	6.583	1.20	12.583	4.43	18.58	1.08
0.667	0.66	6.667	1.20	12.667	4.43	18.67	1.08
0.750	0.66	6.750	1.20	12.750	4.43	18.75	1.08
0.833	0.66	6.833	1.20	12.833	4.43	18.83	1.08
0.917	0.66	6.917	1.20	12.917	4.43	18.92	1.08
1.000	0.66	7.000	1.20	13.000	4.43	19.00	1.08
1.083	0.66	7.083	1.20	13.083	0.84	19.08	1.08
1.167	0.66	7.167	1.20	13.167	0.84	19.17	1.08
1.250	0.66	7.250	1.20	13.250	0.84	19.25	1.08
1.333	0.66	7.333	1.20	13.333	0.84	19.33	1.08
1.417	0.66	7.417	1.20	13.417	0.84	19.42	1.08
1.500	0.66	7.500	1.20	13.500	0.84	19.50	1.08
1.583	0.66	7.583	1.20	13.583	4.91	19.58	1.08
1.667	0.66	7.667	1.20	13.667	4.91	19.67	1.08
1.750	0.66	7.750	1.20	13.750	4.91	19.75	1.08
1.833	0.66	7.833	1.20	13.833	4.91	19.83	1.08
1.917	0.66	7.917	1.20	13.917	4.91	19.92	1.08
2.000	0.66	8.000	1.20	14.000	4.91	20.00	1.08
2.083	0.78	8.083	1.62	14.083	1.80	20.08	0.72
2.167	0.78	8.167	1.62	14.167	1.80	20.17	0.72
2.250	0.78	8.250	1.62	14.250	1.80	20.25	0.72
2.333	0.78	8.333	1.62	14.333	1.80	20.33	0.72
2.417	0.78	8.417	1.62	14.417	1.80	20.42	0.72
2.500	0.78	8.500	1.62	14.500	1.80	20.50	0.72
2.583	0.78	8.583	1.62	14.583	1.80	20.58	0.72
2.667	0.78	8.667	1.62	14.667	1.80	20.67	0.72
2.750	0.78	8.750	1.62	14.750	1.80	20.75	0.72
2.833	0.78	8.833	1.62	14.833	1.80	20.83	0.72
2.917	0.78	8.917	1.62	14.917	1.80	20.92	0.72
3.000	0.78	9.000	1.62	15.000	1.80	21.00	0.72
3.083	0.78	9.083	1.92	15.083	1.80	21.08	0.72
3.167	0.78	9.167	1.92	15.167	1.80	21.17	0.72
3.250	0.78	9.250	1.92	15.250	1.80	21.25	0.72
3.333	0.78	9.333	1.92	15.333	1.80	21.33	0.72
3.417	0.78	9.417	1.92	15.417	1.80	21.42	0.72
3.500	0.78	9.500	1.92	15.500	1.80	21.50	0.72
3.583	0.78	9.583	2.16	15.583	1.80	21.58	0.72
3.667	0.78	9.667	2.16	15.667	1.80	21.67	0.72
3.750	0.78	9.750	2.16	15.750	1.80	21.75	0.72
3.833	0.78	9.833	2.16	15.833	1.80	21.83	0.72
3.917	0.78	9.917	2.16	15.917	1.80	21.92	0.72
4.000	0.78	10.000	2.16	16.000	1.80	22.00	0.72
4.083	0.96	10.083	2.76	16.083	1.08	22.08	0.72
4.167	0.96	10.167	2.76	16.167	1.08	22.17	0.72
4.250	0.96	10.250	2.76	16.250	1.08	22.25	0.72
4.333	0.96	10.333	2.76	16.333	1.08	22.33	0.72
4.417	0.96	10.417	2.76	16.417	1.08	22.42	0.72
4.500	0.96	10.500	2.76	16.500	1.08	22.50	0.72
4.583	0.96	10.583	3.71	16.583	1.08	22.58	0.72
4.667	0.96	10.667	3.71	16.667	1.08	22.67	0.72
4.750	0.96	10.750	3.71	16.750	1.08	22.75	0.72
4.833	0.96	10.833	3.71	16.833	1.08	22.83	0.72
4.917	0.96	10.917	3.71	16.917	1.08	22.92	0.72
5.000	0.96	11.000	3.71	17.000	1.08	23.00	0.72
5.083	0.96	11.083	5.75	17.083	1.08	23.08	0.72
5.167	0.96	11.167	5.75	17.167	1.08	23.17	0.72
5.250	0.96	11.250	5.75	17.250	1.08	23.25	0.72
5.333	0.96	11.333	5.75	17.333	1.08	23.33	0.72
5.417	0.96	11.417	5.75	17.417	1.08	23.42	0.72
5.500	0.96	11.500	5.75	17.500	1.08	23.50	0.72

5.583	0.96	11.583	24.92	17.583	1.08	23.58	0.72
5.667	0.96	11.667	24.92	17.667	1.08	23.67	0.72
5.750	0.96	11.750	24.92	17.750	1.08	23.75	0.72
5.833	0.96	11.833	66.13	17.833	1.08	23.83	0.72
5.917	0.96	11.917	66.13	17.917	1.08	23.92	0.72
6.000	0.96	12.000	66.13	18.000	1.08	24.00	0.72

Max. Eff. Inten. (mm/hr)= 66.13 26.58
 over (min)= 5.00 15.00
 Storage Coeff. (min)= 3.34 (ii) 14.41 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.26 0.08
 TOTALS
 PEAK FLOW (cms)= 0.29 0.03 0.307 (iii)
 TIME TO PEAK (hrs)= 12.00 12.08 12.00
 RUNOFF VOLUME (mm)= 57.90 20.91 48.24
 TOTAL RAINFALL (mm)= 59.90 59.90 59.90
 RUNOFF COEFFICIENT = 0.97 0.35 0.81

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)
IN= 2--> OUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	2.115	0.307	12.00	48.24
OUTFLOW: ID= 1 (0011)	2.115	0.022	13.00	48.16

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.29
 TIME SHIFT OF PEAK FLOW (min)= 60.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0671

ADD HYD (0013)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.022	13.00	48.16
+ ID2= 2 (0012):	0.21	0.007	12.25	20.85
ID = 3 (0013):	2.33	0.027	12.67	45.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.02
Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

IMPERVIOUS PERVIOUS (i)
Surface Area (ha)= 0.01 0.02
Dep. Storage (mm)= 1.00 5.00
Average Slope (%)= 1.00 2.00
Length (m)= 12.38 35.00
Mannings n = 0.013 0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.66	6.083	1.20	12.083	8.63	18.08	1.08
0.167	0.66	6.167	1.20	12.167	8.63	18.17	1.08

0.250	0.66	6.250	1.20	12.250	8.63	18.25	1.08
0.333	0.66	6.333	1.20	12.333	8.63	18.33	1.08
0.417	0.66	6.417	1.20	12.417	8.63	18.42	1.08
0.500	0.66	6.500	1.20	12.500	8.63	18.50	1.08
0.583	0.66	6.583	1.20	12.583	4.43	18.58	1.08
0.667	0.66	6.667	1.20	12.667	4.43	18.67	1.08
0.750	0.66	6.750	1.20	12.750	4.43	18.75	1.08
0.833	0.66	6.833	1.20	12.833	4.43	18.83	1.08
0.917	0.66	6.917	1.20	12.917	4.43	18.92	1.08
1.000	0.66	7.000	1.20	13.000	4.43	19.00	1.08
1.083	0.66	7.083	1.20	13.083	0.84	19.08	1.08
1.167	0.66	7.167	1.20	13.167	0.84	19.17	1.08
1.250	0.66	7.250	1.20	13.250	0.84	19.25	1.08
1.333	0.66	7.333	1.20	13.333	0.84	19.33	1.08
1.417	0.66	7.417	1.20	13.417	0.84	19.42	1.08
1.500	0.66	7.500	1.20	13.500	0.84	19.50	1.08
1.583	0.66	7.583	1.20	13.583	4.91	19.58	1.08
1.667	0.66	7.667	1.20	13.667	4.91	19.67	1.08
1.750	0.66	7.750	1.20	13.750	4.91	19.75	1.08
1.833	0.66	7.833	1.20	13.833	4.91	19.83	1.08
1.917	0.66	7.917	1.20	13.917	4.91	19.92	1.08
2.000	0.66	8.000	1.20	14.000	4.91	20.00	1.08
2.083	0.78	8.083	1.62	14.083	1.80	20.08	0.72
2.167	0.78	8.167	1.62	14.167	1.80	20.17	0.72
2.250	0.78	8.250	1.62	14.250	1.80	20.25	0.72
2.333	0.78	8.333	1.62	14.333	1.80	20.33	0.72
2.417	0.78	8.417	1.62	14.417	1.80	20.42	0.72
2.500	0.78	8.500	1.62	14.500	1.80	20.50	0.72
2.583	0.78	8.583	1.62	14.583	1.80	20.58	0.72
2.667	0.78	8.667	1.62	14.667	1.80	20.67	0.72
2.750	0.78	8.750	1.62	14.750	1.80	20.75	0.72
2.833	0.78	8.833	1.62	14.833	1.80	20.83	0.72
2.917	0.78	8.917	1.62	14.917	1.80	20.92	0.72
3.000	0.78	9.000	1.62	15.000	1.80	21.00	0.72
3.083	0.78	9.083	1.92	15.083	1.80	21.08	0.72
3.167	0.78	9.167	1.92	15.167	1.80	21.17	0.72
3.250	0.78	9.250	1.92	15.250	1.80	21.25	0.72
3.333	0.78	9.333	1.92	15.333	1.80	21.33	0.72
3.417	0.78	9.417	1.92	15.417	1.80	21.42	0.72
3.500	0.78	9.500	1.92	15.500	1.80	21.50	0.72
3.583	0.78	9.583	2.16	15.583	1.80	21.58	0.72
3.667	0.78	9.667	2.16	15.667	1.80	21.67	0.72
3.750	0.78	9.750	2.16	15.750	1.80	21.75	0.72
3.833	0.78	9.833	2.16	15.833	1.80	21.83	0.72
3.917	0.78	9.917	2.16	15.917	1.80	21.92	0.72
4.000	0.78	10.000	2.16	16.000	1.80	22.00	0.72
4.083	0.96	10.083	2.76	16.083	1.08	22.08	0.72
4.167	0.96	10.167	2.76	16.167	1.08	22.17	0.72
4.250	0.96	10.250	2.76	16.250	1.08	22.25	0.72
4.333	0.96	10.333	2.76	16.333	1.08	22.33	0.72
4.417	0.96	10.417	2.76	16.417	1.08	22.42	0.72
4.500	0.96	10.500	2.76	16.500	1.08	22.50	0.72
4.583	0.96	10.583	3.71	16.583	1.08	22.58	0.72
4.667	0.96	10.667	3.71	16.667	1.08	22.67	0.72
4.750	0.96	10.750	3.71	16.750	1.08	22.75	0.72
4.833	0.96	10.833	3.71	16.833	1.08	22.83	0.72
4.917	0.96	10.917	3.71	16.917	1.08	22.92	0.72
5.000	0.96	11.000	3.71	17.000	1.08	23.00	0.72
5.083	0.96	11.083	5.75	17.083	1.08	23.08	0.72
5.167	0.96	11.167	5.75	17.167	1.08	23.17	0.72
5.250	0.96	11.250	5.75	17.250	1.08	23.25	0.72
5.333	0.96	11.333	5.75	17.333	1.08	23.33	0.72
5.417	0.96	11.417	5.75	17.417	1.08	23.42	0.72
5.500	0.96	11.500	5.75	17.500	1.08	23.50	0.72
5.583	0.96	11.583	24.92	17.583	1.08	23.58	0.72
5.667	0.96	11.667	24.92	17.667	1.08	23.67	0.72
5.750	0.96	11.750	24.92	17.750	1.08	23.75	0.72
5.833	0.96	11.833	66.13	17.833	1.08	23.83	0.72
5.917	0.96	11.917	66.13	17.917	1.08	23.92	0.72
6.000	0.96	12.000	66.13	18.000	1.08	24.00	0.72

Max.Eff.Inten.(mm/hr)= 66.13 26.58
over (min) 5.00 15.00
Storage Coeff. (min)= 0.86 (ii) 11.93 (ii)
Unit Hyd. Tpeak (min)= 5.00 15.00
Unit Hyd. peak (cms)= 0.34 0.09

TOTALS
PEAK FLOW (cms)= 0.00 0.00 0.002 (iii)
TIME TO PEAK (hrs)= 12.00 12.08 12.00
RUNOFF VOLUME (mm)= 58.90 20.91 25.21
TOTAL RAINFALL (mm)= 59.90 59.90 59.90
RUNOFF COEFFICIENT = 0.98 0.35 0.42

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)				
1 + 2 = 3				
	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0013):	2.33	0.027	12.67	45.69
+ ID2= 2 (0203):	0.02	0.002	12.00	25.21

ID = 3 (0052):	2.35	0.027	12.67	45.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION: I. 10-Year SCS **

MASS STORM | Filename: C:\Users\cbuscher\AppData
| | LocalTemp
| | 2b624af5-e1eb-44a2-a15e-c8c57a06a611\054a661a
Ptotal= 67.50 mm | Comments: SCS Type II Distribution 24 Hour Storm (

Duration of storm = 24.00 hrs
Mass curve time step = 15.00 min

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.00	0.74	6.00	1.35	12.00	9.72	18.00	1.21
0.25	0.74	6.25	1.35	12.25	9.72	18.25	1.22
0.50	0.74	6.50	1.35	12.50	4.99	18.50	1.21
0.75	0.74	6.75	1.35	12.75	5.00	18.75	1.22
1.00	0.74	7.00	1.35	13.00	0.94	19.00	1.21
1.25	0.74	7.25	1.35	13.25	0.94	19.25	1.22
1.50	0.74	7.50	1.35	13.50	5.54	19.50	1.21
1.75	0.74	7.75	1.35	13.75	5.54	19.75	1.22
2.00	0.88	8.00	1.82	14.00	2.02	20.00	0.81
2.25	0.88	8.25	1.82	14.25	2.02	20.25	0.81
2.50	0.88	8.50	1.82	14.50	2.02	20.50	0.81
2.75	0.88	8.75	1.82	14.75	2.03	20.75	0.81
3.00	0.88	9.00	2.16	15.00	2.02	21.00	0.81
3.25	0.88	9.25	2.16	15.25	2.02	21.25	0.81
3.50	0.88	9.50	2.43	15.50	2.02	21.50	0.81
3.75	0.88	9.75	2.43	15.75	2.02	21.75	0.81
4.00	1.08	10.00	3.11	16.00	1.22	22.00	0.81
4.25	1.08	10.25	3.11	16.25	1.21	22.25	0.81
4.50	1.08	10.50	4.19	16.50	1.21	22.50	0.81
4.75	1.08	10.75	4.18	16.75	1.22	22.75	0.81
5.00	1.08	11.00	6.48	17.00	1.21	23.00	0.81
5.25	1.08	11.25	6.48	17.25	1.22	23.25	0.81
5.50	1.08	11.50	28.08	17.50	1.21	23.50	0.81
5.75	1.08	11.75	74.52	17.75	1.22	23.75	0.81

CALIB |
NASHYD (0202) | Area (ha)= 0.21 Curve Number (CN)= 74.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
| U.H. Tp(hrs)= 0.18

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

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.74	6.083	1.35	12.083	9.73	18.08	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.21
0.250	0.74	6.250	1.35	12.250	9.72	18.25	1.21
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.417	0.74	6.417	1.35	12.417	9.72	18.42	1.22
0.500	0.74	6.500	1.35	12.500	9.72	18.50	1.22
0.583	0.74	6.583	1.35	12.583	5.00	18.58	1.22
0.667	0.74	6.667	1.35	12.667	4.99	18.67	1.21
0.750	0.74	6.750	1.35	12.750	4.99	18.75	1.21
0.833	0.74	6.833	1.35	12.833	4.99	18.83	1.22
0.917	0.74	6.917	1.35	12.917	5.00	18.92	1.22
1.000	0.74	7.000	1.35	13.000	5.00	19.00	1.22

1.083	0.74	7.083	1.35	13.083	0.95	19.08	1.22
1.167	0.74	7.167	1.35	13.167	0.94	19.17	1.21
1.250	0.74	7.250	1.35	13.250	0.94	19.25	1.21
1.333	0.74	7.333	1.35	13.333	0.94	19.33	1.22
1.417	0.74	7.417	1.35	13.417	0.94	19.42	1.22
1.500	0.74	7.500	1.35	13.500	0.94	19.50	1.22
1.583	0.74	7.583	1.35	13.583	5.53	19.58	1.21
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.21
1.750	0.74	7.750	1.35	13.750	5.54	19.75	1.22
1.833	0.74	7.833	1.35	13.833	5.53	19.83	1.22
1.917	0.74	7.917	1.35	13.917	5.54	19.92	1.22
2.000	0.74	8.000	1.35	14.000	5.54	20.00	1.21
2.083	0.88	8.083	1.82	14.083	2.03	20.08	0.81
2.167	0.88	8.167	1.82	14.167	2.02	20.17	0.81
2.250	0.88	8.250	1.82	14.250	2.02	20.25	0.81
2.333	0.88	8.333	1.82	14.333	2.02	20.33	0.81
2.417	0.88	8.417	1.82	14.417	2.02	20.42	0.81
2.500	0.88	8.500	1.82	14.500	2.02	20.50	0.81
2.583	0.88	8.583	1.82	14.583	2.02	20.58	0.81
2.667	0.88	8.667	1.82	14.667	2.02	20.67	0.81
2.750	0.88	8.750	1.82	14.750	2.02	20.75	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.917	0.88	8.917	1.82	14.917	2.03	20.92	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81
3.083	0.88	9.083	2.16	15.083	2.02	21.08	0.81
3.167	0.88	9.167	2.16	15.167	2.02	21.17	0.81
3.250	0.88	9.250	2.16	15.250	2.02	21.25	0.81
3.333	0.88	9.333	2.16	15.333	2.02	21.33	0.81
3.417	0.88	9.417	2.16	15.417	2.02	21.42	0.81
3.500	0.88	9.500	2.16	15.500	2.02	21.50	0.81
3.583	0.88	9.583	2.43	15.583	2.02	21.58	0.81
3.667	0.88	9.667	2.43	15.667	2.02	21.67	0.81
3.750	0.88	9.750	2.43	15.750	2.02	21.75	0.81
3.833	0.88	9.833	2.43	15.833	2.02	21.83	0.81
3.917	0.88	9.917	2.43	15.917	2.02	21.92	0.81
4.000	0.88	10.000	2.43	16.000	2.02	22.00	0.81
4.083	1.08	10.083	3.10	16.083	1.22	22.08	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.250	1.08	10.250	3.11	16.250	1.22	22.25	0.81
4.333	1.08	10.333	3.10	16.333	1.22	22.33	0.81
4.417	1.08	10.417	3.11	16.417	1.21	22.42	0.81
4.500	1.08	10.500	3.11	16.500	1.21	22.50	0.81
4.583	1.08	10.583	4.18	16.583	1.22	22.58	0.81
4.667	1.08	10.667	4.19	16.667	1.21	22.67	0.81
4.750	1.08	10.750	4.19	16.750	1.21	22.75	0.81
4.833	1.08	10.833	4.18	16.833	1.22	22.83	0.81
4.917	1.08	10.917	4.18	16.917	1.22	22.92	0.81
5.000	1.08	11.000	4.18	17.000	1.22	23.00	0.81
5.083	1.08	11.083	6.48	17.083	1.22	23.08	0.81
5.167	1.08	11.167	6.48	17.167	1.21	23.17	0.81
5.250	1.08	11.250	6.48	17.250	1.21	23.25	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.417	1.08	11.417	6.48	17.417	1.22	23.42	0.81
5.500	1.08	11.500	6.48	17.500	1.22	23.50	0.81
5.583	1.08	11.583	28.08	17.583	1.22	23.58	0.81
5.667	1.08	11.667	28.08	17.667	1.21	23.67	0.81
5.750	1.08	11.750	28.08	17.750	1.21	23.75	0.81
5.833	1.08	11.833	74.51	17.833	1.22	23.83	0.81
5.917	1.08	11.917	74.52	17.917	1.22	23.92	0.81
6.000	1.08	12.000	74.52	18.000	1.22	24.00	0.81

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.014 (i)
 TIME TO PEAK (hrs)= 12.083
 RUNOFF VOLUME (mm)= 25.666
 TOTAL RAINFALL (mm)= 67.500
 RUNOFF COEFFICIENT = 0.380

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

RESERVOIR(0012)				
IN= 2--> OUT= 1				
DT= 5.0 min				
OVERFLOW IS OFF				
OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
0.0000	0.0000	0.0116	0.0019	
0.0031	0.0001	0.0123	0.0020	
0.0050	0.0002	0.0129	0.0020	
0.0064	0.0005	0.0135	0.0021	
0.0075	0.0007	0.0141	0.0022	
0.0085	0.0010	0.0146	0.0023	
0.0094	0.0013	0.0151	0.0024	

0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000
AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
0.210	0.014	12.08	25.67
OUTFLOW: ID= 1 (0012)	0.210	0.008	25.66

PEAK FLOW REDUCTION [Qout/Qin](%)= 57.99
 TIME SHIFT OF PEAK FLOW (min)= 10.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0009

CALIB	Area (ha)= 2.12	Dir. Conn.(%)= 73.90
STANDHYD (0201)	Total Imp(%)= 73.90	
ID= 1 DT= 5.0 min		

Surface Area (ha)=	1.56	PERVIOUS (i)	0.55
Dep. Storage (mm)=	2.00		5.00
Average Slope (%)=	1.00		2.00
Length (m)=	118.74		35.00
Mannings n =	0.013		0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.74	6.083	1.35	12.083	9.73	18.08	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.21
0.250	0.74	6.250	1.35	12.250	9.72	18.25	1.21
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.417	0.74	6.417	1.35	12.417	9.72	18.42	1.22
0.500	0.74	6.500	1.35	12.500	9.72	18.50	1.22
0.583	0.74	6.583	1.35	12.583	5.00	18.58	1.22
0.667	0.74	6.667	1.35	12.667	4.99	18.67	1.21
0.750	0.74	6.750	1.35	12.750	4.99	18.75	1.21
0.833	0.74	6.833	1.35	12.833	4.99	18.83	1.22
0.917	0.74	6.917	1.35	12.917	5.00	18.92	1.22
1.000	0.74	7.000	1.35	13.000	5.00	19.00	1.22
1.083	0.74	7.083	1.35	13.083	0.95	19.08	1.22
1.167	0.74	7.167	1.35	13.167	0.94	19.17	1.21
1.250	0.74	7.250	1.35	13.250	0.94	19.25	1.21
1.333	0.74	7.333	1.35	13.333	0.94	19.33	1.22
1.417	0.74	7.417	1.35	13.417	0.94	19.42	1.22
1.500	0.74	7.500	1.35	13.500	0.94	19.50	1.22
1.583	0.74	7.583	1.35	13.583	5.53	19.58	1.21
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.21
1.750	0.74	7.750	1.35	13.750	5.54	19.75	1.22
1.833	0.74	7.833	1.35	13.833	5.53	19.83	1.22
1.917	0.74	7.917	1.35	13.917	5.54	19.92	1.22
2.000	0.74	8.000	1.35	14.000	5.54	20.00	1.21
2.083	0.88	8.083	1.82	14.083	2.03	20.08	0.81
2.167	0.88	8.167	1.82	14.167	2.02	20.17	0.81
2.250	0.88	8.250	1.82	14.250	2.02	20.25	0.81
2.333	0.88	8.333	1.82	14.333	2.02	20.33	0.81
2.417	0.88	8.417	1.82	14.417	2.02	20.42	0.81
2.500	0.88	8.500	1.82	14.500	2.02	20.50	0.81
2.583	0.88	8.583	1.82	14.583	2.02	20.58	0.81
2.667	0.88	8.667	1.82	14.667	2.02	20.67	0.81
2.750	0.88	8.750	1.82	14.750	2.02	20.75	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.917	0.88	8.917	1.82	14.917	2.03	20.92	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81
3.083	0.88	9.083	2.16	15.083	2.02	21.08	0.81
3.167	0.88	9.167	2.16	15.167	2.02	21.17	0.81
3.250	0.88	9.250	2.16	15.250	2.02	21.25	0.81
3.333	0.88	9.333	2.16	15.333	2.02	21.33	0.81
3.417	0.88	9.417	2.16	15.417	2.02	21.42	0.81
3.500	0.88	9.500	2.16	15.500	2.02	21.50	0.81
3.583	0.88	9.583	2.43	15.583	2.02	21.58	0.81
3.667	0.88	9.667	2.43	15.667	2.02	21.67	0.81
3.750	0.88	9.750	2.43	15.750	2.02	21.75	0.81
3.833	0.88	9.833	2.43	15.833	2.02	21.83	0.81
3.917	0.88	9.917	2.43	15.917	2.02	21.92	0.81
4.000	0.88	10.000	2.43	16.000	2.02	22.00	0.81
4.083	1.08	10.083	3.10	16.083	1.22	22.08	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.250	1.08	10.250	3.11	16.250	1.22	22.25	0.81
4.333	1.08	10.333	3.10	16.333	1.22	22.33	0.81
4.417	1.08	10.417	3.11	16.417	1.21	22.42	0.81

4.500	1.08	10.500	3.11	16.500	1.21	22.50	0.81
4.583	1.08	10.583	4.18	16.583	1.22	22.58	0.81
4.667	1.08	10.667	4.19	16.667	1.21	22.67	0.81
4.750	1.08	10.750	4.19	16.750	1.21	22.75	0.81
4.833	1.08	10.833	4.18	16.833	1.22	22.83	0.81
4.917	1.08	10.917	4.18	16.917	1.22	22.92	0.81
5.000	1.08	11.000	4.18	17.000	1.22	23.00	0.81
5.083	1.08	11.083	6.48	17.083	1.22	23.08	0.81
5.167	1.08	11.167	6.48	17.167	1.21	23.17	0.81
5.250	1.08	11.250	6.48	17.250	1.21	23.25	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.417	1.08	11.417	6.48	17.417	1.22	23.42	0.81
5.500	1.08	11.500	6.48	17.500	1.22	23.50	0.81
5.583	1.08	11.583	28.08	17.583	1.22	23.58	0.81
5.667	1.08	11.667	28.08	17.667	1.21	23.67	0.81
5.750	1.08	11.750	28.08	17.750	1.21	23.75	0.81
5.833	1.08	11.833	74.51	17.833	1.22	23.83	0.81
5.917	1.08	11.917	74.52	17.917	1.22	23.92	0.81
6.000	1.08	12.000	74.52	18.000	1.22	24.00	0.81

Max. Eff. Inten. (mm/hr)= 74.52 35.05
 over (min)= 5.00 10.00
 Storage Coeff. (min)= 3.19 (ii) 8.02 (ii)
 Unit Hyd. Tpeak (min)= 5.00 10.00
 Unit Hyd. peak (cms)= 0.27 0.13

TOTALS
 PEAK FLOW (cms)= 0.32 0.04 0.363 (iii)
 TIME TO PEAK (hrs)= 12.00 12.00 12.00
 RUNOFF VOLUME (mm)= 65.50 25.74 55.12
 TOTAL RAINFALL (mm)= 67.50 67.50 67.50
 RUNOFF COEFFICIENT = 0.97 0.38 0.82

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) OVERFLOW IS OFF				
IN= 2 --> OUT= 1				
DT= 5.0 min				
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000		0.0199	0.0650
0.0004	0.0003		0.0382	0.0747
0.0008	0.0053		0.0512	0.0833
0.0011	0.0108		0.0586	0.0906
0.0012	0.0192		0.0661	0.0952
0.0014	0.0299		0.0718	0.0989
0.0015	0.0417		0.0747	0.0992
0.0016	0.0537		0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW: ID= 2 (0201)	2.115	0.363	12.00	55.12
OUTFLOW: ID= 1 (0011)	2.115	0.035	12.58	55.03

PEAK FLOW REDUCTION [Qout/Qin] (%) = 9.65
 TIME SHIFT OF PEAK FLOW (min) = 35.00
 MAXIMUM STORAGE USED (ha.m.) = 0.0734

ADD HYD (0013)				
1 + 2 = 3				
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.035	12.58	55.03
+ ID2= 2 (0012):	0.21	0.008	12.25	25.66

ID = 3 (0013):	2.33	0.042	12.50	52.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDBYD (0203)				
ID= 1 DT= 5.0 min				
	Area (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
Area (ha)=	0.02			
Total Imp(%)=	31.10			
Dir. Conn.(%)=	31.10			

Surface Area (ha)= IMPERVIOUS 0.01 PERVIOUS (i) 0.02

Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 12.38 35.00
 Mannings n = 0.013 0.250

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

--- TRANSFORMED HYETOGRAPH ---							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.74	6.083	1.35	12.083	9.73	18.08	1.22
0.167	0.74	6.167	1.35	12.167	9.72	18.17	1.21
0.250	0.74	6.250	1.35	12.250	9.72	18.25	1.21
0.333	0.74	6.333	1.35	12.333	9.72	18.33	1.22
0.417	0.74	6.417	1.35	12.417	9.72	18.42	1.22
0.500	0.74	6.500	1.35	12.500	9.72	18.50	1.22
0.583	0.74	6.583	1.35	12.583	5.00	18.58	1.22
0.667	0.74	6.667	1.35	12.667	4.99	18.67	1.21
0.750	0.74	6.750	1.35	12.750	4.99	18.75	1.21
0.833	0.74	6.833	1.35	12.833	4.99	18.83	1.22
0.917	0.74	6.917	1.35	12.917	5.00	18.92	1.22
1.000	0.74	7.000	1.35	13.000	5.00	19.00	1.22
1.083	0.74	7.083	1.35	13.083	0.95	19.08	1.22
1.167	0.74	7.167	1.35	13.167	0.94	19.17	1.21
1.250	0.74	7.250	1.35	13.250	0.94	19.25	1.21
1.333	0.74	7.333	1.35	13.333	0.94	19.33	1.22
1.417	0.74	7.417	1.35	13.417	0.94	19.42	1.22
1.500	0.74	7.500	1.35	13.500	0.94	19.50	1.22
1.583	0.74	7.583	1.35	13.583	5.53	19.58	1.21
1.667	0.74	7.667	1.35	13.667	5.54	19.67	1.21
1.750	0.74	7.750	1.35	13.750	5.54	19.75	1.22
1.833	0.74	7.833	1.35	13.833	5.53	19.83	1.22
1.917	0.74	7.917	1.35	13.917	5.54	19.92	1.22
2.000	0.74	8.000	1.35	14.000	5.54	20.00	1.21
2.083	0.88	8.083	1.82	14.083	2.03	20.08	0.81
2.167	0.88	8.167	1.82	14.167	2.02	20.17	0.81
2.250	0.88	8.250	1.82	14.250	2.02	20.25	0.81
2.333	0.88	8.333	1.82	14.333	2.02	20.33	0.81
2.417	0.88	8.417	1.82	14.417	2.02	20.42	0.81
2.500	0.88	8.500	1.82	14.500	2.02	20.50	0.81
2.583	0.88	8.583	1.82	14.583	2.02	20.58	0.81
2.667	0.88	8.667	1.82	14.667	2.02	20.67	0.81
2.750	0.88	8.750	1.82	14.750	2.02	20.75	0.81
2.833	0.88	8.833	1.82	14.833	2.03	20.83	0.81
2.917	0.88	8.917	1.82	14.917	2.03	20.92	0.81
3.000	0.88	9.000	1.82	15.000	2.03	21.00	0.81
3.083	0.88	9.083	2.16	15.083	2.02	21.08	0.81
3.167	0.88	9.167	2.16	15.167	2.02	21.17	0.81
3.250	0.88	9.250	2.16	15.250	2.02	21.25	0.81
3.333	0.88	9.333	2.16	15.333	2.02	21.33	0.81
3.417	0.88	9.417	2.16	15.417	2.02	21.42	0.81
3.500	0.88	9.500	2.16	15.500	2.02	21.50	0.81
3.583	0.88	9.583	2.43	15.583	2.02	21.58	0.81
3.667	0.88	9.667	2.43	15.667	2.02	21.67	0.81
3.750	0.88	9.750	2.43	15.750	2.02	21.75	0.81
3.833	0.88	9.833	2.43	15.833	2.02	21.83	0.81
3.917	0.88	9.917	2.43	15.917	2.02	21.92	0.81
4.000	0.88	10.000	2.43	16.000	2.02	22.00	0.81
4.083	1.08	10.083	3.10	16.083	1.22	22.08	0.81
4.167	1.08	10.167	3.11	16.167	1.22	22.17	0.81
4.250	1.08	10.250	3.11	16.250	1.22	22.25	0.81
4.333	1.08	10.333	3.10	16.333	1.22	22.33	0.81
4.417	1.08	10.417	3.11	16.417	1.21	22.42	0.81
4.500	1.08	10.500	3.11	16.500	1.21	22.50	0.81
4.583	1.08	10.583	4.18	16.583	1.22	22.58	0.81
4.667	1.08	10.667	4.19	16.667	1.21	22.67	0.81
4.750	1.08	10.750	4.19	16.750	1.21	22.75	0.81
4.833	1.08	10.833	4.18	16.833	1.22	22.83	0.81
4.917	1.08	10.917	4.18	16.917	1.22	22.92	0.81
5.000	1.08	11.000	4.18	17.000	1.22	23.00	0.81
5.083	1.08	11.083	6.48	17.083	1.22	23.08	0.81
5.167	1.08	11.167	6.48	17.167	1.21	23.17	0.81
5.250	1.08	11.250	6.48	17.250	1.21	23.25	0.81
5.333	1.08	11.333	6.48	17.333	1.22	23.33	0.81
5.417	1.08	11.417	6.48	17.417	1.22	23.42	0.81
5.500	1.08	11.500	6.48	17.500	1.22	23.50	0.81
5.583	1.08	11.583	28.08	17.583	1.22	23.58	0.81
5.667	1.08	11.667	28.08	17.667	1.21	23.67	0.81
5.750	1.08	11.750	28.08	17.750	1.21	23.75	0.81
5.833	1.08	11.833	74.51	17.833	1.22	23.83	0.81
5.917	1.08	11.917	74.52	17.917	1.22	23.92	0.81
6.000	1.08	12.000	74.52	18.000	1.22	24.00	0.81

Max.Eff.Inten.(mm/hr)= 74.52 35.05
 over (min) 5.00 15.00
 Storage Coeff. (min)= 0.82 (ii) 10.73 (ii)
 Unit Hyd. Tpeak (min)= 5.00 15.00
 Unit Hyd. peak (cms)= 0.34 0.09

PEAK FLOW (cms)= 0.00 0.00 *TOTALS* 0.002 (iii)
 TIME TO PEAK (hrs)= 12.00 12.08 12.00
 RUNOFF VOLUME (mm)= 66.50 25.74 29.93
 TOTAL RAINFALL (mm)= 67.50 67.50 67.50
 RUNOFF COEFFICIENT = 0.99 0.38 0.44

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)	AREA (ha)	OPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0013):	2.33	0.042	12.50	52.38
+ ID2= 2 (0203):	0.02	0.002	12.00	29.93
ID = 3 (0052):	2.35	0.042	12.50	52.16

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ** SIMULATION: J. 25-year SCS **

MASS STORM Filename: C:\Users\cbuscher\AppData\Local\Temp\2b624af5-e1eb-44a2-a15e-c8c57a06a611\c8605f10
 Ptotal= 78.10 mm Comments: SCS Type II Distribution 24 Hour Storm (

Duration of storm = 24.00 hrs
 Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.86	6.00	1.56	12.00	11.25	18.00	1.41
0.25	0.86	6.25	1.56	12.25	11.25	18.25	1.41
0.50	0.86	6.50	1.56	12.50	5.78	18.50	1.41
0.75	0.86	6.75	1.56	12.75	5.78	18.75	1.41
1.00	0.86	7.00	1.56	13.00	1.09	19.00	1.41
1.25	0.86	7.25	1.56	13.25	1.09	19.25	1.41
1.50	0.86	7.50	1.56	13.50	6.40	19.50	1.41
1.75	0.86	7.75	1.56	13.75	6.40	19.75	1.41
2.00	1.02	8.00	2.11	14.00	2.34	20.00	0.94
2.25	1.02	8.25	2.11	14.25	2.34	20.25	0.94
2.50	1.02	8.50	2.11	14.50	2.34	20.50	0.94
2.75	1.02	8.75	2.11	14.75	2.34	20.75	0.94
3.00	1.02	9.00	2.50	15.00	2.34	21.00	0.94
3.25	1.02	9.25	2.50	15.25	2.34	21.25	0.94
3.50	1.02	9.50	2.81	15.50	2.34	21.50	0.94
3.75	1.02	9.75	2.81	15.75	2.34	21.75	0.94
4.00	1.25	10.00	3.59	16.00	1.41	22.00	0.94
4.25	1.25	10.25	3.59	16.25	1.41	22.25	0.94
4.50	1.25	10.50	4.84	16.50	1.41	22.50	0.94
4.75	1.25	10.75	4.84	16.75	1.41	22.75	0.94
5.00	1.25	11.00	7.50	17.00	1.41	23.00	0.94
5.25	1.25	11.25	7.50	17.25	1.41	23.25	0.94
5.50	1.25	11.50	32.49	17.50	1.41	23.50	0.94
5.75	1.25	11.75	86.22	17.75	1.41	23.75	0.94

CALIB NASHYD (0202) Area (ha)= 0.21 Curve Number (CN)= 74.0
 ID= 1 DT= 5.0 min Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
 U.H. Tp(hrs)= 0.18

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

---- TRANSFORMED HYETOGRAPH ----
 TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.86	6.083	1.56	12.083	11.25	18.083	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.167	1.41
0.250	0.86	6.250	1.56	12.250	11.25	18.250	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.333	1.41
0.417	0.86	6.417	1.56	12.417	11.25	18.417	1.41
0.500	0.86	6.500	1.56	12.500	11.25	18.500	1.41
0.583	0.86	6.583	1.56	12.583	5.78	18.583	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.667	1.41
0.750	0.86	6.750	1.56	12.750	5.78	18.750	1.41
0.833	0.86	6.833	1.56	12.833	5.78	18.833	1.41
0.917	0.86	6.917	1.56	12.917	5.78	18.917	1.41
1.000	0.86	7.000	1.56	13.000	5.78	19.000	1.41
1.083	0.86	7.083	1.56	13.083	1.09	19.083	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.167	1.41
1.250	0.86	7.250	1.56	13.250	1.09	19.250	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.333	1.41
1.417	0.86	7.417	1.56	13.417	1.09	19.417	1.41
1.500	0.86	7.500	1.56	13.500	1.09	19.500	1.41
1.583	0.86	7.583	1.56	13.583	6.40	19.583	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.667	1.41
1.750	0.86	7.750	1.56	13.750	6.40	19.750	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.833	1.41
1.917	0.86	7.917	1.56	13.917	6.40	19.917	1.41
2.000	0.86	8.000	1.56	14.000	6.40	20.000	1.41
2.083	1.02	8.083	2.11	14.083	2.34	20.083	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.167	0.94
2.250	1.02	8.250	2.11	14.250	2.34	20.250	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.333	0.94
2.417	1.02	8.417	2.11	14.417	2.34	20.417	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.500	0.94
2.583	1.02	8.583	2.11	14.583	2.34	20.583	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.667	0.94
2.750	1.02	8.750	2.11	14.750	2.34	20.750	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.833	0.94
2.917	1.02	8.917	2.11	14.917	2.34	20.917	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.000	0.94
3.083	1.02	9.083	2.50	15.083	2.34	21.083	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.167	0.94
3.250	1.02	9.250	2.50	15.250	2.34	21.250	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.333	0.94
3.417	1.02	9.417	2.50	15.417	2.34	21.417	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.500	0.94
3.583	1.02	9.583	2.81	15.583	2.34	21.583	0.94
3.667	1.02	9.667	2.81	15.667	2.34	21.667	0.94
3.750	1.02	9.750	2.81	15.750	2.34	21.750	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.833	0.94
3.917	1.02	9.917	2.81	15.917	2.34	21.917	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.000	0.94
4.083	1.25	10.083	3.59	16.083	1.41	22.083	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.167	0.94
4.250	1.25	10.250	3.59	16.250	1.41	22.250	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.333	0.94
4.417	1.25	10.417	3.59	16.417	1.41	22.417	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.500	0.94
4.583	1.25	10.583	4.84	16.583	1.41	22.583	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.667	0.94
4.750	1.25	10.750	4.84	16.750	1.41	22.750	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.833	0.94
4.917	1.25	10.917	4.84	16.917	1.41	22.917	0.94
5.000	1.25	11.000	4.84	17.000	1.41	23.000	0.94
5.083	1.25	11.083	7.50	17.083	1.41	23.083	0.94
5.167	1.25	11.167	7.50	17.167	1.41	23.167	0.94
5.250	1.25	11.250	7.50	17.250	1.41	23.250	0.94
5.333	1.25	11.333	7.50	17.333	1.41	23.333	0.94
5.417	1.25	11.417	7.50	17.417	1.41	23.417	0.94
5.500	1.25	11.500	7.50	17.500	1.41	23.500	0.94
5.583	1.25	11.583	32.49	17.583	1.41	23.583	0.94
5.667	1.25	11.667	32.49	17.667	1.41	23.667	0.94
5.750	1.25	11.750	32.49	17.750	1.41	23.750	0.94
5.833	1.25	11.833	86.22	17.833	1.41	23.833	0.94
5.917	1.25	11.917	86.22	17.917	1.41	23.917	0.94
6.000	1.25	12.000	86.22	18.000	1.41	24.000	0.94

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.018 (i)
 TIME TO PEAK (hrs)= 12.083
 RUNOFF VOLUME (mm)= 32.820
 TOTAL RAINFALL (mm)= 78.100
 RUNOFF COEFFICIENT = 0.420

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

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RESERVOIR( 0012)
IN= 2--> OUT= 1
DT= 5.0 min
OVERFLOW IS OFF

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OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0033	0.0000	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	0.210	0.018	12.08	32.82
OUTFLOW: ID= 1 (0012)	0.210	0.009	12.33	32.82

PEAK FLOW REDUCTION [Qout/Qin](%)= 52.16
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0013

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CALIB
STANDHYD ( 0201)
ID= 1 DT= 5.0 min
Area (ha)= 2.12
Total Imp(%)= 73.90
Dir. Conn.(%)= 73.90

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	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	1.56	0.55
Dep. Storage	2.00	5.00
Average Slope	1.00	2.00
Length	118.74	35.00
Mannings n	0.013	0.250

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

----- TRANSFORMED HYETOGRAPH -----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.86	6.083	1.56	12.083	11.25	18.08	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.17	1.41
0.250	0.86	6.250	1.56	12.250	11.25	18.25	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.33	1.41
0.417	0.86	6.417	1.56	12.417	11.25	18.42	1.41
0.500	0.86	6.500	1.56	12.500	11.25	18.50	1.41
0.583	0.86	6.583	1.56	12.583	5.78	18.58	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.67	1.41
0.750	0.86	6.750	1.56	12.750	5.78	18.75	1.41
0.833	0.86	6.833	1.56	12.833	5.78	18.83	1.41
0.917	0.86	6.917	1.56	12.917	5.78	18.92	1.41
1.000	0.86	7.000	1.56	13.000	5.78	19.00	1.41
1.083	0.86	7.083	1.56	13.083	1.09	19.08	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.17	1.41
1.250	0.86	7.250	1.56	13.250	1.09	19.25	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.33	1.41
1.417	0.86	7.417	1.56	13.417	1.09	19.42	1.41
1.500	0.86	7.500	1.56	13.500	1.09	19.50	1.41
1.583	0.86	7.583	1.56	13.583	6.40	19.58	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.67	1.41
1.750	0.86	7.750	1.56	13.750	6.40	19.75	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.83	1.41
1.917	0.86	7.917	1.56	13.917	6.40	19.92	1.41
2.000	0.86	8.000	1.56	14.000	6.40	20.00	1.41
2.083	1.02	8.083	2.11	14.083	2.34	20.08	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.17	0.94
2.250	1.02	8.250	2.11	14.250	2.34	20.25	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.33	0.94
2.417	1.02	8.417	2.11	14.417	2.34	20.42	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.50	0.94
2.583	1.02	8.583	2.11	14.583	2.34	20.58	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.67	0.94
2.750	1.02	8.750	2.11	14.750	2.34	20.75	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.83	0.94
2.917	1.02	8.917	2.11	14.917	2.34	20.92	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.00	0.94
3.083	1.02	9.083	2.50	15.083	2.34	21.08	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.17	0.94
3.250	1.02	9.250	2.50	15.250	2.34	21.25	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.33	0.94

3.417	1.02	9.417	2.50	15.417	2.34	21.42	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.50	0.94
3.583	1.02	9.583	2.81	15.583	2.34	21.58	0.94
3.667	1.02	9.667	2.81	15.667	2.34	21.67	0.94
3.750	1.02	9.750	2.81	15.750	2.34	21.75	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.83	0.94
3.917	1.02	9.917	2.81	15.917	2.34	21.92	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.00	0.94
4.083	1.25	10.083	3.59	16.083	1.41	22.08	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.17	0.94
4.250	1.25	10.250	3.59	16.250	1.41	22.25	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.33	0.94
4.417	1.25	10.417	3.59	16.417	1.41	22.42	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.50	0.94
4.583	1.25	10.583	4.84	16.583	1.41	22.58	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.67	0.94
4.750	1.25	10.750	4.84	16.750	1.41	22.75	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.83	0.94
4.917	1.25	10.917	4.84	16.917	1.41	22.92	0.94
5.000	1.25	11.000	4.84	17.000	1.41	23.00	0.94
5.083	1.25	11.083	7.50	17.083	1.41	23.08	0.94
5.167	1.25	11.167	7.50	17.167	1.41	23.17	0.94
5.250	1.25	11.250	7.50	17.250	1.41	23.25	0.94
5.333	1.25	11.333	7.50	17.333	1.41	23.33	0.94
5.417	1.25	11.417	7.50	17.417	1.41	23.42	0.94
5.500	1.25	11.500	7.50	17.500	1.41	23.50	0.94
5.583	1.25	11.583	32.49	17.583	1.41	23.58	0.94
5.667	1.25	11.667	32.49	17.667	1.41	23.67	0.94
5.750	1.25	11.750	32.49	17.750	1.41	23.75	0.94
5.833	1.25	11.833	86.22	17.833	1.41	23.83	0.94
5.917	1.25	11.917	86.22	17.917	1.41	23.92	0.94
6.000	1.25	12.000	86.22	18.000	1.41	24.00	0.94

Max. Eff. Inten. (mm/hr)=	86.22	44.72
over (min)	5.00	10.00
Storage Coeff. (min)=	3.01 (ii)	7.56 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.28	0.13

TOTALS

PEAK FLOW (cms)=	0.37	0.05	0.427 (iii)
TIME TO PEAK (hrs)=	12.00	12.00	12.00
RUNOFF VOLUME (mm)=	76.10	32.92	64.83
TOTAL RAINFALL (mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT =	0.97	0.42	0.83

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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RESERVOIR( 0011)
IN= 2--> OUT= 1
DT= 5.0 min
OVERFLOW IS OFF

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OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	2.115	0.427	12.00	64.83
OUTFLOW: ID= 1 (0011)	2.115	0.051	12.50	64.74

PEAK FLOW REDUCTION [Qout/Qin](%)= 11.94
 TIME SHIFT OF PEAK FLOW (min)= 30.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0833

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ADD HYD ( 0013)
1 + 2 = 3
ID1= 1 ( 0011):
AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)
2.12 0.051 12.50 64.74

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+ ID2= 2 (0012): 0.21 0.009 12.33 32.82
 ID = 3 (0013): 2.33 0.060 12.50 61.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
 STANDHYD (0203) Area (ha)= 0.02
 ID= 1 DT= 5.0 min Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

IMPERVIOUS PERVIOUS (i)
 Surface Area (ha)= 0.01 0.02
 Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 12.38 35.00
 Mannings n = 0.013 0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.86	6.083	1.56	12.083	11.25	18.08	1.41
0.167	0.86	6.167	1.56	12.167	11.25	18.17	1.41
0.250	0.86	6.250	1.56	12.250	11.25	18.25	1.41
0.333	0.86	6.333	1.56	12.333	11.25	18.33	1.41
0.417	0.86	6.417	1.56	12.417	11.25	18.42	1.41
0.500	0.86	6.500	1.56	12.500	11.25	18.50	1.41
0.583	0.86	6.583	1.56	12.583	5.78	18.58	1.41
0.667	0.86	6.667	1.56	12.667	5.78	18.67	1.41
0.750	0.86	6.750	1.56	12.750	5.78	18.75	1.41
0.833	0.86	6.833	1.56	12.833	5.78	18.83	1.41
0.917	0.86	6.917	1.56	12.917	5.78	18.92	1.41
1.000	0.86	7.000	1.56	13.000	5.78	19.00	1.41
1.083	0.86	7.083	1.56	13.083	1.09	19.08	1.41
1.167	0.86	7.167	1.56	13.167	1.09	19.17	1.41
1.250	0.86	7.250	1.56	13.250	1.09	19.25	1.41
1.333	0.86	7.333	1.56	13.333	1.09	19.33	1.41
1.417	0.86	7.417	1.56	13.417	1.09	19.42	1.41
1.500	0.86	7.500	1.56	13.500	1.09	19.50	1.41
1.583	0.86	7.583	1.56	13.583	6.40	19.58	1.41
1.667	0.86	7.667	1.56	13.667	6.40	19.67	1.41
1.750	0.86	7.750	1.56	13.750	6.40	19.75	1.41
1.833	0.86	7.833	1.56	13.833	6.40	19.83	1.41
1.917	0.86	7.917	1.56	13.917	6.40	19.92	1.41
2.000	0.86	8.000	1.56	14.000	6.40	20.00	1.41
2.083	1.02	8.083	2.11	14.083	2.34	20.08	0.94
2.167	1.02	8.167	2.11	14.167	2.34	20.17	0.94
2.250	1.02	8.250	2.11	14.250	2.34	20.25	0.94
2.333	1.02	8.333	2.11	14.333	2.34	20.33	0.94
2.417	1.02	8.417	2.11	14.417	2.34	20.42	0.94
2.500	1.02	8.500	2.11	14.500	2.34	20.50	0.94
2.583	1.02	8.583	2.11	14.583	2.34	20.58	0.94
2.667	1.02	8.667	2.11	14.667	2.34	20.67	0.94
2.750	1.02	8.750	2.11	14.750	2.34	20.75	0.94
2.833	1.02	8.833	2.11	14.833	2.34	20.83	0.94
2.917	1.02	8.917	2.11	14.917	2.34	20.92	0.94
3.000	1.02	9.000	2.11	15.000	2.34	21.00	0.94
3.083	1.02	9.083	2.50	15.083	2.34	21.08	0.94
3.167	1.02	9.167	2.50	15.167	2.34	21.17	0.94
3.250	1.02	9.250	2.50	15.250	2.34	21.25	0.94
3.333	1.02	9.333	2.50	15.333	2.34	21.33	0.94
3.417	1.02	9.417	2.50	15.417	2.34	21.42	0.94
3.500	1.02	9.500	2.50	15.500	2.34	21.50	0.94
3.583	1.02	9.583	2.81	15.583	2.34	21.58	0.94
3.667	1.02	9.667	2.81	15.667	2.34	21.67	0.94
3.750	1.02	9.750	2.81	15.750	2.34	21.75	0.94
3.833	1.02	9.833	2.81	15.833	2.34	21.83	0.94
3.917	1.02	9.917	2.81	15.917	2.34	21.92	0.94
4.000	1.02	10.000	2.81	16.000	2.34	22.00	0.94
4.083	1.25	10.083	3.59	16.083	1.41	22.08	0.94
4.167	1.25	10.167	3.59	16.167	1.41	22.17	0.94
4.250	1.25	10.250	3.59	16.250	1.41	22.25	0.94
4.333	1.25	10.333	3.59	16.333	1.41	22.33	0.94
4.417	1.25	10.417	3.59	16.417	1.41	22.42	0.94
4.500	1.25	10.500	3.59	16.500	1.41	22.50	0.94
4.583	1.25	10.583	4.84	16.583	1.41	22.58	0.94
4.667	1.25	10.667	4.84	16.667	1.41	22.67	0.94
4.750	1.25	10.750	4.84	16.750	1.41	22.75	0.94
4.833	1.25	10.833	4.84	16.833	1.41	22.83	0.94
4.917	1.25	10.917	4.84	16.917	1.41	22.92	0.94
5.000	1.25	11.000	4.84	17.000	1.41	23.00	0.94

5.083	1.25	11.083	7.50	17.083	1.41	23.08	0.94
5.167	1.25	11.167	7.50	17.167	1.41	23.17	0.94
5.250	1.25	11.250	7.50	17.250	1.41	23.25	0.94
5.333	1.25	11.333	7.50	17.333	1.41	23.33	0.94
5.417	1.25	11.417	7.50	17.417	1.41	23.42	0.94
5.500	1.25	11.500	7.50	17.500	1.41	23.50	0.94
5.583	1.25	11.583	32.49	17.583	1.41	23.58	0.94
5.667	1.25	11.667	32.49	17.667	1.41	23.67	0.94
5.750	1.25	11.750	32.49	17.750	1.41	23.75	0.94
5.833	1.25	11.833	86.22	17.833	1.41	23.83	0.94
5.917	1.25	11.917	86.22	17.917	1.41	23.92	0.94
6.000	1.25	12.000	86.22	18.000	1.41	24.00	0.94

Max. Eff. Inten. (mm/hr)= 86.22 44.72
 over (min) = 5.00 10.00
 Storage Coeff. (min)= 0.77 (ii) 9.76 (ii)
 Unit Hyd. Tpeak (min)= 5.00 10.00
 Unit Hyd. peak (cms)= 0.34 0.11

PEAK FLOW (cms)= 0.00 0.00 *TOTALS*
 TIME TO PEAK (hrs)= 12.00 12.00 0.003 (iii)
 RUNOFF VOLUME (mm)= 77.10 32.92 39.17
 TOTAL RAINFALL (mm)= 78.10 78.10 78.10
 RUNOFF COEFFICIENT = 0.99 0.42 0.50

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)
 1 + 2 = 3
 ID1= 1 (0013): 2.33 0.060 12.50 61.86
 + ID2= 2 (0203): 0.02 0.003 12.00 39.17
 ID = 3 (0052): 2.35 0.060 12.50 61.63

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

 ** SIMULATION:K. 50-Year SCS **

MASS STORM
 Ptotal= 85.40 mm
 Filename: C:\Users\cbuscher\AppData\Local\Temp\2b624af5-e1eb-44a2-a15e-c8c57a06a611\658f72a9
 Comments: SCS Type II Distribution 24 Hour Storm (Duration of storm = 24.00 hrs
 Mass curve time step = 15.00 min)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.94	6.00	1.71	12.00	12.30	18.00	1.54
0.25	0.94	6.25	1.71	12.25	12.30	18.25	1.54
0.50	0.94	6.50	1.71	12.50	6.32	18.50	1.54
0.75	0.94	6.75	1.71	12.75	6.32	18.75	1.54
1.00	0.94	7.00	1.71	13.00	1.20	19.00	1.54
1.25	0.94	7.25	1.71	13.25	1.20	19.25	1.54
1.50	0.94	7.50	1.71	13.50	7.00	19.50	1.54
1.75	0.94	7.75	1.71	13.75	7.00	19.75	1.54
2.00	1.11	8.00	2.31	14.00	2.56	20.00	1.02
2.25	1.11	8.25	2.31	14.25	2.56	20.25	1.02
2.50	1.11	8.50	2.31	14.50	2.56	20.50	1.02
2.75	1.11	8.75	2.31	14.75	2.56	20.75	1.02
3.00	1.11	9.00	2.73	15.00	2.56	21.00	1.02
3.25	1.11	9.25	2.73	15.25	2.56	21.25	1.02
3.50	1.11	9.50	3.07	15.50	2.56	21.50	1.02
3.75	1.11	9.75	3.07	15.75	2.56	21.75	1.02
4.00	1.37	10.00	3.93	16.00	1.54	22.00	1.02
4.25	1.37	10.25	3.93	16.25	1.54	22.25	1.02
4.50	1.37	10.50	5.29	16.50	1.54	22.50	1.02
4.75	1.37	10.75	5.29	16.75	1.54	22.75	1.02
5.00	1.37	11.00	8.20	17.00	1.54	23.00	1.02
5.25	1.37	11.25	8.20	17.25	1.54	23.25	1.02
5.50	1.37	11.50	35.53	17.50	1.54	23.50	1.02
5.75	1.37	11.75	94.28	17.75	1.54	23.75	1.02

CALIB
 NASHYD (0202) Area (ha)= 0.21 Curve Number (CN)= 74.0
 ID= 1 DT= 5.0 min Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
 U.H. Tp(hrs)= 0.18

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.94	6.083	1.71	12.083	12.31	18.08	1.54
0.167	0.94	6.167	1.71	12.167	12.30	18.17	1.54
0.250	0.94	6.250	1.71	12.250	12.30	18.25	1.54
0.333	0.94	6.333	1.71	12.333	12.30	18.33	1.54
0.417	0.94	6.417	1.71	12.417	12.30	18.42	1.54
0.500	0.94	6.500	1.71	12.500	12.30	18.50	1.54
0.583	0.94	6.583	1.71	12.583	6.32	18.58	1.54
0.667	0.94	6.667	1.71	12.667	6.32	18.67	1.54
0.750	0.94	6.750	1.71	12.750	6.32	18.75	1.54
0.833	0.94	6.833	1.71	12.833	6.32	18.83	1.54
0.917	0.94	6.917	1.71	12.917	6.32	18.92	1.54
1.000	0.94	7.000	1.71	13.000	6.32	19.00	1.54
1.083	0.94	7.083	1.71	13.083	1.20	19.08	1.54
1.167	0.94	7.167	1.71	13.167	1.20	19.17	1.54
1.250	0.94	7.250	1.71	13.250	1.20	19.25	1.54
1.333	0.94	7.333	1.71	13.333	1.20	19.33	1.54
1.417	0.94	7.417	1.71	13.417	1.20	19.42	1.54
1.500	0.94	7.500	1.71	13.500	1.20	19.50	1.54
1.583	0.94	7.583	1.71	13.583	7.00	19.58	1.54
1.667	0.94	7.667	1.71	13.667	7.00	19.67	1.54
1.750	0.94	7.750	1.71	13.750	7.00	19.75	1.54
1.833	0.94	7.833	1.71	13.833	7.00	19.83	1.54
1.917	0.94	7.917	1.71	13.917	7.00	19.92	1.54
2.000	0.94	8.000	1.71	14.000	7.00	20.00	1.54
2.083	1.11	8.083	2.31	14.083	2.56	20.08	1.02
2.167	1.11	8.167	2.31	14.167	2.56	20.17	1.02
2.250	1.11	8.250	2.31	14.250	2.56	20.25	1.02
2.333	1.11	8.333	2.31	14.333	2.56	20.33	1.02
2.417	1.11	8.417	2.31	14.417	2.56	20.42	1.02
2.500	1.11	8.500	2.31	14.500	2.56	20.50	1.02
2.583	1.11	8.583	2.31	14.583	2.56	20.58	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.750	1.11	8.750	2.31	14.750	2.56	20.75	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.917	1.11	8.917	2.31	14.917	2.56	20.92	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.083	1.11	9.083	2.73	15.083	2.56	21.08	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.250	1.11	9.250	2.73	15.250	2.56	21.25	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.417	1.11	9.417	2.73	15.417	2.56	21.42	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.583	1.11	9.583	3.07	15.583	2.56	21.58	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.750	1.11	9.750	3.07	15.750	2.56	21.75	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.917	1.11	9.917	3.07	15.917	2.56	21.92	1.02
4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.083	1.37	10.083	3.93	16.083	1.54	22.08	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.250	1.37	10.250	3.93	16.250	1.54	22.25	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.417	1.37	10.417	3.93	16.417	1.54	22.42	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.583	1.37	10.583	5.29	16.583	1.54	22.58	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.750	1.37	10.750	5.29	16.750	1.54	22.75	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.917	1.37	10.917	5.29	16.917	1.54	22.92	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.083	1.37	11.083	8.20	17.083	1.54	23.08	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.250	1.37	11.250	8.20	17.250	1.54	23.25	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.417	1.37	11.417	8.20	17.417	1.54	23.42	1.02
5.500	1.37	11.500	8.20	17.500	1.54	23.50	1.02
5.583	1.37	11.583	35.52	17.583	1.54	23.58	1.02
5.667	1.37	11.667	35.52	17.667	1.54	23.67	1.02
5.750	1.37	11.750	35.52	17.750	1.54	23.75	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02

5.917 1.37 | 11.917 94.28 | 17.917 1.54 | 23.92 1.02
 6.000 1.37 | 12.000 94.28 | 18.000 1.54 | 24.00 1.02

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.020 (i)
 TIME TO PEAK (hrs)= 12.083
 RUNOFF VOLUME (mm)= 37.994
 TOTAL RAINFALL (mm)= 85.400
 RUNOFF COEFFICIENT = 0.445

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

RESERVOIR(0012) OVERFLOW IS OFF				
IN= 2---> OUT= 1				
DT= 5.0 min				
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0116	0.0019
	0.0031	0.0001	0.0123	0.0020
	0.0050	0.0002	0.0129	0.0020
	0.0064	0.0005	0.0135	0.0021
	0.0075	0.0007	0.0141	0.0022
	0.0085	0.0010	0.0146	0.0023
	0.0094	0.0013	0.0151	0.0024
	0.0102	0.0016	0.0157	0.0024
	0.0109	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	0.210	0.020	12.08	37.99
OUTFLOW : ID= 1 (0012)	0.210	0.010	12.33	37.99

	PEAK FLOW REDUCTION [Qout/Qin] (%)	TIME SHIFT OF PEAK FLOW (min)	MAXIMUM STORAGE USED (ha.m.)
	49.18	15.00	0.0016

CALIB
 STANDHYD (0201) Area (ha)= 2.12
 ID= 1 DT= 5.0 min Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90

Surface Area (ha)= 1.56 IMPERVIOUS PERVIOUS (i)
 Dep. Storage (mm)= 2.00 0.55
 Average Slope (%)= 1.00 5.00
 Length (m)= 118.74 35.00
 Mannings n = 0.013 0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.94	6.083	1.71	12.083	12.31	18.08	1.54
0.167	0.94	6.167	1.71	12.167	12.30	18.17	1.54
0.250	0.94	6.250	1.71	12.250	12.30	18.25	1.54
0.333	0.94	6.333	1.71	12.333	12.30	18.33	1.54
0.417	0.94	6.417	1.71	12.417	12.30	18.42	1.54
0.500	0.94	6.500	1.71	12.500	12.30	18.50	1.54
0.583	0.94	6.583	1.71	12.583	6.32	18.58	1.54
0.667	0.94	6.667	1.71	12.667	6.32	18.67	1.54
0.750	0.94	6.750	1.71	12.750	6.32	18.75	1.54
0.833	0.94	6.833	1.71	12.833	6.32	18.83	1.54
0.917	0.94	6.917	1.71	12.917	6.32	18.92	1.54
1.000	0.94	7.000	1.71	13.000	6.32	19.00	1.54
1.083	0.94	7.083	1.71	13.083	1.20	19.08	1.54
1.167	0.94	7.167	1.71	13.167	1.20	19.17	1.54
1.250	0.94	7.250	1.71	13.250	1.20	19.25	1.54
1.333	0.94	7.333	1.71	13.333	1.20	19.33	1.54
1.417	0.94	7.417	1.71	13.417	1.20	19.42	1.54
1.500	0.94	7.500	1.71	13.500	1.20	19.50	1.54
1.583	0.94	7.583	1.71	13.583	7.00	19.58	1.54
1.667	0.94	7.667	1.71	13.667	7.00	19.67	1.54
1.750	0.94	7.750	1.71	13.750	7.00	19.75	1.54
1.833	0.94	7.833	1.71	13.833	7.00	19.83	1.54
1.917	0.94	7.917	1.71	13.917	7.00	19.92	1.54
2.000	0.94	8.000	1.71	14.000	7.00	20.00	1.54
2.083	1.11	8.083	2.31	14.083	2.56	20.08	1.02
2.167	1.11	8.167	2.31	14.167	2.56	20.17	1.02
2.250	1.11	8.250	2.31	14.250	2.56	20.25	1.02

2.333	1.11	8.333	2.31	14.333	2.56	20.33	1.02
2.417	1.11	8.417	2.31	14.417	2.56	20.42	1.02
2.500	1.11	8.500	2.31	14.500	2.56	20.50	1.02
2.583	1.11	8.583	2.31	14.583	2.56	20.58	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.750	1.11	8.750	2.31	14.750	2.56	20.75	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.917	1.11	8.917	2.31	14.917	2.56	20.92	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.083	1.11	9.083	2.73	15.083	2.56	21.08	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.250	1.11	9.250	2.73	15.250	2.56	21.25	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.417	1.11	9.417	2.73	15.417	2.56	21.42	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.583	1.11	9.583	3.07	15.583	2.56	21.58	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.750	1.11	9.750	3.07	15.750	2.56	21.75	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.917	1.11	9.917	3.07	15.917	2.56	21.92	1.02
4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.083	1.37	10.083	3.93	16.083	1.54	22.08	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.250	1.37	10.250	3.93	16.250	1.54	22.25	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.417	1.37	10.417	3.93	16.417	1.54	22.42	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.583	1.37	10.583	5.29	16.583	1.54	22.58	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.750	1.37	10.750	5.29	16.750	1.54	22.75	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.917	1.37	10.917	5.29	16.917	1.54	22.92	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.083	1.37	11.083	8.20	17.083	1.54	23.08	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.250	1.37	11.250	8.20	17.250	1.54	23.25	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.417	1.37	11.417	8.20	17.417	1.54	23.42	1.02
5.500	1.37	11.500	8.20	17.500	1.54	23.50	1.02
5.583	1.37	11.583	35.53	17.583	1.54	23.58	1.02
5.667	1.37	11.667	35.53	17.667	1.54	23.67	1.02
5.750	1.37	11.750	35.53	17.750	1.54	23.75	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02
5.917	1.37	11.917	94.28	17.917	1.54	23.92	1.02
6.000	1.37	12.000	94.28	18.000	1.54	24.00	1.02

Max.Eff.Inten.(mm/hr)= 94.28
over (min) = 5.00
Storage Coeff. (min)= 2.90 (ii) 7.30 (ii)
Unit Hyd. Tpeak (min)= 5.00
Unit Hyd. peak (cms)= 0.28 0.14

TOTALS

PEAK FLOW (cms)= 0.41 0.06 0.471 (iii)
TIME TO PEAK (hrs)= 12.00 12.00 12.00
RUNOFF VOLUME (mm)= 83.40 38.10 71.58
TOTAL RAINFALL (mm)= 85.40 85.40 85.40
RUNOFF COEFFICIENT = 0.98 0.45 0.84

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011) OVERFLOW IS OFF				
IN= 2--> OUT= 1				
DT= 5.0 min				
OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
0.0000	0.0000	0.0199	0.0650	
0.0004	0.0003	0.0382	0.0747	
0.0008	0.0053	0.0512	0.0833	
0.0011	0.0108	0.0586	0.0906	
0.0012	0.0192	0.0661	0.0952	
0.0014	0.0299	0.0718	0.0989	
0.0015	0.0417	0.0747	0.0992	
0.0016	0.0537	0.0000	0.0000	
AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	
2.115	0.471	12.00	71.58	

OUTFLOW: ID= 1 (0011) 2.115 0.059 12.50 71.49

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.53
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.0910

ADD HYD (0013)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0011):	2.12	0.059	12.50	71.49
+ ID2= 2 (0012):	0.21	0.010	12.33	37.99
ID = 3 (0013):	2.33	0.069	12.50	68.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203)	Area (ha)	IMP (Imp%)	PERVIOUS (i)
ID= 1 DT= 5.0 min	0.02	31.10	31.10
Surface Area (ha)=	0.01		0.02
Dep. Storage (mm)=	1.00		5.00
Average Slope (%)=	1.00		2.00
Length (m)=	12.38		35.00
Mannings n =	0.013		0.250

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

--- TRANSFORMED HYETOGRAPH ---							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.94	6.083	1.71	12.083	12.31	18.08	1.54
0.167	0.94	6.167	1.71	12.167	12.30	18.17	1.54
0.250	0.94	6.250	1.71	12.250	12.30	18.25	1.54
0.333	0.94	6.333	1.71	12.333	12.30	18.33	1.54
0.417	0.94	6.417	1.71	12.417	12.30	18.42	1.54
0.500	0.94	6.500	1.71	12.500	12.30	18.50	1.54
0.583	0.94	6.583	1.71	12.583	6.32	18.58	1.54
0.667	0.94	6.667	1.71	12.667	6.32	18.67	1.54
0.750	0.94	6.750	1.71	12.750	6.32	18.75	1.54
0.833	0.94	6.833	1.71	12.833	6.32	18.83	1.54
0.917	0.94	6.917	1.71	12.917	6.32	18.92	1.54
1.000	0.94	7.000	1.71	13.000	6.32	19.00	1.54
1.083	0.94	7.083	1.71	13.083	1.20	19.08	1.54
1.167	0.94	7.167	1.71	13.167	1.20	19.17	1.54
1.250	0.94	7.250	1.71	13.250	1.20	19.25	1.54
1.333	0.94	7.333	1.71	13.333	1.20	19.33	1.54
1.417	0.94	7.417	1.71	13.417	1.20	19.42	1.54
1.500	0.94	7.500	1.71	13.500	1.20	19.50	1.54
1.583	0.94	7.583	1.71	13.583	7.00	19.58	1.54
1.667	0.94	7.667	1.71	13.667	7.00	19.67	1.54
1.750	0.94	7.750	1.71	13.750	7.00	19.75	1.54
1.833	0.94	7.833	1.71	13.833	7.00	19.83	1.54
1.917	0.94	7.917	1.71	13.917	7.00	19.92	1.54
2.000	0.94	8.000	1.71	14.000	7.00	20.00	1.54
2.083	1.11	8.083	2.31	14.083	2.56	20.08	1.02
2.167	1.11	8.167	2.31	14.167	2.56	20.17	1.02
2.250	1.11	8.250	2.31	14.250	2.56	20.25	1.02
2.333	1.11	8.333	2.31	14.333	2.56	20.33	1.02
2.417	1.11	8.417	2.31	14.417	2.56	20.42	1.02
2.500	1.11	8.500	2.31	14.500	2.56	20.50	1.02
2.583	1.11	8.583	2.31	14.583	2.56	20.58	1.02
2.667	1.11	8.667	2.31	14.667	2.56	20.67	1.02
2.750	1.11	8.750	2.31	14.750	2.56	20.75	1.02
2.833	1.11	8.833	2.31	14.833	2.56	20.83	1.02
2.917	1.11	8.917	2.31	14.917	2.56	20.92	1.02
3.000	1.11	9.000	2.31	15.000	2.56	21.00	1.02
3.083	1.11	9.083	2.73	15.083	2.56	21.08	1.02
3.167	1.11	9.167	2.73	15.167	2.56	21.17	1.02
3.250	1.11	9.250	2.73	15.250	2.56	21.25	1.02
3.333	1.11	9.333	2.73	15.333	2.56	21.33	1.02
3.417	1.11	9.417	2.73	15.417	2.56	21.42	1.02
3.500	1.11	9.500	2.73	15.500	2.56	21.50	1.02
3.583	1.11	9.583	3.07	15.583	2.56	21.58	1.02
3.667	1.11	9.667	3.07	15.667	2.56	21.67	1.02
3.750	1.11	9.750	3.07	15.750	2.56	21.75	1.02
3.833	1.11	9.833	3.07	15.833	2.56	21.83	1.02
3.917	1.11	9.917	3.07	15.917	2.56	21.92	1.02

4.000	1.11	10.000	3.07	16.000	2.56	22.00	1.02
4.083	1.37	10.083	3.93	16.083	1.54	22.08	1.02
4.167	1.37	10.167	3.93	16.167	1.54	22.17	1.02
4.250	1.37	10.250	3.93	16.250	1.54	22.25	1.02
4.333	1.37	10.333	3.93	16.333	1.54	22.33	1.02
4.417	1.37	10.417	3.93	16.417	1.54	22.42	1.02
4.500	1.37	10.500	3.93	16.500	1.54	22.50	1.02
4.583	1.37	10.583	5.29	16.583	1.54	22.58	1.02
4.667	1.37	10.667	5.29	16.667	1.54	22.67	1.02
4.750	1.37	10.750	5.29	16.750	1.54	22.75	1.02
4.833	1.37	10.833	5.29	16.833	1.54	22.83	1.02
4.917	1.37	10.917	5.29	16.917	1.54	22.92	1.02
5.000	1.37	11.000	5.29	17.000	1.54	23.00	1.02
5.083	1.37	11.083	8.20	17.083	1.54	23.08	1.02
5.167	1.37	11.167	8.20	17.167	1.54	23.17	1.02
5.250	1.37	11.250	8.20	17.250	1.54	23.25	1.02
5.333	1.37	11.333	8.20	17.333	1.54	23.33	1.02
5.417	1.37	11.417	8.20	17.417	1.54	23.42	1.02
5.500	1.37	11.500	8.20	17.500	1.54	23.50	1.02
5.583	1.37	11.583	35.52	17.583	1.54	23.58	1.02
5.667	1.37	11.667	35.53	17.667	1.54	23.67	1.02
5.750	1.37	11.750	35.53	17.750	1.54	23.75	1.02
5.833	1.37	11.833	94.28	17.833	1.54	23.83	1.02
5.917	1.37	11.917	94.28	17.917	1.54	23.92	1.02
6.000	1.37	12.000	94.28	18.000	1.54	24.00	1.02

Max.Eff.Inten.(mm/hr)= 94.28
over (min) = 5.00
Storage Coeff. (min) = 0.75 (ii) 9.23 (ii)
Unit Hyd. Tpeak (min) = 5.00
Unit Hyd. peak (cms) = 0.34

PEAK FLOW (cms) = 0.00
TIME TO PEAK (hrs) = 12.00
RUNOFF VOLUME (mm) = 84.40
TOTAL RAINFALL (mm) = 85.40
RUNOFF COEFFICIENT = 0.99

TOTALS
0.004 (iii)
12.00
44.27
85.40
0.52

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)				
1 + 2 = 3				
ID1= 1 (0013):	2.33	0.069	12.50	68.46
+ ID2= 2 (0203):	0.02	0.004	12.00	44.27
===== ID = 3 (0052):	2.35	0.069	12.50	68.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

***** SIMULATION: L_100-year SCS **

MASS STORM | Filename: C:\Users\cbuscher\AppData\Local\Temp\
| | 2b624af5-e1eb-44a2-a15e-c8c57a06a611\d0271e79
| | Comments: SCS Type II Distribution 24 Hour Storm ()
Ptotal= 92.90 mm |
Duration of storm = 24.00 hrs
Mass curve time step = 15.00 min

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.02	6.00	1.86	12.00	13.38	18.00	1.67
0.25	1.02	6.25	1.86	12.25	13.38	18.25	1.67
0.50	1.02	6.50	1.86	12.50	6.87	18.50	1.67
0.75	1.02	6.75	1.86	12.75	6.87	18.75	1.67
1.00	1.02	7.00	1.86	13.00	1.30	19.00	1.67
1.25	1.02	7.25	1.86	13.25	1.30	19.25	1.67
1.50	1.02	7.50	1.86	13.50	7.62	19.50	1.67
1.75	1.02	7.75	1.86	13.75	7.62	19.75	1.67
2.00	1.21	8.00	2.51	14.00	2.79	20.00	1.11
2.25	1.21	8.25	2.51	14.25	2.79	20.25	1.11
2.50	1.21	8.50	2.51	14.50	2.79	20.50	1.11

2.75	1.21	8.75	2.51	14.75	2.79	20.75	1.11
3.00	1.21	9.00	2.97	15.00	2.79	21.00	1.11
3.25	1.21	9.25	2.97	15.25	2.79	21.25	1.11
3.50	1.21	9.50	3.34	15.50	2.79	21.50	1.11
3.75	1.21	9.75	3.34	15.75	2.79	21.75	1.11
4.00	1.49	10.00	4.27	16.00	1.67	22.00	1.11
4.25	1.49	10.25	4.27	16.25	1.67	22.25	1.11
4.50	1.49	10.50	5.76	16.50	1.67	22.50	1.11
4.75	1.49	10.75	5.76	16.75	1.67	22.75	1.11
5.00	1.49	11.00	8.92	17.00	1.67	23.00	1.11
5.25	1.49	11.25	8.92	17.25	1.67	23.25	1.11
5.50	1.49	11.50	38.65	17.50	1.67	23.50	1.11
5.75	1.49	11.75	102.56	17.75	1.67	23.75	1.11

CALIB NASHYD (0202) | Area (ha)= 0.21 Curve Number (CN)= 74.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.02	6.083	1.86	12.083	13.38	18.08	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.250	1.02	6.250	1.86	12.250	13.38	18.25	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.417	1.02	6.417	1.86	12.417	13.38	18.42	1.67
0.500	1.02	6.500	1.86	12.500	13.38	18.50	1.67
0.583	1.02	6.583	1.86	12.583	6.88	18.58	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67
0.750	1.02	6.750	1.86	12.750	6.87	18.75	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.917	1.02	6.917	1.86	12.917	6.87	18.92	1.67
1.000	1.02	7.000	1.86	13.000	6.87	19.00	1.67
1.083	1.02	7.083	1.86	13.083	1.30	19.08	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67
1.250	1.02	7.250	1.86	13.250	1.30	19.25	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.417	1.02	7.417	1.86	13.417	1.30	19.42	1.67
1.500	1.02	7.500	1.86	13.500	1.30	19.50	1.67
1.583	1.02	7.583	1.86	13.583	7.62	19.58	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.750	1.02	7.750	1.86	13.750	7.62	19.75	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.917	1.02	7.917	1.86	13.917	7.62	19.92	1.67
2.000	1.02	8.000	1.86	14.000	7.62	20.00	1.67
2.083	1.21	8.083	2.51	14.083	2.79	20.08	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.250	1.21	8.250	2.51	14.250	2.79	20.25	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.417	1.21	8.417	2.51	14.417	2.79	20.42	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.583	1.21	8.583	2.51	14.583	2.79	20.58	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.750	1.21	8.750	2.51	14.750	2.79	20.75	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11
2.917	1.21	8.917	2.51	14.917	2.79	20.92	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.083	1.21	9.083	2.97	15.083	2.79	21.08	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.250	1.21	9.250	2.97	15.250	2.79	21.25	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.417	1.21	9.417	2.97	15.417	2.79	21.42	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.583	1.21	9.583	3.34	15.583	2.79	21.58	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.750	1.21	9.750	3.34	15.750	2.79	21.75	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.917	1.21	9.917	3.34	15.917	2.79	21.92	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.083	1.49	10.083	4.27	16.083	1.67	22.08	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.250	1.49	10.250	4.27	16.250	1.67	22.25	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.417	1.49	10.417	4.27	16.417	1.67	22.42	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.583	1.49	10.583	5.76	16.583	1.67	22.58	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.750	1.49	10.750	5.76	16.750	1.67	22.75	1.11

4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.917	1.49	10.917	5.76	16.917	1.67	22.92	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.083	1.49	11.083	8.92	17.083	1.67	23.08	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.250	1.49	11.250	8.92	17.250	1.67	23.25	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.417	1.49	11.417	8.92	17.417	1.67	23.42	1.11
5.500	1.49	11.500	8.92	17.500	1.67	23.50	1.11
5.583	1.49	11.583	38.64	17.583	1.67	23.58	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.750	1.49	11.750	38.65	17.750	1.67	23.75	1.11
5.833	1.49	11.833	102.55	17.833	1.67	23.83	1.11
5.917	1.49	11.917	102.56	17.917	1.67	23.92	1.11
6.000	1.49	12.000	102.56	18.000	1.67	24.00	1.11

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.023 (i)
 TIME TO PEAK (hrs)= 12.083
 RUNOFF VOLUME (mm)= 43.490
 TOTAL RAINFALL (mm)= 92.900
 RUNOFF COEFFICIENT = 0.468

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

RESERVOIR(0012)
 IN= 2--> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	0.210	0.023	12.08	43.49
OUTFLOW: ID= 1 (0012)	0.210	0.011	12.33	43.49

PEAK FLOW REDUCTION [Qout/Qin](%)= 48.52
 TIME SHIFT OF PEAK FLOW (min)= 15.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0019

CALIB
 STANDHYD (0201)
 ID= 1 DT= 5.0 min

	Area (ha)	Imp(%)	Dir. Conn.(%)
Total	2.12	73.90	73.90

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	1.56	0.55
Dep. Storage	2.00	5.00
Average Slope	1.00	2.00
Length	118.74	35.00
Mannings n	0.013	0.250

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

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.02	6.083	1.86	12.083	13.39	18.08	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.250	1.02	6.250	1.86	12.250	13.38	18.25	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.417	1.02	6.417	1.86	12.417	13.38	18.42	1.67
0.500	1.02	6.500	1.86	12.500	13.38	18.50	1.67
0.583	1.02	6.583	1.86	12.583	6.88	18.58	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67
0.750	1.02	6.750	1.86	12.750	6.87	18.75	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.917	1.02	6.917	1.86	12.917	6.87	18.92	1.67
1.000	1.02	7.000	1.86	13.000	6.87	19.00	1.67
1.083	1.02	7.083	1.86	13.083	1.30	19.08	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67

1.250	1.02	7.250	1.86	13.250	1.30	19.25	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.417	1.02	7.417	1.86	13.417	1.30	19.42	1.67
1.500	1.02	7.500	1.86	13.500	1.30	19.50	1.67
1.583	1.02	7.583	1.86	13.583	7.62	19.58	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.750	1.02	7.750	1.86	13.750	7.62	19.75	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.917	1.02	7.917	1.86	13.917	7.62	19.92	1.67
2.000	1.02	8.000	1.86	14.000	7.62	20.00	1.67
2.083	1.21	8.083	2.51	14.083	2.79	20.08	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.250	1.21	8.250	2.51	14.250	2.79	20.25	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.417	1.21	8.417	2.51	14.417	2.79	20.42	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.583	1.21	8.583	2.51	14.583	2.79	20.58	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.750	1.21	8.750	2.51	14.750	2.79	20.75	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11
2.917	1.21	8.917	2.51	14.917	2.79	20.92	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.083	1.21	9.083	2.97	15.083	2.79	21.08	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.250	1.21	9.250	2.97	15.250	2.79	21.25	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.417	1.21	9.417	2.97	15.417	2.79	21.42	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.583	1.21	9.583	3.34	15.583	2.79	21.58	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.750	1.21	9.750	3.34	15.750	2.79	21.75	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.917	1.21	9.917	3.34	15.917	2.79	21.92	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.083	1.49	10.083	4.27	16.083	1.67	22.08	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.250	1.49	10.250	4.27	16.250	1.67	22.25	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.417	1.49	10.417	4.27	16.417	1.67	22.42	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.583	1.49	10.583	5.76	16.583	1.67	22.58	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.750	1.49	10.750	5.76	16.750	1.67	22.75	1.11
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.917	1.49	10.917	5.76	16.917	1.67	22.92	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.083	1.49	11.083	8.92	17.083	1.67	23.08	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.250	1.49	11.250	8.92	17.250	1.67	23.25	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.417	1.49	11.417	8.92	17.417	1.67	23.42	1.11
5.500	1.49	11.500	8.92	17.500	1.67	23.50	1.11
5.583	1.49	11.583	38.64	17.583	1.67	23.58	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.750	1.49	11.750	38.65	17.750	1.67	23.75	1.11
5.833	1.49	11.833	102.55	17.833	1.67	23.83	1.11
5.917	1.49	11.917	102.56	17.917	1.67	23.92	1.11
6.000	1.49	12.000	102.56	18.000	1.67	24.00	1.11

Max. Eff. Inten. (mm/hr)= 102.56 59.06
 over (min) 5.00 10.00
 Storage Coeff. (min)= 2.80 (ii) 7.06 (ii)
 Unit Hyd. Tpeak (min)= 5.00 10.00
 Unit Hyd. peak (cms)= 0.28 0.14

PEAK FLOW (cms)= 0.44 0.07 *TOTALS*
 TIME TO PEAK (hrs)= 12.00 12.00 0.518 (iii)
 RUNOFF VOLUME (mm)= 90.90 43.62 78.56
 TOTAL RAINFALL (mm)= 92.90 92.90 92.90
 RUNOFF COEFFICIENT = 0.98 0.47 0.85

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)
 IN= 2--> OUT= 1
 DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW	STORAGE	OUTFLOW	STORAGE
---------	---------	---------	---------

(cms)	(ha.m.)	(cms)	(ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	2.115	0.518	12.00	78.56
OUTFLOW: ID= 1 (0011)	2.115	0.071	12.50	78.47

PEAK FLOW REDUCTION [Qout/Qin](%)= 13.70
 TIME SHIFT OF PEAK FLOW (min)= 30.00
 MAXIMUM STORAGE USED (ha.m.)= 0.0983

ADD HYD (0013)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0011):	2.12	0.071	12.50	78.47
+ ID2= 2 (0012):	0.21	0.011	12.33	43.49
ID = 3 (0013):	2.33	0.082	12.33	75.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0203)	Area (ha)	Imp(%)	Dir. Conn.(%)
ID= 1 DT= 5.0 min	0.02	31.10	31.10

	IMPERVIOUS (ha)	PERVIOUS (i)
Surface Area	0.01	0.02
Dep. Storage	1.00	5.00
Average Slope	1.00	2.00
Length	12.38	35.00
Mannings n	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.02	6.083	1.86	12.083	13.39	18.08	1.67
0.167	1.02	6.167	1.86	12.167	13.38	18.17	1.67
0.250	1.02	6.250	1.86	12.250	13.38	18.25	1.67
0.333	1.02	6.333	1.86	12.333	13.38	18.33	1.67
0.417	1.02	6.417	1.86	12.417	13.38	18.42	1.67
0.500	1.02	6.500	1.86	12.500	13.38	18.50	1.67
0.583	1.02	6.583	1.86	12.583	6.88	18.58	1.67
0.667	1.02	6.667	1.86	12.667	6.87	18.67	1.67
0.750	1.02	6.750	1.86	12.750	6.87	18.75	1.67
0.833	1.02	6.833	1.86	12.833	6.87	18.83	1.67
0.917	1.02	6.917	1.86	12.917	6.87	18.92	1.67
1.000	1.02	7.000	1.86	13.000	6.87	19.00	1.67
1.083	1.02	7.083	1.86	13.083	1.30	19.08	1.67
1.167	1.02	7.167	1.86	13.167	1.30	19.17	1.67
1.250	1.02	7.250	1.86	13.250	1.30	19.25	1.67
1.333	1.02	7.333	1.86	13.333	1.30	19.33	1.67
1.417	1.02	7.417	1.86	13.417	1.30	19.42	1.67
1.500	1.02	7.500	1.86	13.500	1.30	19.50	1.67
1.583	1.02	7.583	1.86	13.583	7.62	19.58	1.67
1.667	1.02	7.667	1.86	13.667	7.62	19.67	1.67
1.750	1.02	7.750	1.86	13.750	7.62	19.75	1.67
1.833	1.02	7.833	1.86	13.833	7.62	19.83	1.67
1.917	1.02	7.917	1.86	13.917	7.62	19.92	1.67
2.000	1.02	8.000	1.86	14.000	7.62	20.00	1.67
2.083	1.21	8.083	2.51	14.083	2.79	20.08	1.11
2.167	1.21	8.167	2.51	14.167	2.79	20.17	1.11
2.250	1.21	8.250	2.51	14.250	2.79	20.25	1.11
2.333	1.21	8.333	2.51	14.333	2.79	20.33	1.11
2.417	1.21	8.417	2.51	14.417	2.79	20.42	1.11
2.500	1.21	8.500	2.51	14.500	2.79	20.50	1.11
2.583	1.21	8.583	2.51	14.583	2.79	20.58	1.11
2.667	1.21	8.667	2.51	14.667	2.79	20.67	1.11
2.750	1.21	8.750	2.51	14.750	2.79	20.75	1.11
2.833	1.21	8.833	2.51	14.833	2.79	20.83	1.11

2.917	1.21	8.917	2.51	14.917	2.79	20.92	1.11
3.000	1.21	9.000	2.51	15.000	2.79	21.00	1.11
3.083	1.21	9.083	2.97	15.083	2.79	21.08	1.11
3.167	1.21	9.167	2.97	15.167	2.79	21.17	1.11
3.250	1.21	9.250	2.97	15.250	2.79	21.25	1.11
3.333	1.21	9.333	2.97	15.333	2.79	21.33	1.11
3.417	1.21	9.417	2.97	15.417	2.79	21.42	1.11
3.500	1.21	9.500	2.97	15.500	2.79	21.50	1.11
3.583	1.21	9.583	3.34	15.583	2.79	21.58	1.11
3.667	1.21	9.667	3.34	15.667	2.79	21.67	1.11
3.750	1.21	9.750	3.34	15.750	2.79	21.75	1.11
3.833	1.21	9.833	3.34	15.833	2.79	21.83	1.11
3.917	1.21	9.917	3.34	15.917	2.79	21.92	1.11
4.000	1.21	10.000	3.34	16.000	2.79	22.00	1.11
4.083	1.49	10.083	4.27	16.083	1.67	22.08	1.11
4.167	1.49	10.167	4.27	16.167	1.67	22.17	1.11
4.250	1.49	10.250	4.27	16.250	1.67	22.25	1.11
4.333	1.49	10.333	4.27	16.333	1.67	22.33	1.11
4.417	1.49	10.417	4.27	16.417	1.67	22.42	1.11
4.500	1.49	10.500	4.27	16.500	1.67	22.50	1.11
4.583	1.49	10.583	5.76	16.583	1.67	22.58	1.11
4.667	1.49	10.667	5.76	16.667	1.67	22.67	1.11
4.750	1.49	10.750	5.76	16.750	1.67	22.75	1.11
4.833	1.49	10.833	5.76	16.833	1.67	22.83	1.11
4.917	1.49	10.917	5.76	16.917	1.67	22.92	1.11
5.000	1.49	11.000	5.76	17.000	1.67	23.00	1.11
5.083	1.49	11.083	8.92	17.083	1.67	23.08	1.11
5.167	1.49	11.167	8.92	17.167	1.67	23.17	1.11
5.250	1.49	11.250	8.92	17.250	1.67	23.25	1.11
5.333	1.49	11.333	8.92	17.333	1.67	23.33	1.11
5.417	1.49	11.417	8.92	17.417	1.67	23.42	1.11
5.500	1.49	11.500	8.92	17.500	1.67	23.50	1.11
5.583	1.49	11.583	38.64	17.583	1.67	23.58	1.11
5.667	1.49	11.667	38.65	17.667	1.67	23.67	1.11
5.750	1.49	11.750	38.65	17.750	1.67	23.75	1.11
5.833	1.49	11.833	102.55	17.833	1.67	23.83	1.11
5.917	1.49	11.917	102.56	17.917	1.67	23.92	1.11
6.000	1.49	12.000	102.56	18.000	1.67	24.00	1.11

Max.Eff.Inten.(mm/hr)=	102.56	59.06
over (min)	5.00	10.00
Storage Coeff. (min)=	0.72 (ii)	8.76 (ii)
Unit Hyd. Tpeak (min)=	5.00	10.00
Unit Hyd. peak (cms)=	0.34	0.12
PEAK FLOW (cms)=	0.00	0.00
TIME TO PEAK (hrs)=	12.00	12.00
RUNOFF VOLUME (mm)=	91.90	43.62
TOTAL RAINFALL (mm)=	92.90	92.90
RUNOFF COEFFICIENT =	0.99	0.47

TOTALS
0.004 (iii)

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3				
ID1= 1 (0013):	2.33	0.082	12.33	75.31
+ ID2= 2 (0203):	0.02	0.004	12.00	49.63
ID = 3 (0052):	2.35	0.083	12.33	75.06

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

** SIMULATION:M. 25mm Storm **

CHICAGO STORM	IDF curve parameters:	A= 568.700
Ptotal= 24.98 mm		B= 6.662
		C= 0.819
	used in:	INTENSITY = A / (t + B) ^C
	Duration of storm =	4.00 hrs
	Storm time step =	10.00 min
	Time to peak ratio =	0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.47	1.00	13.64	2.00	3.72	3.00	1.77
0.17	1.70	1.17	56.79	2.17	3.12	3.17	1.63
0.33	2.02	1.33	18.09	2.33	2.69	3.33	1.52
0.50	2.53	1.50	9.21	2.50	2.37	3.50	1.42
0.67	3.41	1.67	6.15	2.67	2.13	3.67	1.33
0.83	5.38	1.83	4.63	2.83	1.93	3.83	1.26

CALIB
NASHYD (0202) | Area (ha)= 0.21 Curve Number (CN)= 74.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.47	1.083	13.64	2.083	3.72	3.08	1.77
0.167	1.47	1.167	13.64	2.167	3.72	3.17	1.77
0.250	1.70	1.250	56.79	2.250	3.12	3.25	1.63
0.333	1.70	1.333	56.79	2.333	3.12	3.33	1.63
0.417	2.02	1.417	18.09	2.417	2.69	3.42	1.52
0.500	2.02	1.500	18.09	2.500	2.69	3.50	1.52
0.583	2.53	1.583	9.21	2.583	2.37	3.58	1.42
0.667	2.53	1.667	9.21	2.667	2.37	3.67	1.42
0.750	3.41	1.750	6.15	2.750	2.13	3.75	1.33
0.833	3.41	1.833	6.15	2.833	2.13	3.83	1.33
0.917	5.38	1.917	4.63	2.917	1.93	3.92	1.26
1.000	5.38	2.000	4.63	3.000	1.93	4.00	1.26

Unit Hyd Qpeak (cms)= 0.045

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 3.644
TOTAL RAINFALL (mm)= 24.985
RUNOFF COEFFICIENT = 0.146

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

RESERVOIR(0012)
IN= 2--> QOUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0116	0.0019
0.0031	0.0001	0.0123	0.0020
0.0050	0.0002	0.0129	0.0020
0.0064	0.0005	0.0135	0.0021
0.0075	0.0007	0.0141	0.0022
0.0085	0.0010	0.0146	0.0023
0.0094	0.0013	0.0151	0.0024
0.0102	0.0016	0.0157	0.0024
0.0109	0.0018	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	0.210	0.002	1.50	3.64
OUTFLOW: ID= 1 (0012)	0.210	0.002	1.67	3.64

PEAK FLOW REDUCTION [Qout/Qin](%)= 92.03
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0001
MAXIMUM STORAGE USED (cu.m.)= 0.663658

CALIB
STANDHYD (0201)
ID= 1 DT= 5.0 min

Area (ha)= 2.12
Total Imp(%)= 73.90 Dir. Conn.(%)= 73.90

	IMPERVIOUS (mm)	PERVIOUS (i) (mm)
Surface Area (ha)=	1.56	0.55
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	118.74	35.00

Mannings n = 0.013 0.250

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

--- TRANSFORMED HYETOGRAPH ---

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	1.47	1.083	13.64	2.083	3.72	3.08	1.77
0.167	1.47	1.167	13.64	2.167	3.72	3.17	1.77
0.250	1.70	1.250	56.79	2.250	3.12	3.25	1.63
0.333	1.70	1.333	56.79	2.333	3.12	3.33	1.63
0.417	2.02	1.417	18.09	2.417	2.69	3.42	1.52
0.500	2.02	1.500	18.09	2.500	2.69	3.50	1.52
0.583	2.53	1.583	9.21	2.583	2.37	3.58	1.42
0.667	2.53	1.667	9.21	2.667	2.37	3.67	1.42
0.750	3.41	1.750	6.15	2.750	2.13	3.75	1.33
0.833	3.41	1.833	6.15	2.833	2.13	3.83	1.33
0.917	5.38	1.917	4.63	2.917	1.93	3.92	1.26
1.000	5.38	2.000	4.63	3.000	1.93	4.00	1.26

Max. Eff. Inten. (mm/hr)= 56.79 over (min)= 5.00
Storage Coeff. (min)= 3.55 (ii) 26.87 (ii)
Unit Hyd. Tpeak (min)= 5.00 30.00
Unit Hyd. peak (cms)= 0.26 0.04

PEAK FLOW (cms)= 0.24 0.00 *TOTALS* 0.236 (iii)
TIME TO PEAK (hrs)= 1.33 1.92 1.33
RUNOFF VOLUME (mm)= 22.98 3.66 17.93
TOTAL RAINFALL (mm)= 24.98 24.98 24.98
RUNOFF COEFFICIENT = 0.92 0.15 0.72

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 74.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR(0011)
IN= 2--> QOUT= 1
DT= 5.0 min

OVERFLOW IS OFF

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0199	0.0650
0.0004	0.0003	0.0382	0.0747
0.0008	0.0053	0.0512	0.0833
0.0011	0.0108	0.0586	0.0906
0.0012	0.0192	0.0661	0.0952
0.0014	0.0299	0.0718	0.0989
0.0015	0.0417	0.0747	0.0992
0.0016	0.0537	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	2.115	0.236	1.33	17.93
OUTFLOW: ID= 1 (0011)	2.115	0.001	4.17	17.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.62
TIME SHIFT OF PEAK FLOW (min)= 170.00
MAXIMUM STORAGE USED (ha.m.)= 0.0363

ADD HYD (0013)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	2.12	0.001	4.17	17.85
+ ID2= 2 (0012):	0.21	0.002	1.67	3.64
ID = 3 (0013):	2.33	0.003	1.67	16.56

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0203)
ID= 1 DT= 5.0 min

Area (ha)= 0.02
Total Imp(%)= 31.10 Dir. Conn.(%)= 31.10

IMPERVIOUS PERVIOUS (i)

Surface Area (ha)= 0.01 0.02
 Dep. Storage (mm)= 1.00 5.00
 Average Slope (%)= 1.00 2.00
 Length (m)= 12.38 35.00
 Mannings n = 0.013 0.250

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

---- TRANSFORMED HYETOGRAPH ----							
TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	1.47	1.083	13.64	2.083	3.72	3.08	1.77
0.167	1.47	1.167	13.64	2.167	3.72	3.17	1.77
0.250	1.70	1.250	56.79	2.250	3.12	3.25	1.63
0.333	1.70	1.333	56.79	2.333	3.12	3.33	1.63
0.417	2.02	1.417	18.09	2.417	2.69	3.42	1.52
0.500	2.02	1.500	18.09	2.500	2.69	3.50	1.52
0.583	2.53	1.583	9.21	2.583	2.37	3.58	1.42
0.667	2.53	1.667	9.21	2.667	2.37	3.67	1.42
0.750	3.41	1.750	6.15	2.750	2.13	3.75	1.33
0.833	3.41	1.833	6.15	2.833	2.13	3.83	1.33
0.917	5.38	1.917	4.63	2.917	1.93	3.92	1.26
1.000	5.38	2.000	4.63	3.000	1.93	4.00	1.26

Max. Eff. Inten. (mm/hr)= 56.79 4.12
 over (min) = 5.00 25.00
 Storage Coeff. (min)= 0.91 (ii) 24.23 (ii)
 Unit Hyd. Tpeak (min)= 5.00 25.00
 Unit Hyd. peak (cms)= 0.34 0.05

TOTALS
 PEAK FLOW (cms)= 0.00 0.00 0.001 (iii)
 TIME TO PEAK (hrs)= 1.33 1.83 1.33
 RUNOFF VOLUME (mm)= 23.98 3.66 8.44
 TOTAL RAINFALL (mm)= 24.98 24.98 24.98
 RUNOFF COEFFICIENT = 0.96 0.15 0.34

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
 CN* = 74.0 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
 THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0052)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0013):	2.33	0.003	1.67	16.56
+ ID2= 2 (0203):	0.02	0.001	1.33	8.44
=====				
ID = 3 (0052):	2.35	0.004	1.67	16.48

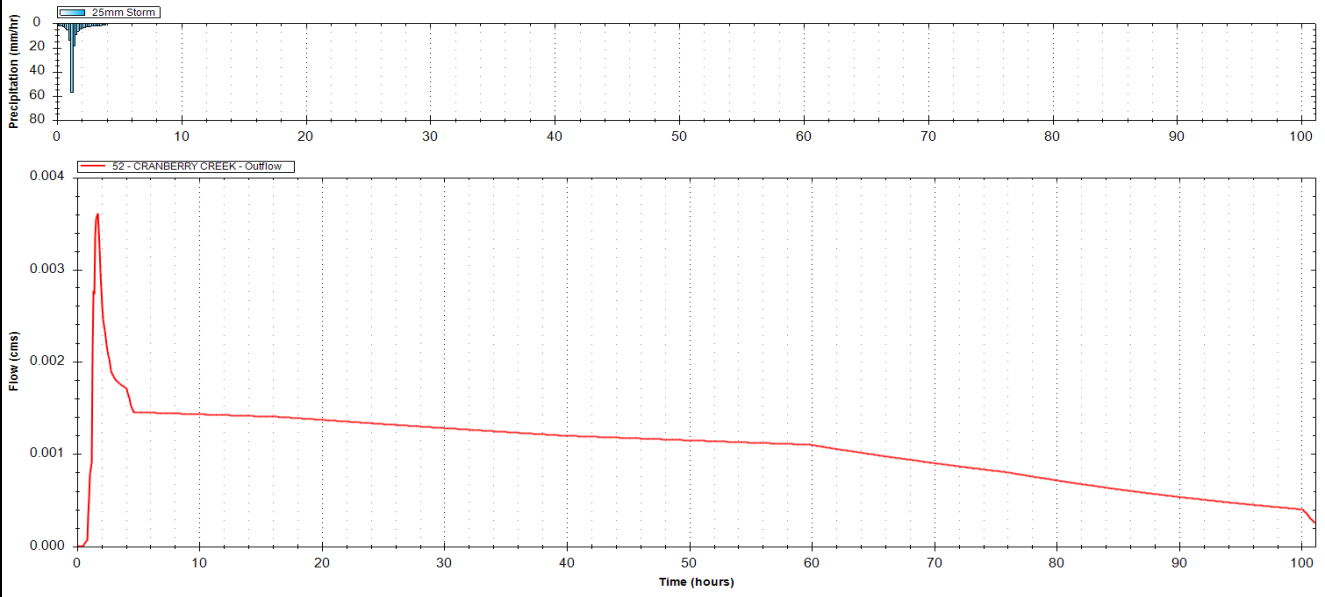
NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.



Project: Reverie Townhouses
Project No.: 1790-5382-2
File: 25mm Hydrograph
Design by: CB
Date: 2025-08-20

Cranberry Creek Outlet - 25mm Storm Event Hydrograph

Hydrograph Plots Post-Dev





Project: Reverie Townhouses

Project No.: 1790-5382-2

Created By: CB

Checked By:

Date: 2025-08-20

Pre-Development Phosphorus Loading

Catchment	Land Use	Area (ha)	P coeff (kg/ha/yr)	P Load (kg/yr)	P Load Total (kg/yr)
Pre-Development Site	Forest	2.35	0.06	0.14	0.14

Note:
1. Phosphorus Coefficient for Forest identified in NVCA Phosphorus Loading Tool & Hutchinson Report.



Project: Reverie Townhouses

Project No.: 1790-5382-2

Created By: CB

Checked By:

Date: 2025-08-20

Pre-Development Phosphorus Loading - NO Mitigation

Parameter	Area 1	Unit	
Total Phosphorus Concentration	0.41	kg/yr	(per Hutchinson Report Table 8, residential)
Total Annual Precipitation	920	mm/yr	(from HydroG Report)
Total Precipitation Runoff	408	mm/yr	(from HydroG Report)
Fraction Runoff	0.44		
% Impervious	60%		
Runoff Coefficient (Rv)	0.59	(0.05 + 0.91 x %imp)	
Phosphorus Coefficient	0.99	kg/ha/yr	

Post - Development Conditions

Catchment	Land Use	Area (ha)	P coeff (kg/ha)	P Load (kg/yr)
Captured Areas	Residential	2.35	0.99	2.33



Note:

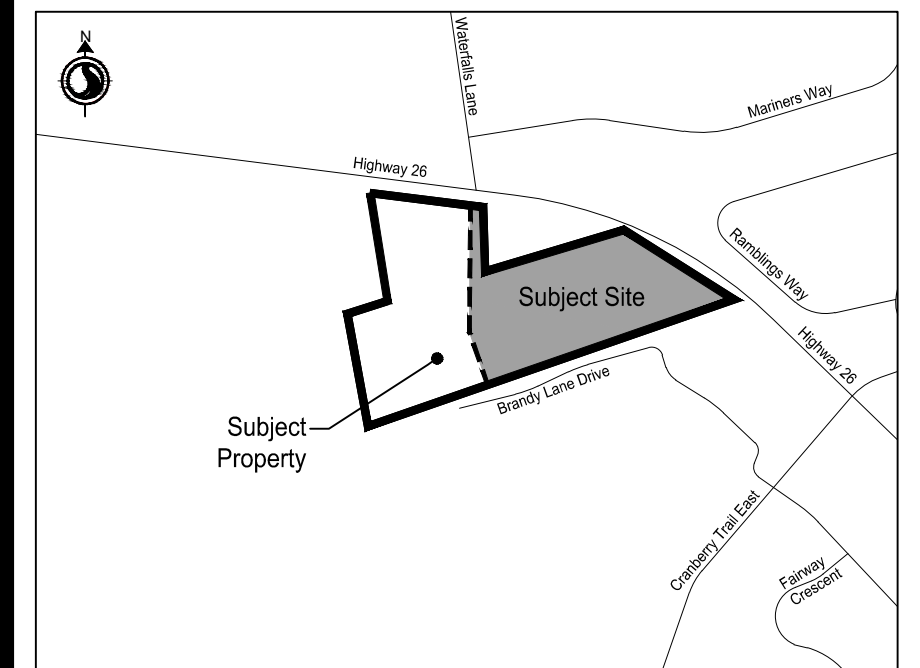
1. Phosphorus Coefficient for Residential Development calculated per Equation 3 of the Hutchinson Phosphorus Report for the NVCA Phosphorus Tool.

FIGURES

- Figure 1:** Site Location Plan
- Figure 2:** Site Plan (Stantec, December 2024)
- Figure 3:** Preliminary Site Grading and Drainage Plan
- Figure 4:** Preliminary Sanitary Routing Concept
- Figure 5:** Preliminary Water Distribution Plan
- Figure 6:** Post-Development Drainage Plan



Legend  = SUBJECT LANDS	Project REVERIE TOWNHOUSES												
	Drawing SITE LOCATION PLAN		<table border="1"> <tr> <td>Drawn By</td> <td>N.L.</td> <td>Design By</td> <td>N.L.</td> <td>Project</td> <td>1790-5382</td> </tr> <tr> <td>Scale</td> <td>N.T.S.</td> <td>Date</td> <td>MAR/10/2025</td> <td>Check By</td> <td>R.A./R.W.</td> </tr> </table>	Drawn By	N.L.	Design By	N.L.	Project	1790-5382	Scale	N.T.S.	Date	MAR/10/2025
Drawn By	N.L.	Design By	N.L.	Project	1790-5382								
Scale	N.T.S.	Date	MAR/10/2025	Check By	R.A./R.W.								



Details of Development

SITE DETAILS	REQUIRED	PROVIDED
ZONING	RESIDENTIAL THIRD DENSITY (TOWNHOUSE) WITH SITE SPECIFIC PROVISIONS (R3-33)	
MINIMUM LOT AREA	NIL	23468.7m ²
MINIMUM LOT FRONTAGE	NIL	140.6m
MINIMUM FRONT YARD	4.5m	5.0m
MINIMUM EXTERIOR SIDE YARD	4.5m	N/A
MINIMUM INTERIOR SIDE YARD	1.8m	1.9m, 5.1m
MINIMUM REAR YARD	7.5m	7.8m
MAXIMUM HEIGHT	12.0m	9.0m
DENSITY (INCLUDING ROADS/PARKING)	N/A	53 UNITS/ha (124 UNITS)
DENSITY (EXCLUDING WITH ROADS/PARKING)	N/A	68 UNITS/ha (124 UNITS)
MAXIMUM FSI	3.5	0.55
MAXIMUM LOT COVERAGE	45.0% (10560.9m ²)	30.6% (7183.4m ²)
MINIMUM LANDSCAPED OPEN SPACE	35.0% (8214.0m ²)	38.1% (8962.0m ²)
OFF-STREET PARKING	149 SPACES	197 SPACES
BARRIER FREE PARKING	3 SPACES (1 TYPE 'A', 2 TYPE 'B')	4 SPACES (2 TYPE 'A', 2 TYPE 'B')
BICYCLE PARKING	6 SPACES	20 SPACES

Parking Calculation

STACKED TOWNHOUSES:
1 SPACES PER UNIT PLUS 0.2 SPACES PER UNIT FOR VISITOR PARKING
(124 UNITS x 1 SPACES) + (124 UNITS x 0.2 SPACES)
= 124 SPACES + 25 SPACES
= 149 SPACES

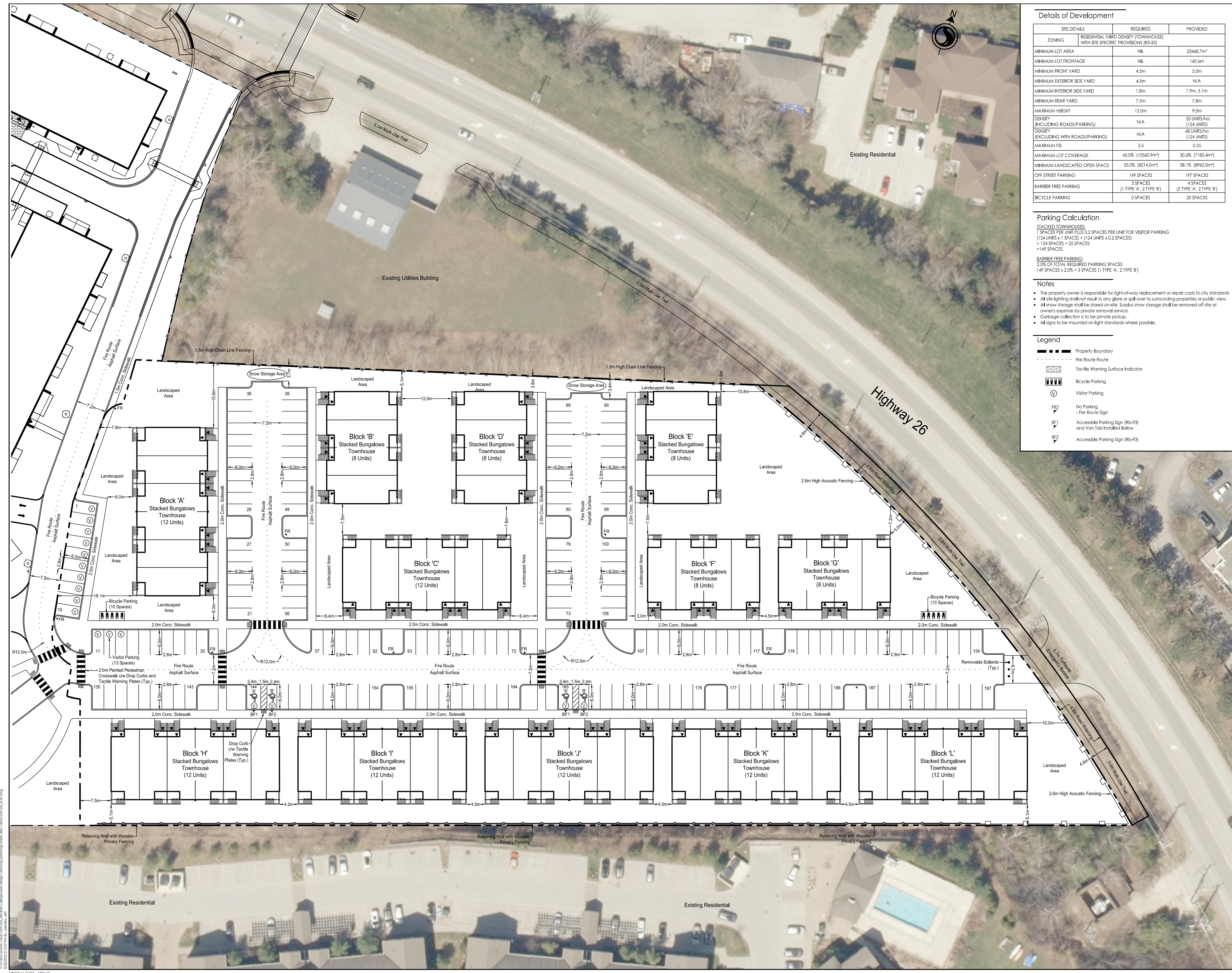
BARRIER FREE PARKING:
2.0% OF TOTAL REQUIRED PARKING SPACES
149 SPACES x 2.0% = 3 SPACES (1 TYPE 'A', 2 TYPE 'B')

Notes

- The property owner is responsible for right-of-way replacement or repair costs to city standards
- All site lighting shall not result in any glare or spill over to surrounding properties or public view.
- All snow storage shall be stored on-site. Surplus snow storage shall be removed off site at owner's expense by private removal service.
- Garbage collection is to be private pickup.
- All signs to be mounted on light standards where possible.

Legend

- Property Boundary
- Fire Route Route
- Tactile Warning Surface Indicator
- Bicycle Parking
- Visitor Parking
- No Parking - Fire Route Sign
- Accessible Parking Sign (Rb-93) and Van Tab Installed Below
- Accessible Parking Sign (Rb-93)



Revision	By	Appd	Date
ISSUED FOR I&A AND OPA	JJ	KR	2025.08.26
Revision	By	Appd	YYYY.MM.DD
File Name: 160321029-555_R-SP	JJ	KR	2024.09.30
	Dwn.	Dsgn.	Chkd.
			YYYY.MM.DD

Permit-Seal

Client/Project
REID'S HERITAGE HOMES

REVERIE
11403 HIGHWAY 26
COLLINGWOOD, ON

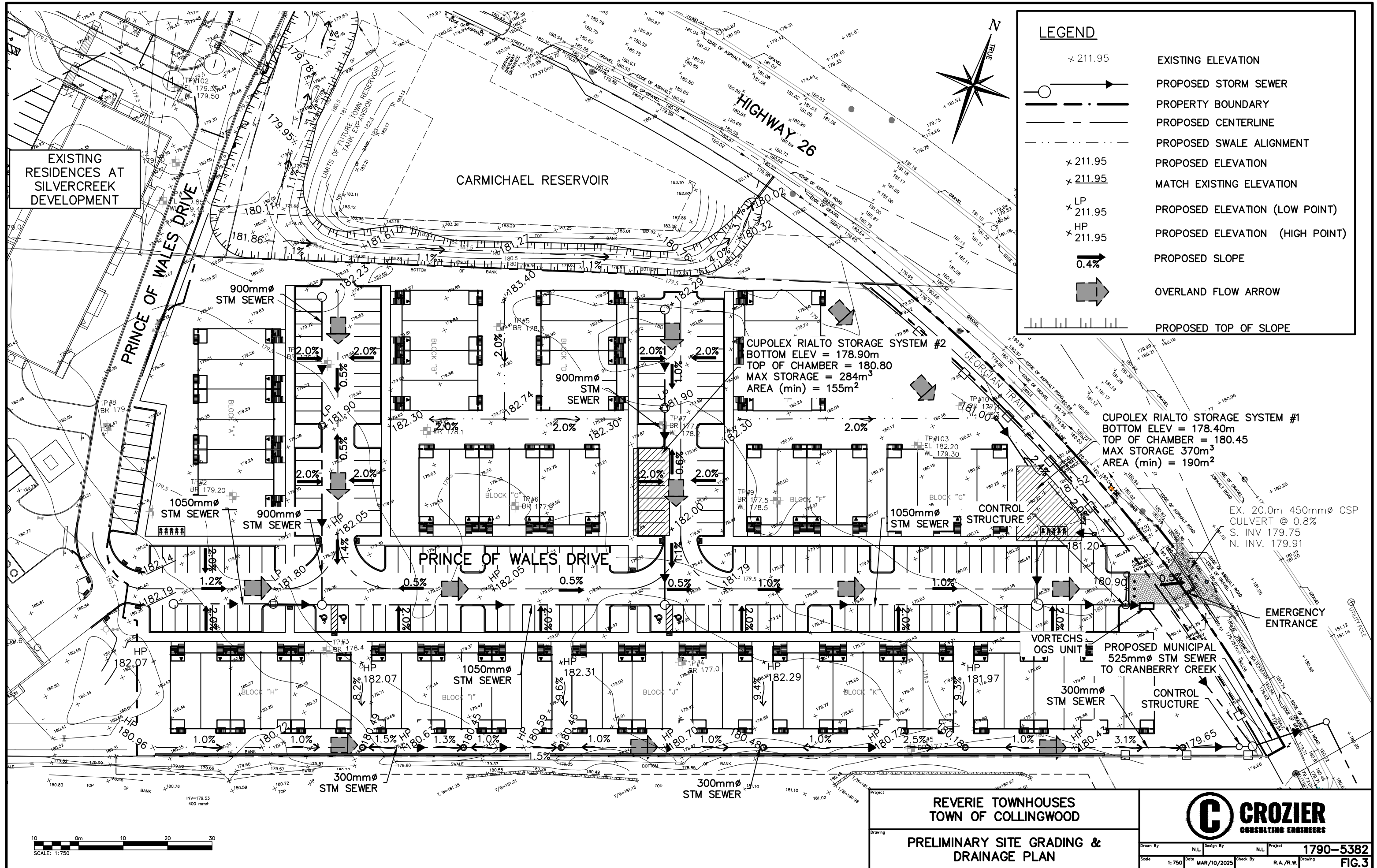
Title

SITE PLAN

Project No. 160321029-555 Scale 1:400

Revision 1 Sheet 1 of 1 Drawing No. SP-1

V:\03\2025\160321029-555_Rev02\Collingwood\Design\Drawings\SitePlan\SP-1.dwg
 2025.08.26 11:52 AM JJ
 ORIGINAL SHEET - ARCH D



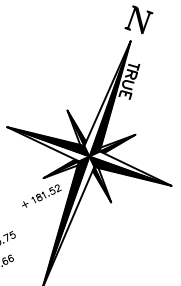
LEGEND

- × 211.95 EXISTING ELEVATION
- ———→ PROPOSED STORM SEWER
- · — · — PROPERTY BOUNDARY
- — — — — PROPOSED CENTERLINE
- - - - - PROPOSED SWALE ALIGNMENT
- × 211.95 PROPOSED ELEVATION
- × 211.95 MATCH EXISTING ELEVATION
- × LP 211.95 PROPOSED ELEVATION (LOW POINT)
- × HP 211.95 PROPOSED ELEVATION (HIGH POINT)
- 0.4% PROPOSED SLOPE
- OVERLAND FLOW ARROW
- ▬▬▬▬▬ PROPOSED TOP OF SLOPE

EXISTING RESIDENCES AT SILVERCREEK DEVELOPMENT

CARMICHAEL RESERVOIR

HIGHWAY 26



PRINCE OF WALES DRIVE

900mm STM SEWER

1050mm STM SEWER

900mm STM SEWER

PRINCE OF WALES DRIVE

CUPLEX RIALTO STORAGE SYSTEM #2
 BOTTOM ELEV = 178.90m
 TOP OF CHAMBER = 180.80
 MAX STORAGE = 284m³
 AREA (min) = 155m²

CUPLEX RIALTO STORAGE SYSTEM #1
 BOTTOM ELEV = 178.40m
 TOP OF CHAMBER = 180.45
 MAX STORAGE 370m³
 AREA (min) = 190m²

CONTROL STRUCTURE

1050mm STM SEWER

EX. 20.0m 450mm CSP CULVERT @ 0.8%
 S. INV 179.75
 N. INV. 179.91

EMERGENCY ENTRANCE

VORTECHS OGS UNIT

PROPOSED MUNICIPAL 525mm STM SEWER TO CRANBERRY CREEK

300mm STM SEWER

CONTROL STRUCTURE

300mm STM SEWER

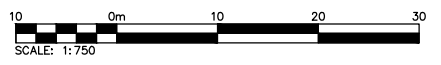
300mm STM SEWER

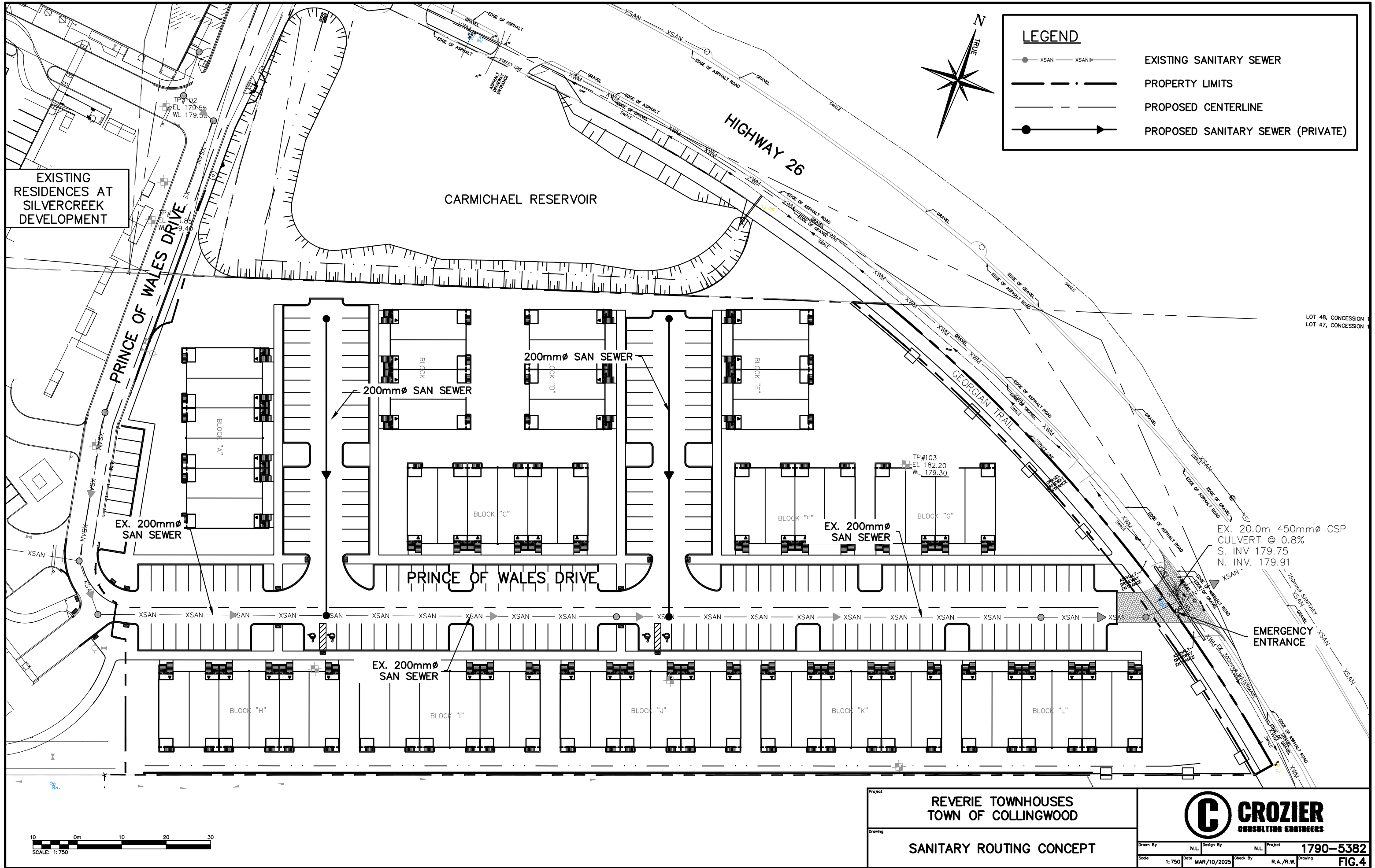
REVERIE TOWNHOUSES
 TOWN OF COLLINGWOOD

PRELIMINARY SITE GRADING &
 DRAINAGE PLAN



Drawn By: N.L. Design By: N.L. Project: 1790-5382
 Scale: 1:750 Date: MAR/10/2025 Check By: R.A./R.W. Drawing: FIG.3





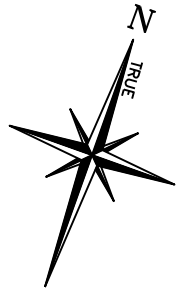
LEGEND

- XSAN — XSAN — EXISTING SANITARY SEWER
- - - - - PROPERTY LIMITS
- - - - - PROPOSED CENTERLINE
- PROPOSED SANITARY SEWER (PRIVATE)

EXISTING RESIDENCES AT SILVERCREEK DEVELOPMENT

CARMICHAEL RESERVOIR

HIGHWAY 26



LOT 48, CONCESSION 1
LOT 47, CONCESSION 1

EX. 200mmØ SAN SEWER

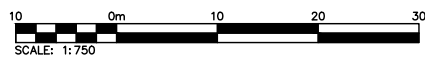
200mmØ SAN SEWER

200mmØ SAN SEWER

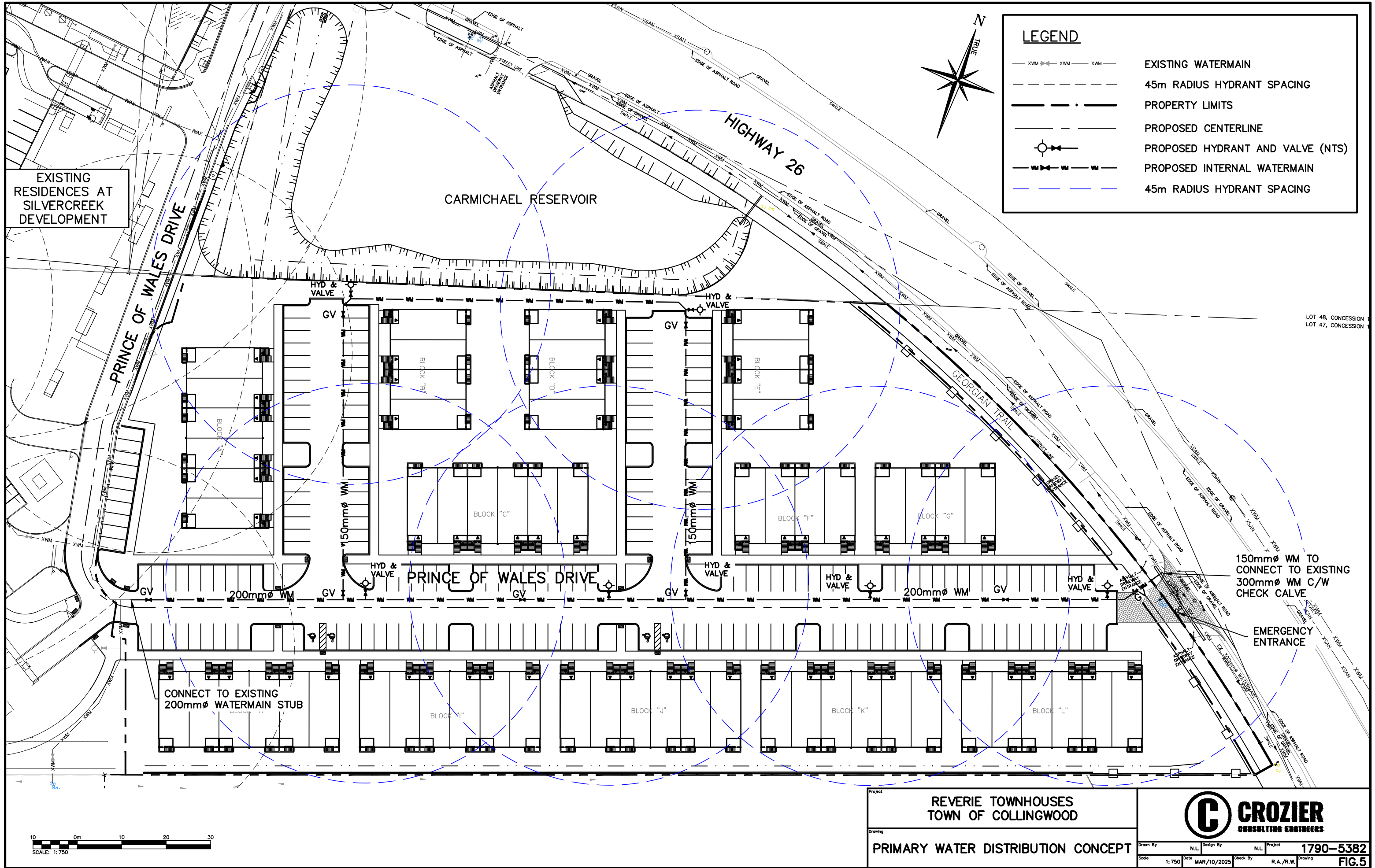
EX. 200mmØ SAN SEWER

EX. 20.0m 450mmØ CSP CULVERT @ 0.8%
S. INV. 179.75
N. INV. 179.91

EMERGENCY ENTRANCE



Project		REVERIE TOWNHOUSES TOWN OF COLLINGWOOD		
Drawing		SANITARY ROUTING CONCEPT		
Drawn By	N.L.	Design By	N.L.	Project
Scale	1:750	Date	MAR/10/2025	Check By
				R.A./R.W.
				1790-5382
				FIG.4



EXISTING RESIDENCES AT SILVERCREEK DEVELOPMENT

LEGEND

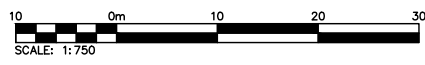
- EXISTING WATERMAIN
- 45m RADIUS HYDRANT SPACING
- PROPERTY LIMITS
- PROPOSED CENTERLINE
- PROPOSED HYDRANT AND VALVE (NTS)
- PROPOSED INTERNAL WATERMAIN
- 45m RADIUS HYDRANT SPACING

LOT 48, CONCESSION 1
LOT 47, CONCESSION 1

150mmØ WM TO CONNECT TO EXISTING 300mmØ WM C/W CHECK CALVE

EMERGENCY ENTRANCE

CONNECT TO EXISTING 200mmØ WATERMAIN STUB



Project: **REVERIE TOWNHOUSES**
Town of Collingwood

Drawing: **PRIMARY WATER DISTRIBUTION CONCEPT**



Drawn By: N.L. Design By: N.L. Project: **1790-5382**

Scale: 1:750 Date: MAR/10/2025 Check By: R.A./R.W. Drawing: **FIG.5**

