Municipal Servicing Report
For

Proposed Residential Development at

0 Chippewa Avenue

Prepared for:
Mamta Homes

Prepared by:
Kresin Engineering Corporation

April 2024

Table of Contents

List of Appendices

1. Proposed Site Plan
2. Sault Ste. Marie Official Plan Schedule C – Land use
3. Geotechnical Report
4. Stormwater Management Plan
5. Preliminary Site Grading Plan
6. Traffic Impact Study
7. Sanitary Sewer Design
8. Fire Flow Design
9. Preliminary Water Distribution Plans

1 Introduction

1.1 Overview

Mamta Homes (Mamta) is proposing to develop vacant lands in the west end of Sault Ste. Marie for mixed density residential use. The proposed site plan is presented in Appendix 1, and includes: single family residential, semi-detached, row housing and apartment developments. Mamta has retained Kresin Engineering Corporation (Kresin) to prepare this functional servicing report (FSR) in support of an application for Draft Plan of Subdivision approval.

The site of the development (the "Site"), shown in Figure 1, is in the west end of Sault Ste. Marie north of Second Line and west of Goulais Avenue, an extension of the existing Broadview Gardens neighbourhood which was developed in the 1960s and 1970s. The 15.1 hectare site is bordered by conservation land to the north and west, industrial and institutional land to the south and residential areas to the east.

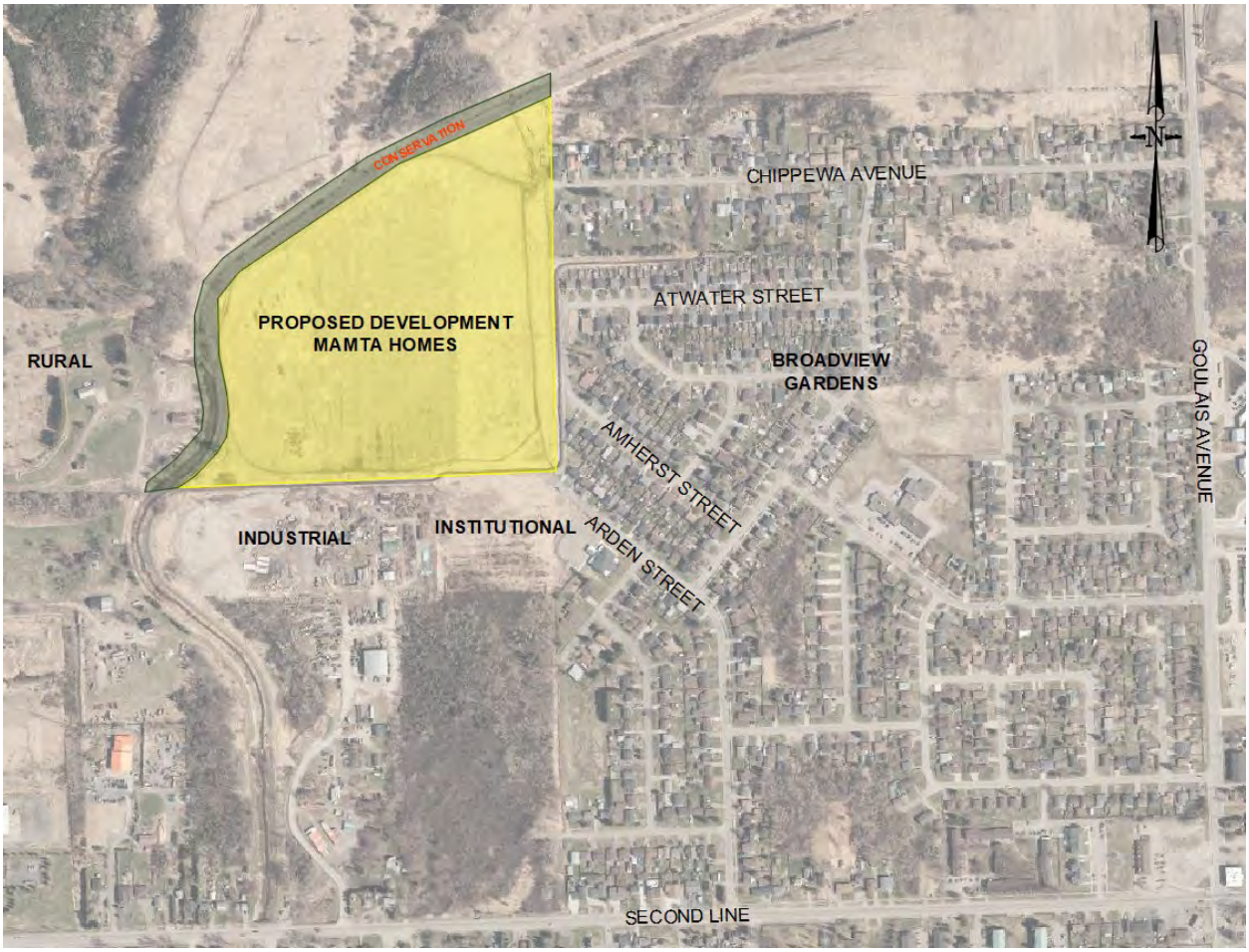


Figure 1: Location Plan (background image from soomaps.com)

Currently, the site is classified as a Rural Area Zone "RA" in the City's zoning by-law and is shown on the Official Plan Scheule C – Land Use (copy in Appendix 2) as a residential area.

The purpose of this FSR is to provide the necessary information to support the proposed Draft Plan of Subdivision and define the servicing requirements to meet the needs of the City.

1.2 Background

As shown on Schedule C of the City's Official Plan, the Site is designated for residential use, and is located within the Existing Urban Settlement Area. The proposed development appears to be compatible with the City's Official Plan. Further, based on the layout of the existing road network in Broadview Gardens, immediately east of the Site, it appears that a continuation of the residential neighbourhood was likely intended at the time it was developed.

2 Existing Conditions

2.1 Site Characterization

Currently, the Site is vacant land characterized by open grassy field with no significant tree cover. There is no evidence of recent agricultural use of the property. It is noted that there are some informal trails on the Site, apparently used by area residents for recreational purposes. In winter months, the Site is reportedly frequented by recreational snowmobilers.

2.2 Topography

The topography of the Site is relatively flat with an overall gentle slope towards the southeast. The total change in elevation between the southeast corner and the northwest limit of the Site is approximately 3.5 metres, providing an average slope of approximately 0.8%.

The site elevation is comparable to the adjacent lands, with no indication of large-scale historical grade adjustments by landfilling or excavation.

The existing site surface drainage is via overland flow directed towards a municipal ditch which borders the Site along the east and south sides. The ditch outlets at the West Davignon Creek near the southwest limit of the property.

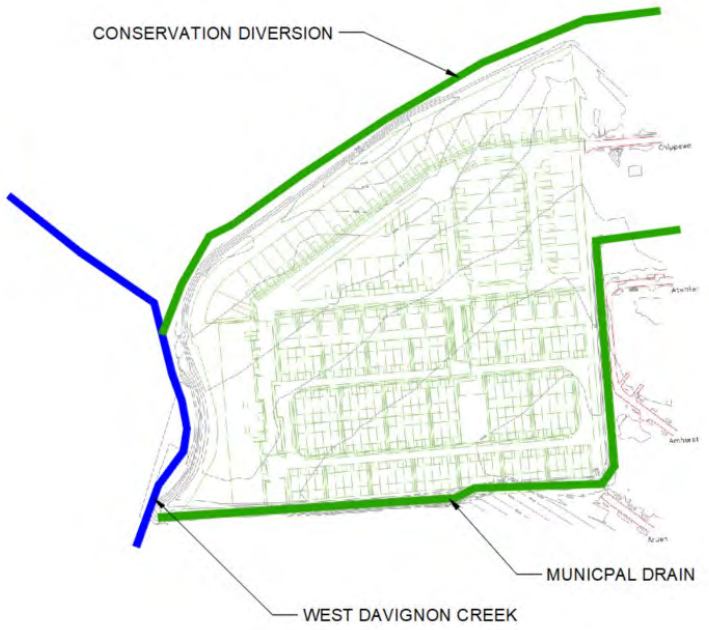


Figure 2 – Existing Site Conditions

2.3 Geotechnical

At the request of the developer, a geotechnical investigation has been completed for the Site. The investigation included advancement of a number of boreholes to obtain soil samples and measure in-situ conditions. Following analysis of the findings, recommendations regarding building foundations, buried infrastructure, roads and constructability were developed and are presented in the report, a copy of which is included in Appendix 3.

The existing sub-surface conditions are described in the geotechnical report as consisting of natural deposits of clays and silts below the organic topsoil layer. It was also noted that groundwater level is fairly consistent at about 1.2 metres below the surface.

2.4 Adjacent Infrastructure

The Site is adjacent to the existing Broadview Gardens neighbourhood. It is our understanding that Broadview Gardens was developed in the 1970s, and it appears to have been constructed anticipating the potential future development of the subject Site. Although no historical documentation to this effect has been provided by the City, this is inferred based on the layout of streets and subsurface utilities.

The existing roads, sewers and municipal water system in proximity of the Site are accessible to service the proposed development. The capacity of the existing infrastructure and ability to accommodate the development is discussed in the following sections.

3 Proposed Development

Mamta Homes is proposing to develop the Site in three parcels as shown on the site plan in Appendix 1.

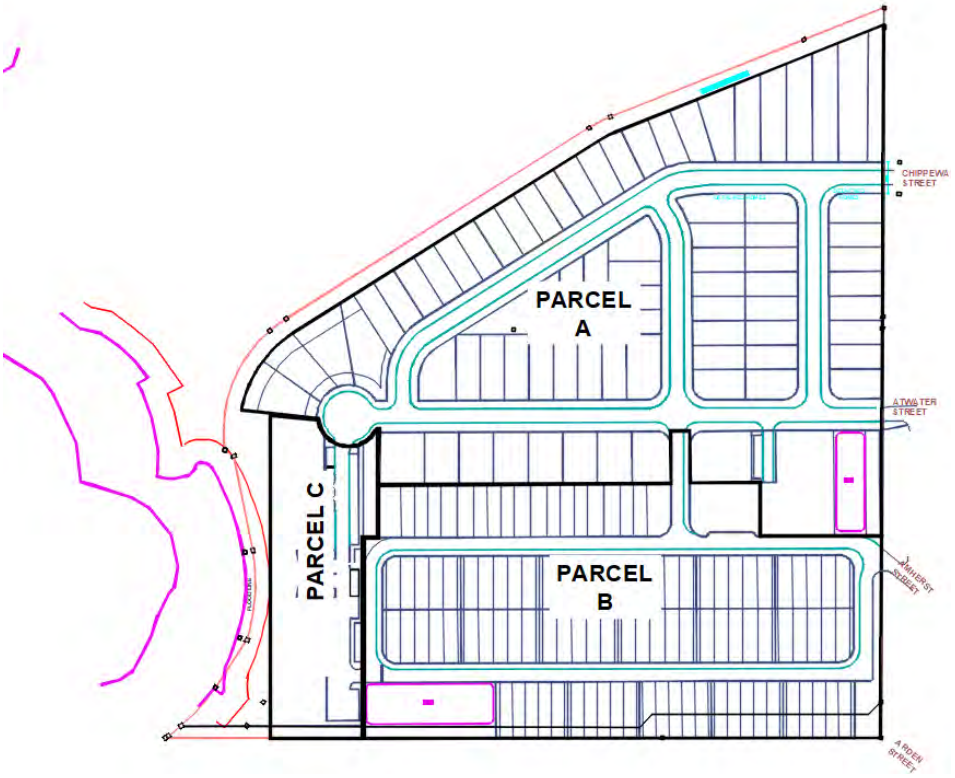


Figure 3 – Proposed Development Parcel Layout

3.1 Parcel A – Municipal Neighbourhood

Parcel A is a proposed extension of the existing Broadview Gardens neighbourhood. This parcel will include freehold lots for approximately 66 single family and 16 semi-detached houses, as well as a lot for commercial development and areas designated for public park space.

The road network in Parcel A will be constructed to municipal standard, and the City will ultimately assume ownership of the roads and sewers servicing these properties.

It is our understanding that the Parcel A development will be subject to a subdivision agreement with the City.

3.2 Parcel B – Townhouse Development

An adult lifestyle community is proposed in Parcel B, which will include approximately 104 townhouse units in a series of 4 to 5 unit blocks. This parcel will also include an amenity building for the use of residents. Roads, utilities, amenity building, etc. within Parcel B will be privately owned through a condominium corporation.

It is our understanding that the Parcel B development will be subject to a site plan control agreement with the City.

3.3 Parcel C – Apartment Buildings

It is proposed to construct two mid-rise (5 storey) apartment buildings in Parcel C, providing an estimated total of 180 residential units. The apartment buildings will be privately owned and operated.

Due to the location of the apartment buildings, servicing infrastructure such as sanitary sewer and watermain may transit Parcel B; thus a shared services agreement with the Parcel B condo corporation will be required.

It is our understanding that the Parcel C development will be subject to a site plan control agreement with the City.

4 Site Grading

4.1 Overall Considerations

As mentioned previously, the existing Site grading is relatively uniform with a low slope towards the southeast portion of the Site. There are existing drainage ditches and creeks bordering the south, west and north boundaries of the Site, and partially along the east boundary. The existing ditches have been constructed historically to provide storm water diversion and drainage for Broadview Gardens.

The proposed grading for the Site is intended to control stormwater surface runoff to ensure that adjacent properties are not adversely impacted by the development. This includes preventing the overland discharge of stormwater onto adjacent private property, accommodating existing flow paths to ensure drainage is maintained, avoiding flooding of adjacent properties, and conforming to other City requirements.

A Stormwater Management Plan (SWMP) has been developed and is presented in Appendix 4. The SWMP includes measures to ensure that the quantity/flow rate and quality of stormwater discharged from the Site meets the requirements of the City and the Sault Ste. Marie Region Conservation Authority (SSMRCA).

4.2 Parcel A Lot Grading and Yard Drainage

The City's Stormwater Design Guidelines stipulate that lot grading must ensure that positive drainage is provided for all lots; surface storage is not allowed in low-density and single-family residential developments. To accommodate this, minimum grades are established as shown on the Site grading plan in Appendix 5.

The Site grading plan illustrates that the surface drainage will meet or exceed the minimum required criteria, including:

- Minimum swale grade of 1%.
- Minimum swale depth of 200mm and width of 300mm.
- Rear-yard swales no longer than 90m.

Wherever possible, lots are graded to the street in order to avoid the need for rear-yard swales and catch basins.

4.3 Parcel B and Parcel C Site Grading

Similar to the grades in Parcel A, the proposed grading in Parcels B and C will be carried in order to avoid adverse impacts to abutting properties. Detailed grading plans will be included in the Site Plan Agreements for these future stages of the development.

5 Site Access and Egress

5.1 Existing Road Network

The Site is serviced with the following existing municipal streets in Broadview Gardens:

- Chippewa Avenue
- Atwater Street
- Amherst Street

The existing streets are Class A local roads consisting of paved surface with gravel shoulders and open ditches. The existing road network services the residential neighbourhood and connects to the collector and arterial routes at Goulais Avenue and Second Line.

5.2 Parcel A Proposed Roads

The proposed municipal roads in Parcel A will service the abutting single family and semi-detached lots, as well as the future townhouse development at Parcel B and the future apartments at Parcel C.

Municipal roads designs comply with the City's requirements, including:

- 20m road right-of-way.
- Class A construction including paved roads with concrete curb and gutter.
- Road catch basin drainage.
- Intersection configuration accommodating snow removal and turning movements.

The proposed municipal roads will connect to Chippewa and Atwater Streets.

5.3 Parcel B Proposed Roads

The townhouse development at Parcel B will be serviced by an internal loop road, connecting to the proposed extension of Atwater Street as well as to the end of Amherst Street. The road connection at Amherst Street will be configured to accommodate municipal snow clearing operations so that City equipment will not enter the private property.

5.4 Parcel C Proposed Roads

The apartment development at Parcel C will access the municipal road network via the proposed Atwater Street extension. Access will also be provided through the shared condo loop road at Parcel B.

5.5 Traffic Impacts

A traffic impact assessment has been completed for the proposed development. A copy of the study report is included in Appendix 6.

The conclusions presented in the traffic impact study indicate that the existing road network can accommodate the proposed development at full build-out.

6 Sanitary Sewer Servicing

6.1 Parcel A Sanitary Sewer

The proposed development at Parcel A will include the installation of sanitary sewers which will be assumed by the City. This municipal sewer system is designed in accordance with the provincial guidelines, as well as the City standards for sewer layout and construction.

The Parcel A sanitary sewer will discharge to the existing infrastructure on Chippewa Avenue. A review of the existing sanitary sewers on Chippewa Avenue and Goulais Avenue confirm that adequate capacity exists to accommodate the design flows.

The sanitary sewer design for Parcel A is based on the following criteria:

Population density	3.5 persons per lot
Domestic sewage flow rate	400 L/capita per day
Extraneous flow	0.15 L/h/s
Minimum sewer main size	250mm diameter

A copy of the sanitary sewer design calculations in included in Appendix 7.

6.2 Parcels B and C Sanitary Sewer

The proposed sanitary sewer accommodating flows from Parcels B and C will connect to the municipal sewer at the Arden Street.

The sanitary sewer design for Parcels B and C is based on the following criteria:

Population Density (townhouse)	3.5 persons per unit
Population Density (apartment)	2 persons per unit
Population Density (existing)	3.5 persons per lot
Domestic Sewage Flow Rate	400 L/capita per day
Extraneous Flow	0.15 L/h/s

A review of the Arden Street infrastructure reveals that the existing sanitary sewers may experience minor surcharge at full build-out and 100% occupancy of Parcels B and C. According to information provided by the City, approximately 120 metres of existing 300mm diameter sewer on Arden Street between Winfield Drive and Ascot Avenue is installed with a grade of 0.15% - well below the guideline minimum of 0.22%. Under the design criteria described herein, this section of existing sewer may experience pipe utilization of approximately 110% of capacity. The remainder of sewers on Arden Street are anticipated to operate at utilizations of less than 67% of capacity.

Although there is a portion of existing sewer which may experience flows 10% greater than capacity during the design peak flow scenarios, it is anticipated that the system will function without detrimental effects to the City and connected users.

7 Water Servicing

The existing water distribution system in Broadview Gardens, owned and operated by PUC Services Inc., includes the following potential connection points:

- 200mm watermain on Chippewa Avenue

- 300mm diameter watermain on Atwater Street
- 150mm diameter watermain on Amherst Street

Preliminary comments provided by PUC Services indicate that system pressures in this area are anticipated to be sufficient for the proposed development. Confirmatory hydrant flow testing will be required, and is to be coordinated with PUC Services Inc.

7.1 Domestic and Fire Flow Demand

The proposed development at the Site includes a total population at 100% build-out of approximately 855 people. The MECP Design Guidelines for Drinking Water Systems provides guidance for development of domestic flow demands as follows.

Using a design demand rate of 400 L per capita per day, and a maximum day factor of 2.75, the calculated maximum daily demand for water consumption at the Site is 10.89 L/s. The maximum hourly demand, with a peak rate factor of 4.13, is 16.35 L/s. The calculations are presented in Appendix 8.

Design fire flows for the Site are calculated using guidance from the Fire Underwriters Survey and the Ontario Building Code (OBC). For the purposes of determining the fire demand flow, it is proposed that a likely worst case condition design fire would include one entire 5 unit townhouse block with limited combustible contents.

Fire Underwriters Criteria	
Building footprint area	1500 sq. m.
Number of storeys	2
Construction Type	Type III (Common construction)
Occupancy	Group C residential
Exposure distance (side 1)	4m
Exposure distance (side 2)	4m
Exposure distance (rear)	20m

The calculations prepared in Appendix 8 conclude that a fire demand of 16,000 L/min (265 L/s) is appropriate for the proposed development at the Site. Note that this rate is calculated using the Fire Underwriters procedure as a worst case; OBC procedure results in a lower flow requirement.

The overall required design flow for the development is the sum of domestic (max day) and fire demand flows:

$$Q = 10.89+265 = 276 \text{ L/s (rounded)}$$

7.2 Parcel A Water Service

The proposed development on Parcel A will include water distribution infrastructure in accordance with the requirements of PUC Services Inc., including pipe size and material, hydrant spacing, isolation valve arrangements, etc.

Connections to the existing potable water network will be provided at Chippewa Avenue and Atwater Street. This will provide a looped water main with redundant supply and will provide pressure and flow balancing in the overall system. The proposed water system is shown on the design drawings attached in Appendix 9.

Service connections to private lots in Parcel A will be made in accordance with the requirements of PUC Services Inc.

7.3 Parcel B and Parcel C Water Service

The proposed water service for Parcels B and C will include a connection to the existing distribution system at Amherst Street, as well as the extension of Atwater Street in Parcel A. It is also proposed that there will be an interconnection between Parcels B and C. The proposed water system is shown on the drawings attached in Appendix 9.

PUC Services Inc. may require backflow prevention and metering at the property boundaries for Parcels B and C. The detailed design of this will be determined during the site plan approval process.

8 Stormwater Management

8.1 General Requirements

The City requires that the developer implement a stormwater management plan (SWMP) for the Site. The plan is intended to address the quantity/rate of stormwater discharge from the Site, as well as the quality of the water leaving the Site. The stormwater management design also includes the roadway drainage infrastructure such as sewers, maintenance holes, catch basins, inlet and outlet structures.

In accordance with the City of Sault Ste. Marie's Stormwater Management Policy, the peak rate of stormwater flow leaving the Site following development should not exceed the peak rate prior to development. In Sault Ste. Marie, this quantity control is typically accommodated through the construction of a dry pond or subsurface storage. The City policy also outlines quality parameters which must be addressed.

A copy of the SWMP for the Site is attached in Appendix 4.

8.2 Parcel A Stormwater Management

Stormwater drainage for Parcel A will be provided through a dual system approach consisting of a minor system of piped storm drains as well as a major system with overland drainage paths. The City requires that the minor system accommodate a storm event with a 10 year return period, whereas larger flows will be handled by the major system.

A stormwater management facility (SWMF) proposed for Parcel A will include one dry pond with an outlet piped to the West Davignon Creek channel. The pond will provide quantity and quality control as required by the City.

8.3 Parcel B and Parcel C Stormwater Management

Similar to the approach for Parcel A, the stormwater drainage system for Parcels B and C will be accommodated through a dual system approach consisting of minor and major systems.

A separate, private, SWMF will be constructed in Parcel C to accommodate the stormwater quantity and quality treatment required for these parcels. The SWMF will consist of a dry pond with outlet to the West Davignon Creek Channel.

9 Electrical and Roadway Lighting

Electrical servicing and roadway lighting for the proposed development will be provided by the local hydro utility, PUC Distribution Inc. During the detailed design of the development, PUC Distribution Inc. will be consulted to ensure their requirements are accommodated.

10 Other Utilities Servicing

It is anticipated that the proposed development will be serviced by additional utilities such as:

- Enbridge (natural gas)
- Rogers Communications (Telecom)
- Bell Canada (Telecom)

Each of these utilities currently have existing services in Broadview Gardens adjacent to the Site.

11 Conclusions

Based on the information above, the following conclusions are presented

1. The proposed development of the Site is functionally feasible.
2. The site can be adequately serviced with Municipal sanitary sewer, potable water and transportation networks.
3. Stormwater management meeting the requirements of the City is achievable.
4. The extension of existing gas, hydro and telecommunications infrastructure will be required to service the proposed development.

Appendix 1

Proposed Site Plan

DESCRIPTION		BLOCK/MODEL NAME	NO. OF UNIT	PARKING
TOTAL PROPOSED UNITS	PARCEL - A	DETACH HOMES	66	66
		SEMI DETACH HOMES	16	16
	PARCEL - B ADULT COMMUNITY LIFE STYLE	TOWN HOMES	104	104
	PARCEL - C SENIOR'S COMMUNITY	APARTMENTS (2 BUILDINGS X 90)	180	81 (SURFACE PARKING)
				123 (UNDER GROUND PARKING)
		VISITOR PARKING		15
		PLAZA PARKING		10
		TOTAL	366	395

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

PLAN OF SURVEY OF
PART OF SECTION 27
TOWNSHIP OF KORAH
NOW IN THE
CITY OF SAULT STE. MARIE
DISTRICT OF ALGOMA
SCALE: 1 : 1500
0 20 60
METRES

N

OBSERVED REFERENCE POINTS (ORPs) DERIVED FROM REAL TIME KINETIC OBSERVATIONS USING MONUMENTS 'A' AND 'B' HAVING A BEARING OF N3°45'35"W UTM ZONE 16 NAD 83 (CSRS)(2010.0) COORDINATES TO URBAN ACCURACY PER SEC. 14(2) OF O.REG. 216/10.

	NORTHING	EASTING

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

LEGEND

□	DENOTES	FOUND MONUMENT
□	DENOTES	PLANTED MONUMENT
IB	DENOTES	IRON BAR
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
M	DENOTES	MEASURED
P	DENOTES	DEPOSITED PLAN 1R-6007
P1	DENOTES	DEPOSITED PLAN 1R-3123
P2	DENOTES	DEPOSITED PLAN 1R-6153
P3	DENOTES	DEPOSITED PLAN 1R-6204
P4	DENOTES	DEPOSITED PLAN 1R-6206
P5	DENOTES	REGISTERED PLAN AR-262
P6	DENOTES	REGISTERED PLAN AR-111
P7	DENOTES	DEPOSITED PLAN 1R-1658
S	DENOTES	SET
OU	DENOTES	ORIGIN UNKNOWN
WEB	DENOTES	W.E. BOLAN, O.L.S.
FCW	DENOTES	F.C. WILSON, O.L.S.
LAM	DENOTES	L.A. MILLER, O.L.S.
JBC	DENOTES	J.B. CHAMBERS, O.L.S.
PIN	DENOTES	PROPERTY IDENTIFICATION NUMBER

ROTATION NOTE

FOR BEARING COMPARISONS, A ROTATION OF 1°53'25" COUNTER CLOCKWISE WAS APPLIED TO PLANS 'P' THROUGHT 'P7' TO CONVERT TO GRID BEARINGS.

BEARING NOTE

BEARINGS ARE GRID AND ARE REFERRED TO THE WESTERLY LIMIT OF REGISTERED PLAN H-526 HAVING A BEARING OF N3°45'35"W FROM ON SITE GPS OBSERVATIONS.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, AND THE LAND TITLES ACT, AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON JANUARY 6, 2023.

January 9, 2023
SAULT STE. MARIE, ONT.

D.S. URSO
ONTARIO LAND SURVEYOR

RPDS
INTEGRATED DESIGN FIRM
SUITE 203, 7895 TRANMERE DR., MISSISSAUGA, ON L5S 1V9
MAIL: PROJECT@RPDSTUDIO.CA, CALL: 647-556-2596
WEBSITE: WWW.RPDSTUDIO.CA

DEVELOPED BY:
MAMTA HOMES

CONSULTING ENGINEER :
KRESIN Engineering Corporation

FOR REVIEW ONLY
(NOT FOR PERMIT)

No.	Revision	Date
01	Issued For Review	2023/08/23

Client Name:

Drawing Title:

Project:

0 CHIPPEWA STREET

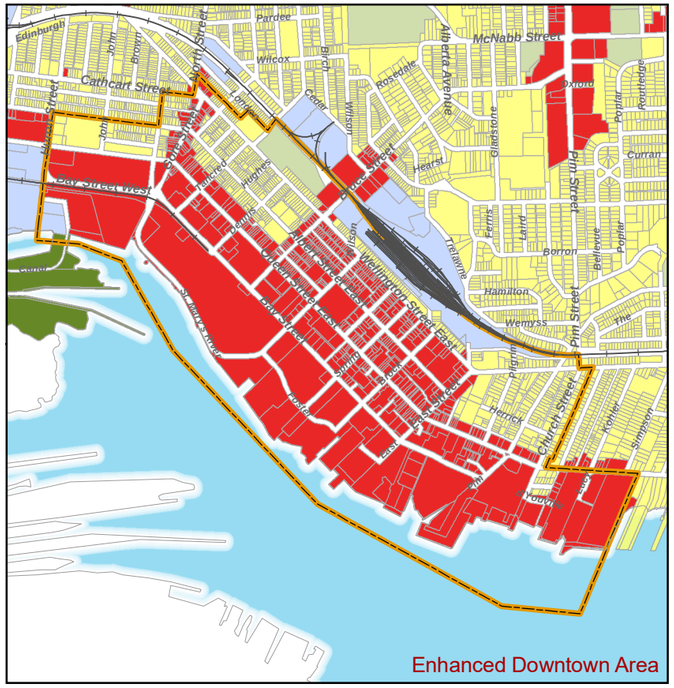
CITY OF SAULT STE. MARIE
DISTRICT OF ALGOMA

N

Scale: 1"=80'-0"
Drawn by: HL
Checked by: RP
Project No.:
Date: 2023/08/23
Drawing No.: **A-2.0**

Appendix 2

Sault Ste. Marie Official Plan Schedule C – Land use



Municipal Boundary

Municipal Boundary

RANKIN LOCATION
INDIAN RESERVE
No. 15D
(Not Included in Planning Area)

PRINCE TOWNSHIP
(Not Included in Planning Area)

Municipal Boundary

(Not Included in Planning Area)

(Not Included in Planning Area)

Lake Superior/
Whitefish Bay

St. Marys River

Canada
USA

CHIPPEWA COUNTY.
STATE OF MICHIGAN

St. Marys River

Canada
USA

SUGAR ISLAND TWP.
STATE OF MICHIGAN

City of Sault Ste. Marie

OFFICIAL PLAN SCHEDULE 'C'
Land Use

Residential
Commercial
Institutional
Parks Recreation
Industrial
Rural Area
Airport Lands
Downtown (OPA 121)
Existing Urban Settlement Area
Shield Line (2005)

Appendix 4

Stormwater Management Plan

Stormwater Management Report

Proposed Residential Subdivision,
0 Chippewa Avenue
Sault Ste. Marie, Ontario

Prepared for:
Mamta Homes

KRESIN
Engineering Corporation
www.kresinengineering.ca

June 2024
KEC Ref: 2278

TABLE OF CONTENTS

APPENDICES

1. Introduction

Kresin Engineering Corporation ("KEC") has been retained by Mamta Homes Inc. ("Mamta") to prepare a stormwater management plan ("SWMP") for the planned subdivision at 0 Chippewa Avenue (the "site"). Mamta is proposing to develop the site for mixed density residential use, including single family homes, semi-detached homes, townhouses and apartment buildings.

2. Background

The site is a vacant 15.1 hectare parcel of land in the west end of Sault Ste. Marie, located north of Second Line and west of Goulais Avenue, adjacent to the existing Broadview Gardens neighbourhood. The site is bordered on the west by the West Davignon Creek, constructed ditches to the north and south and Broadview Gardens to the east..

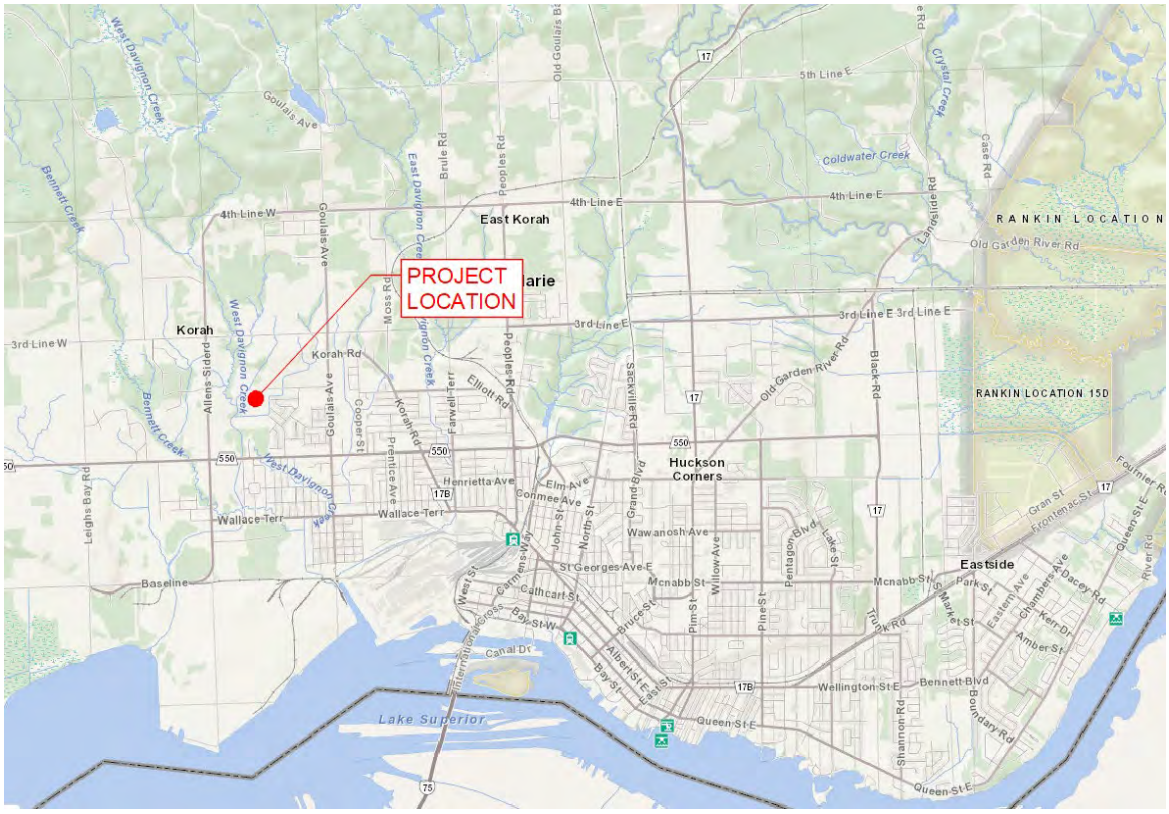


Figure 1: Project Location in Sault Ste. Marie, Ontario

It is our understanding that the property has historically been used for agricultural purposes, and it is currently zoned as Rural Area Zone in the City's zoning by-law.

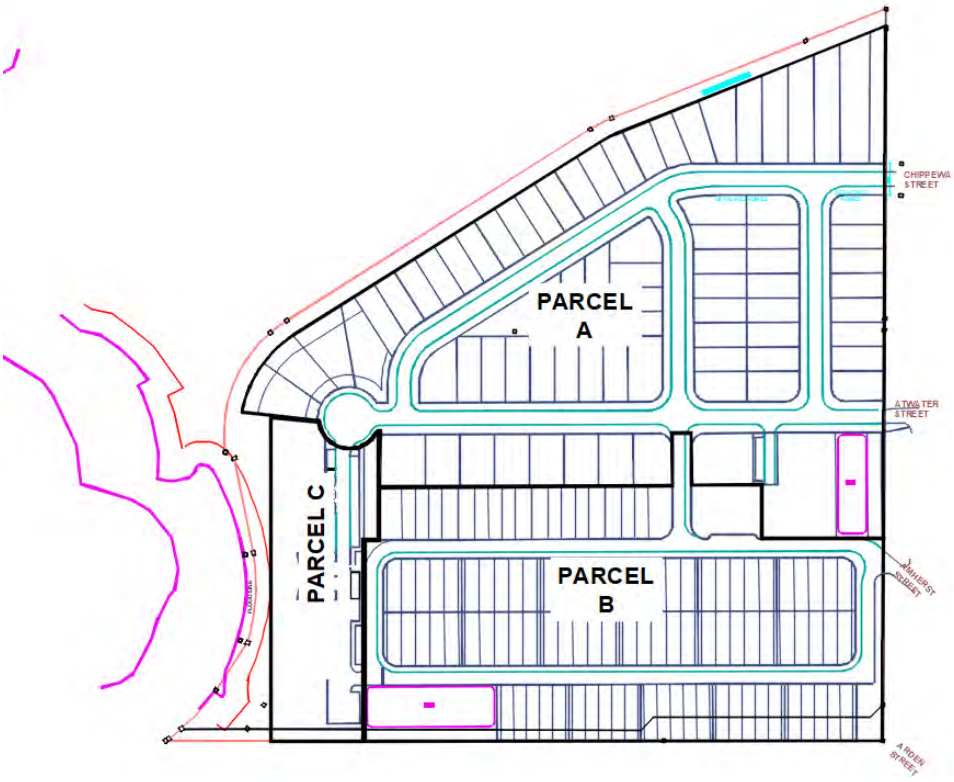
3. Proposed Subdivision

The proposed development consists of residential uses in a mix of densities including single family, semi-detached and multi-family as follows:

Table 1: Lot Count Use	Number of Lots
Single Family Residential	66
Semi-Detached	16
Townhouse	104
Apartment	2

The proposed subdivision is divided into the following three parcels as shown in Figure 2:

- Parcel A: Freehold single family and semi-detached with municipal roads/services.
- Parcel B: Townhouse condominium with private roads (condo association).
- Parcel C: Apartment buildings.



- *Figure 2: 0 Chippewa Avenue (the "Site")*

This report is intended to address the SWMP for Parcel A only, as Parcel A servicing will be municipally owned. Stormwater management for Parcels B and C will be addressed during the site plan approval stage for those projects.

The development is to include construction of local roads, sewers, and water distribution, as well as electrical, natural gas and telecom infrastructure. The proposed roads are to be Class

"A" pavement including curbs and gutters with storm sewers. Storm water infrastructure will include yard drainage, road drainage and connections for foundation drains/sump pumps of individual buildings.

4. Stormwater Management

The City of Sault Ste. Marie ("City") Stormwater Management Guidelines (the "Guidelines") provides direction for the design of stormwater drainage systems serving developments within the City. As stated in the Guidelines, the goals of these drainage systems is to:

- Protect human health and safety;
- Protect property, structures and infrastructure from damage;
- Preserve natural water courses and wetlands; and,
- Minimize impacts on the quantity and quality of surface and groundwater.

The goals are to be addressed through the engineered design of stormwater collection, transmission and management systems. The collection and transmission components comprise catch basins and other inlets, as well as ditches, swales, culverts and other piped storm sewers. Stormwater management systems may include lot level, and/or a development scale approaches to control quantity, rate and quality of stormwater discharge.

Existing Conditions (Pre-Development)

Stormwater runoff for the pre-development conditions of Parcel A is projected using the airport method, with an estimated runoff coefficient of 0.35 (MTO Drainage Management Manual, Design Chart 1.07, flat woodland, clay soil). With the topographic characteristics described above and available rainfall IDF data for Sault Ste. Marie, the following runoff volumes are estimated:

Table 2: Existing runoff rates

Storm Return Period	Peak runoff (L/s)
10 year	281
100 year	467
Regional Storm	592

Calculation summary sheets are attached in Appendix A.

Post Development

It is proposed that Parcel A of the subdivision will discharge stormwater flows to a constructed dry pond of sufficient capacity to accommodate the required design storm. The pond will be equipped with flow control structure(s) designed to ensure that the peak outflow does not exceed the pre-development flows noted above.

Storm Sewer System

In accordance with the Guidelines, the storm sewer system (minor system) has been designed to accommodate flows from a 10 year return storm event without surcharging. Flows exceeding

the capacity of the storm sewers will be accommodated via overland pathways and directed to avoid flooding of buildings.

Overland flow pathways are sized to accommodate flows up to and including the design major storm event (i.e. 100 year return event and the Regional Storm) without negative impacts to private property.

Storm sewer design plans and sheets are attached in Appendix B.

Storm Water Management Facility

The proposed Stormwater Management (SWM) Facility is designed to accommodate the required flow rates and quantities, and is in accordance with the City's design criteria, including:

- Quality control for enhanced level of protection;
- Municipal Stormwater Management Guidelines; and,
- Provincial Stormwater Management Standards.

Based on the design rainfall events, the SWM pond can accommodate a volume of approximately 2120m^3 of runoff with a maximum depth of 1.5m. In accordance with City guidelines, the pond will be constructed with 4:1 side slopes and will provide at least 0.3m of freeboard above the maximum operating level.

The outlet structure of the SWM pond has been designed to limit the rate of discharge to ensure pre-development rates are not exceeded; a summary is shown in Table 3. The discharge from the pond is directed to an existing municipal drainage ditch.

Table 3: SWM Pond Summary

Design Storm	Runoff rate (m^3/s)		SWM Pond	
	Pre	Post	Depth (m)	Volume (m^3)
10 year	0.281	0.562	1.03	1300
100 year	0.467	0.848	1.19	1575
Regional Storm	0.592	0.863	1.45	2040

In addition to managing the flow rate of runoff, the SWM facility will also provide the necessary enhanced level of protection for stormwater quality. Enhanced protection is defined as the long term average removal of 80% of total suspended solids (TSS) up to and including a 10 year return storm; this will be achieved utilizing Stormscepter oil/grit separator (OGS) at the pond inlet.

5. Maintenance and Operation

The storm sewer system will require maintenance in order to ensure proper function and long term performance. Routine maintenance may include catch-basin cleaning, vegetation management at the SWMP, pipeline inspections and maintenance hole cleaning. The timing of the maintenance should coincide with the City's standard procedures for storm sewer systems.

Stormceptor OGS unit(s) will require routine inspection and periodic sediment removal. Initially following installation and during the development build-out stage, annual inspection is recommended to confirm proper function and to observe sediment build-up. Once the development is built and landscaping has been established, the inspection interval may be extended pending observations.

Sediment removal, using a vacuum truck, will be required when the depth of sediment is approximately 15% of the unit's total storage capacity.

A copy of the Stormceptor manual is attached in Appendix C.

6. Closure

This stormwater management plan has been developed to provide the intended results in accordance with the Guidelines.

Runoff from the Site following storm events will be treated for minimum 80% TSS removal.

Flow rates from storm events will be tempered through the SWM facility so that the overall downstream peak flows will not increase when compared to pre-development discharge rate.

Thank you.

Yours Very Truly,
Kresin Engineering Corporation

Michael Kresin, P. Eng.
Consulting Engineer

2278 mk SWMP.docx

APPENDIX A

STORMWATER MODELLING

Storm Sewer Design Sheet

Project: **Chippewa Ave. Subdivision**
Client: **Mamta Homes**

KEC Project: **2278.03**
Date Updated: **March 8, 2023**

Bransby Williams Formula		
Time of Concentration=	0.057xL/(Sw^0.2xA^0.1)	
L=	Watershed Length	571.00m
Sw=	Watershed Slope	0.70%
A=	Watershed Area	7.31ha
	Time of Concentration=	10.00min

KRESIN Engineering Corporation

Design Parameters:

Storm Event Data: Sault Ste. Marie Airport AES IDF Curve (2010)
Use Rational Formula: Q=2.78CiA, for runoff generation.
Use Mannings Equation for sewer capacity determination.
Time of concentration: where C > 0.4 use Bransby Williams Formula (Tc= 0.057 x L / Sw0.2 x A0.1)
where C < 0.4 use Airport Formula (Tc= $(3.26*(1.1*C)*L^{0.5})/S_w^{0.33}$)

Pipe diameter are actual ID. From manufacturer's catalogs.
Pipe less then 600 nominal - PVC PROFILE PIPE
Pipe 600 nominal and larger - CONCRETE

Sewer Capacity:

Mannings Equation - $Q = 1/n * A * R^{2/3} * S^{1/2}$
Roughness Coefficient (n) - 0.013
Hydraulic Radius (R) - 0.25 * pipe diameter
Design Flow Velocity - $V= 1/n * R^{2/3} * S^{\wedge 1/2}$

LOCATION			DESIGN FLOWS										PIPE DESIGN							
			TRIBUTARY AREA										SEWER DATA							
from MH	to MH	Area	Roads C= 0.90 (ha)	Single Fam C= 0.35 (ha)	Grass C= 0.20 (ha)	Semis C= 0.50 (ha)	Commercial C= 0.85 (ha)	Individual 2.78 CA	Cumulative 2.78 CA	Time of Concentration (min)	Rainfall Intensity (mm/hr)	Flow "Q_d" (L/s)	Trade Size	Average ID (mm)	Grade (%)	Length (m)	Capacity "Q_{cap}" (L/s)	Velocity (m/s)	Time (min)	Pipe Utilization (Q_d/Q_{cap})
1	2	A1	0.05	0.15	0.23	0.00	0.00	0.399	0.399	10.0	116.1	46.3		375	0.15	33.9	67.91	0.62	10.0	68%
5	2	A2	0.10	0.36	0.20	0.00	0.00	0.712	1.111	10.9	109.2	121.3		525	0.13	79.8	155.06	0.72	10.9	78%
2	3	A3	0.08	0.52	0.00	0.00	0.00	0.706	1.817	12.8	97.8	177.7		750	0.06	81.9	272.70	0.62	12.8	65%
3	4	A4	0.13	0.61	0.00	0.00	0.00	0.919	2.736	15.0	87.5	239.3		750	0.05	74.9	248.94	0.56	15.0	96%
6	7	B1	0.09	0.46	0.00	0.00	0.00	0.673	0.673	10.0	116.1	78.1		450	0.08	82.8	80.64	0.51	10.0	97%
7	8	B2	0.13	0.78	0.00	0.00	0.00	1.084	1.757	12.7	98.1	172.4		600	0.08	100.7	173.67	0.61	12.7	99%
8	9	B3	0.04	0.17	0.00	0.00	0.00	0.273	2.030	15.5	85.6	173.8		675	0.07	40.8	222.40	0.62	15.5	78%
9	10	B4	0.14	0.59	0.00	0.00	0.00	0.924	2.954	16.5	81.6	241.1		750	0.06	109.7	272.70	0.62	16.5	88%
11	12	C1	0.18	0.50	0.00	0.12	0.00	1.109	1.109	10.0	116.1	128.7		450	0.23	56.5	136.73	0.86	10.0	94%
12	13	C2	0.07	0.24	0.00	0.23	0.00	0.728	1.837	11.1	108.0	198.3		600	0.12	61.0	212.70	0.75	11.1	93%
13	10	C3	0.14	0.46	0.00	0.31	0.00	1.229	3.066	12.4	99.6	305.4		825	0.07	96.8	379.78	0.71	12.4	80%
10	4	C4	0.06	0.00	0.00	0.00	0.15	0.505	6.525	14.7	88.6	578.1		900	0.09	87.0	543.09	0.85	14.7	106%
4	POND		0.00	0.00	0.00	0.00	0.00	0.000	9.260	16.4	82.1	760.0		900	0.16	25.0	724.12	1.14	16.4	105%
			0.18	0.35	0.00	0.30	0.00													
	TOTAL		1.40	5.19	0.43	0.96	0.15									930.8				

Stormwater modelling output

EPA SWMM/Autodesk SSA

O Chippewa Avenue Development – Municipal portion

10 year return event

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.0.94 (Build 0)

****
Project Description
****

File Name ..... CHIPPEWA WITH STORM IMPORT.SPF
Description ..... S:\projects\2022\2278 Chippewa Ave Development\2278 Acad\Design\C3D-2278.03 P1 P2 P3 P4.dwg

****
Analysis Options
****

Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... Horton
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date JUN-09-2024 00:00:00
Ending Date JUN-10-2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****

Number of rain gages 3
Number of subbasins 14
Number of nodes 16

Number of links 14
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
100-yr storm	10-yr	INTENSITY	6.00
10-yr storm	10-yr	INTENSITY	6.00
timmins	10-yr	INTENSITY	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
PRE DVLP	7.31	100.00	0.00	1.2600	10-yr storm
Sub-05	0.60	60.00	25.00	1.2600	10-yr storm
Sub-06	0.60	40.00	25.00	1.2600	10-yr storm
Sub-07	0.60	60.00	25.00	1.2600	10-yr storm
Sub-08	0.60	60.00	25.00	1.2600	10-yr storm
Sub-09	0.60	60.00	25.00	1.2600	10-yr storm
Sub-10	0.60	60.00	25.00	1.2600	10-yr storm
Sub-11	0.60	60.00	25.00	1.2600	10-yr storm
Sub-12	0.60	60.00	25.00	1.2600	10-yr storm
Sub-13	0.60	60.00	25.00	1.2600	10-yr storm
Sub-14	0.60	60.00	25.00	1.2600	10-yr storm

Sub-15	0.60	60.00	25.00	1.2600	10-yr storm
Sub-16	0.60	60.00	25.00	1.2600	10-yr storm
Sub-17	0.60	60.00	25.00	1.2600	10-yr storm

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
EndNullStruct0	JUNCTION	0.00	0.00	0.00	
MH 1 (Proposed Storm)	JUNCTION	193.79	195.60	0.00	
MH 10 (Proposed Storm)	JUNCTION	193.63	195.60	0.00	
MH 11 (Proposed Storm)	JUNCTION	193.85	195.64	0.00	
MH 12 (Proposed Storm)	JUNCTION	193.75	196.27	0.00	
MH 13 (Proposed Storm)	JUNCTION	193.68	196.11	0.00	
MH 2 (Proposed Storm)	JUNCTION	193.64	195.70	0.00	
MH 3 (Proposed Storm)	JUNCTION	193.56	195.26	0.00	
MH 4 (Proposed Storm)	JUNCTION	193.38	194.94	0.00	
MH 5 (Proposed Storm)	JUNCTION	193.84	196.27	0.00	
MH 6 (Proposed Storm)	JUNCTION	194.10	196.20	0.00	
MH 7 (Proposed Storm)	JUNCTION	193.95	196.68	0.00	
MH 8 (Proposed Storm)	JUNCTION	193.83	194.88	0.00	
MH 9 (Proposed Storm)	JUNCTION	193.74	196.10	0.00	
Out-01	OUTFALL	192.50	192.50	0.00	
POND	STORAGE	193.00	194.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness

---

{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)MH 1 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 33.9
0.2000 0.0120

{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)MH 10 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT
87.0 0.2529 0.0130

{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)MH 11 (Proposed Storm)MH 12 (Proposed Storm)CONDUIT
53.5 0.2000 0.0130

{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)MH 12 (Proposed Storm)MH 13 (Proposed Storm)CONDUIT
64.0 0.2000 0.0130

{Proposed Storm}.MH 13 - MH 10 (Proposed Storm)MH 13 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
96.8 0.2000 0.0120

{Proposed Storm}.MH 2 - MH 3 (Proposed Storm)MH 2 (Proposed Storm)MH 3 (Proposed Storm)CONDUIT 81.9
0.2000 0.0120

{Proposed Storm}.MH 3 - MH 4 (Proposed Storm)MH 3 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT 74.9
0.2000 0.0120

{Proposed Storm}.MH 4 - POND (Proposed Storm)MH 4 (Proposed Storm)POND CONDUIT 25.0
0.2000 0.0120

{Proposed Storm}.MH 5 - MH 2 (Proposed Storm)MH 5 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 79.8
0.2000 0.0120

{Proposed Storm}.MH 7 - MH 88 (Proposed Storm)MH 7 (Proposed Storm)MH 8 (Proposed Storm)CONDUIT 99.8
0.2000 0.0120

{Proposed Storm}.MH 8 - MH 9 (Proposed Storm)MH 8 (Proposed Storm)MH 9 (Proposed Storm)CONDUIT 40.6
0.2000 0.0120

{Proposed Storm}.MH 9 - MH 10 (Proposed Storm)MH 9 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
109.7 0.2000 0.0120

{Proposed Storm}.MH 9 - MH 11 (Proposed Storm)MH 6 (Proposed Storm)MH 7 (Proposed Storm)CONDUIT 82.8
0.2000 0.0120

Orifice-01 POND Out-01 ORIFICE

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter	Width	No. of Barrels	Cross Sectional	Full Flow Hydraulic	Design Flow

			Area	Radius	Capacity		
	m	m	m²	m	LPS		
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	559.91	
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	127.51	
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	274.61	
{Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 4 - POND (Proposed Storm) CIRCULAR	0.90	0.90	1	0.64	0.23	877.11	
{Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------
Total Precipitation	1.086	71.563

Evaporation Loss	0.000	0.000
Infiltration Loss	0.102	6.717
Surface Runoff	0.868	57.182
Final Surface Storage	0.117	7.699
Continuity Error (%)	-0.050	

********** Flow Routing Continuity **********	Volume hectare-m ---------	Volume Mliters ---------
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.867	8.666
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.863	8.633
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.001	0.014
Continuity Error (%)	0.217	

****
EPA SWMM Time of Concentration Computations Report
****

Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

Where:

Tc = Time of Concentration (min)
L = Flow Length (ft)
n = Manning's Roughness

```
        i  = Rainfall Intensity (in/hr)
        S  = Slope (ft/ft)

--------------------
Subbasin PRE DVLP
--------------------

        Flow length (m):                            731.20
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.40000
        Pervious Rainfall Intensity (mm/hr):       2.98180
        Impervious Rainfall Intensity (mm/hr):     2.98180
        Slope (%):                                 1.26000
        Computed TOC (minutes):                     220.48

------------------
Subbasin Sub-05
------------------

        Flow length (m):                            100.83
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       2.98180
        Impervious Rainfall Intensity (mm/hr):     2.98180
        Slope (%):                                 1.26000
        Computed TOC (minutes):                      56.51

------------------
Subbasin Sub-06
------------------

        Flow length (m):                            151.25
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       2.98180
```

```
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     72.08

------------------
Subbasin Sub-07
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-08
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-09
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-10
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-11
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-12
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
```

Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	2.98180
Impervious Rainfall Intensity (mm/hr):	2.98180
Slope (%):	1.26000
Computed TOC (minutes):	56.51

Subbasin Sub-13

Flow length (m):	100.83
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	2.98180
Impervious Rainfall Intensity (mm/hr):	2.98180
Slope (%):	1.26000
Computed TOC (minutes):	56.51

Subbasin Sub-14

Flow length (m):	100.83
Pervious Manning's Roughness:	0.10000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	2.98180
Impervious Rainfall Intensity (mm/hr):	2.98180
Slope (%):	1.26000
Computed TOC (minutes):	56.51

Subbasin Sub-15

Flow length (m):	100.83

```
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-16
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51

------------------
Subbasin Sub-17
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      2.98180
        Impervious Rainfall Intensity (mm/hr):    2.98180
        Slope (%):                                1.26000
        Computed TOC (minutes):                     56.51


**********************
Subbasin Runoff Summary
**********************
```

Subbasin ID	Total Rainfall mm	Total Runon mm	Total Evap. mm	Total Infil. mm	Total Runoff mm	Peak Runoff LPS	Runoff Coefficient	Time of Concentration days	Time of Concentration hh:mm:ss
PRE DVLP	71.56	0.00	0.00	4.17	56.68	281.68	0.792	0	03:40:28
Sub-05	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-06	71.56	0.00	0.00	9.08	57.45	41.05	0.803	0	01:12:04
Sub-07	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-08	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-09	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-10	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-11	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-12	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-13	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-14	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-15	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-16	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30
Sub-17	71.56	0.00	0.00	9.08	57.66	43.65	0.806	0	00:56:30

****
Node Depth Summary
****

Node ID	Average Depth Attained m	Maximum Depth Attained m	Maximum HGL Attained m	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume ha-mm	Total Flooded Time minutes	Retention Time hh:mm:ss
EndNullStruct0	0.00	0.00	0.00	0	00:00	0	0	0:00:00
MH 1 (Proposed Storm)	0.04	0.17	193.96	0	12:12	0	0	0:00:00

MH 10 (Proposed Storm)	0.10	0.43	194.06	0	12:14	0	0	0:00:00
MH 11 (Proposed Storm)	0.04	0.18	194.03	0	12:12	0	0	0:00:00
MH 12 (Proposed Storm)	0.09	0.23	193.98	0	12:12	0	0	0:00:00
MH 13 (Proposed Storm)	0.11	0.30	193.98	0	12:13	0	0	0:00:00
MH 2 (Proposed Storm)	0.14	0.27	193.91	0	12:12	0	0	0:00:00
MH 3 (Proposed Storm)	0.09	0.29	193.85	0	12:13	0	0	0:00:00
MH 4 (Proposed Storm)	0.24	0.52	193.90	0	12:14	0	0	0:00:00
MH 5 (Proposed Storm)	0.04	0.17	194.01	0	12:12	0	0	0:00:00
MH 6 (Proposed Storm)	0.04	0.17	194.27	0	12:12	0	0	0:00:00
MH 7 (Proposed Storm)	0.09	0.22	194.17	0	12:13	0	0	0:00:00
MH 8 (Proposed Storm)	0.08	0.28	194.11	0	12:13	0	0	0:00:00
MH 9 (Proposed Storm)	0.11	0.33	194.07	0	12:14	0	0	0:00:00
Out-01	0.00	0.00	192.50	0	00:00	0	0	0:00:00
POND	0.15	1.03	194.03	0	13:08	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow LPS	Peak Inflow LPS	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow LPS	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
EndNullStruct0	JUNCTION	0.00	0.00	0	00:00	0.00		
MH 1 (Proposed Storm)	JUNCTION	43.65	43.65	0	12:12	0.00		
MH 10 (Proposed Storm)	JUNCTION	43.65	347.62	0	12:14	0.00		
MH 11 (Proposed Storm)	JUNCTION	43.65	43.65	0	12:12	0.00		
MH 12 (Proposed Storm)	JUNCTION	43.65	87.16	0	12:12	0.00		
MH 13 (Proposed Storm)	JUNCTION	43.65	130.60	0	12:13	0.00		
MH 2 (Proposed Storm)	JUNCTION	43.65	130.73	0	12:12	0.00		
MH 3 (Proposed Storm)	JUNCTION	41.05	171.66	0	12:13	0.00		
MH 4 (Proposed Storm)	JUNCTION	43.65	562.32	0	12:14	0.00		

MH 5 (Proposed Storm)	JUNCTION	43.65	43.65	0	12:12	0.00
MH 6 (Proposed Storm)	JUNCTION	43.65	43.65	0	12:12	0.00
MH 7 (Proposed Storm)	JUNCTION	43.65	87.11	0	12:12	0.00
MH 8 (Proposed Storm)	JUNCTION	43.65	130.45	0	12:13	0.00
MH 9 (Proposed Storm)	JUNCTION	43.65	173.86	0	12:13	0.00
Out-01	OUTFALL	281.68	541.77	0	12:54	0.00
POND	STORAGE	0.00	562.32	0	12:15	0.00

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded (%)	Time of Max Ponded days hh:mm	Average Ponded Volume 1000 m³	Average Ponded (%)	Maximum Storage Node Outflow LPS	Maximum Exfiltration Rate cmm	Time of Max. Exfiltration hh:mm:ss	Total Exfiltrated Volume 1000 m³
POND	1.300	61	0 13:07	0.151	7	265.41	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
Out-01	96.95	103.04	541.77
System	96.95	103.04	541.77

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained m/sec	Length Factor	Peak Flow during Analysis LPS	Design Flow Capacity LPS	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Reported Time minutes	Condition
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)	CONDUIT	0 12:12	0.77	1.00	43.62	138.14	0.32	0.39	0	Calculated
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)	CONDUIT	0 12:15	1.33	1.00	347.53	559.91	0.62	0.57	0	Calculated
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)	CONDUIT	0 12:13	0.73	1.00	43.59	127.51	0.34	0.40	0	Calculated
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)	CONDUIT	0 12:13	0.86	1.00	87.10					

```
274.61      0.32      0.39           0  Calculated
  {Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CONDUIT      0  12:14      1.01    1.00      130.53
539.39      0.24      0.34           0  Calculated
  {Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CONDUIT      0  12:13      1.01    1.00      130.64      539.39
    0.24      0.34           0  Calculated
  {Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CONDUIT      0  12:14      1.08    1.00      171.60      539.39
    0.32      0.39           0  Calculated
  {Proposed Storm}.MH 4 - POND (Proposed Storm) CONDUIT      0  12:15      1.46    1.00      562.32      877.11
    0.64      0.58           0  Calculated
  {Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CONDUIT      0  12:13      0.77    1.00       43.57      138.14
    0.32      0.39           0  Calculated
  {Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CONDUIT      0  12:14      0.91    1.00       87.03      297.50
     0.29      0.37           0  Calculated
  {Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CONDUIT      0  12:14      1.02    1.00      130.44      297.50
    0.44      0.46           0  Calculated
  {Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CONDUIT      0  12:14      1.09    1.00      173.79      539.39
     0.32      0.39           0  Calculated
  {Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CONDUIT      0  12:13      0.77    1.00       43.57      138.14
     0.32      0.39           0  Calculated
  Orifice-01           ORIFICE      0  13:08                      265.41


  ******************************
  Highest Flow Instability Indexes
  ******************************
  Link {Proposed Storm}.MH 10 - MH 4 (Proposed Storm) (1)
  Link {Proposed Storm}.MH 4 - POND (Proposed Storm) (1)


  ************************
  Routing Time Step Summary
  ************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
```

```
Percent in Steady State     :     0.00
Average Iterations per Step :     1.39


Analysis began on:  Sun Jun 09 19:54:10 2024
Analysis ended on:  Sun Jun 09 19:54:10 2024
Total elapsed time: < 1 sec
```

Stormwater modelling output

EPA SWMM/Autodesk SSA

O Chippewa Avenue Development – Municipal portion

100 year return event

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.0.94 (Build 0)

****
Project Description
****

File Name ..... CHIPPEWA WITH STORM IMPORT.SPF
Description ..... S:\projects\2022\2278 Chippewa Ave Development\2278 Acad\Design\C3D-2278.03 P1 P2 P3 P4.dwg

****
Analysis Options
****

Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... Horton
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date JUN-09-2024 00:00:00
Ending Date JUN-10-2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****

Number of rain gages 3
Number of subbasins 14
Number of nodes 16

Number of links 14
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
100-yr storm	100 YR	INTENSITY	6.00
10-yr storm	100 YR	INTENSITY	6.00
timmins	100 YR	INTENSITY	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
PRE DVLP	7.31	100.00	0.00	1.2600	100-yr storm
Sub-05	0.60	60.00	25.00	1.2600	100-yr storm
Sub-06	0.60	40.00	25.00	1.2600	100-yr storm
Sub-07	0.60	60.00	25.00	1.2600	100-yr storm
Sub-08	0.60	60.00	25.00	1.2600	100-yr storm
Sub-09	0.60	60.00	25.00	1.2600	100-yr storm
Sub-10	0.60	60.00	25.00	1.2600	100-yr storm
Sub-11	0.60	60.00	25.00	1.2600	100-yr storm
Sub-12	0.60	60.00	25.00	1.2600	100-yr storm
Sub-13	0.60	60.00	25.00	1.2600	100-yr storm
Sub-14	0.60	60.00	25.00	1.2600	100-yr storm

Sub-15	0.60	60.00	25.00	1.2600	100-yr storm
Sub-16	0.60	60.00	25.00	1.2600	100-yr storm
Sub-17	0.60	60.00	25.00	1.2600	100-yr storm

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
EndNullStruct0	JUNCTION	0.00	0.00	0.00	
MH 1 (Proposed Storm)	JUNCTION	193.79	195.60	0.00	
MH 10 (Proposed Storm)	JUNCTION	193.63	195.60	0.00	
MH 11 (Proposed Storm)	JUNCTION	193.85	195.64	0.00	
MH 12 (Proposed Storm)	JUNCTION	193.75	196.27	0.00	
MH 13 (Proposed Storm)	JUNCTION	193.68	196.11	0.00	
MH 2 (Proposed Storm)	JUNCTION	193.64	195.70	0.00	
MH 3 (Proposed Storm)	JUNCTION	193.56	195.26	0.00	
MH 4 (Proposed Storm)	JUNCTION	193.38	194.94	0.00	
MH 5 (Proposed Storm)	JUNCTION	193.84	196.27	0.00	
MH 6 (Proposed Storm)	JUNCTION	194.10	196.20	0.00	
MH 7 (Proposed Storm)	JUNCTION	193.95	196.68	0.00	
MH 8 (Proposed Storm)	JUNCTION	193.83	194.88	0.00	
MH 9 (Proposed Storm)	JUNCTION	193.74	196.10	0.00	
Out-01	OUTFALL	192.50	192.50	0.00	
POND	STORAGE	193.00	194.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness

---

{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)MH 1 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 33.9
0.2000 0.0120

{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)MH 10 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT
87.0 0.2529 0.0130

{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)MH 11 (Proposed Storm)MH 12 (Proposed Storm)CONDUIT
53.5 0.2000 0.0130

{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)MH 12 (Proposed Storm)MH 13 (Proposed Storm)CONDUIT
64.0 0.2000 0.0130

{Proposed Storm}.MH 13 - MH 10 (Proposed Storm)MH 13 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
96.8 0.2000 0.0120

{Proposed Storm}.MH 2 - MH 3 (Proposed Storm)MH 2 (Proposed Storm)MH 3 (Proposed Storm)CONDUIT 81.9
0.2000 0.0120

{Proposed Storm}.MH 3 - MH 4 (Proposed Storm)MH 3 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT 74.9
0.2000 0.0120

{Proposed Storm}.MH 4 - POND (Proposed Storm)MH 4 (Proposed Storm)POND CONDUIT 25.0
0.2000 0.0120

{Proposed Storm}.MH 5 - MH 2 (Proposed Storm)MH 5 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 79.8
0.2000 0.0120

{Proposed Storm}.MH 7 - MH 88 (Proposed Storm)MH 7 (Proposed Storm)MH 8 (Proposed Storm)CONDUIT 99.8
0.2000 0.0120

{Proposed Storm}.MH 8 - MH 9 (Proposed Storm)MH 8 (Proposed Storm)MH 9 (Proposed Storm)CONDUIT 40.6
0.2000 0.0120

{Proposed Storm}.MH 9 - MH 10 (Proposed Storm)MH 9 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
109.7 0.2000 0.0120

{Proposed Storm}.MH 9 - MH 11 (Proposed Storm)MH 6 (Proposed Storm)MH 7 (Proposed Storm)CONDUIT 82.8
0.2000 0.0120

Orifice-01 POND Out-01 ORIFICE

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter	Width	No. of Barrels	Cross Sectional	Full Flow Hydraulic	Design Flow

			Area	Radius	Capacity		
	m	m	m²	m	LPS		
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	559.91	
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	127.51	
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	274.61	
{Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 4 - POND (Proposed Storm) CIRCULAR	0.90	0.90	1	0.64	0.23	877.11	
{Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------
Total Precipitation	1.584	104.363

Evaporation Loss	0.000	0.000
Infiltration Loss	0.103	6.793
Surface Runoff	1.352	89.100
Final Surface Storage	0.129	8.524
Continuity Error (%)	-0.052	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	Mliters
**********	---------	---------
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	1.350	13.503
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	1.346	13.460
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.002	0.021
Continuity Error (%)	0.165	

****
EPA SWMM Time of Concentration Computations Report
****

Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

Where:

Tc = Time of Concentration (min)
L = Flow Length (ft)
n = Manning's Roughness

```
        i  = Rainfall Intensity (in/hr)
        S  = Slope (ft/ft)

--------------------
Subbasin PRE DVLP
--------------------

        Flow length (m):                            731.20
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.40000
        Pervious Rainfall Intensity (mm/hr):       4.34846
        Impervious Rainfall Intensity (mm/hr):     4.34846
        Slope (%):                                 1.26000
        Computed TOC (minutes):                     189.58

------------------
Subbasin Sub-05
------------------

        Flow length (m):                            100.83
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       4.34846
        Impervious Rainfall Intensity (mm/hr):     4.34846
        Slope (%):                                 1.26000
        Computed TOC (minutes):                      48.59

------------------
Subbasin Sub-06
------------------

        Flow length (m):                            151.25
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):       4.34846
```

```
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     61.98

------------------
Subbasin Sub-07
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-08
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-09
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-10
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-11
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-12
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
```

```
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-13
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-14
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-15
------------------

        Flow length (m):                           100.83
```

```
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-16
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59

------------------
Subbasin Sub-17
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):      4.34846
        Impervious Rainfall Intensity (mm/hr):    4.34846
        Slope (%):                                1.26000
        Computed TOC (minutes):                     48.59


**********************
Subbasin Runoff Summary
**********************
```

Subbasin ID	Total Rainfall mm	Total Runon mm	Total Evap. mm	Total Infil. mm	Total Runoff mm	Peak Runoff LPS	Runoff Coefficient	Time of Concentration days	Time of Concentration hh:mm:ss
PRE DVLP	104.36	0.00	0.00	4.21	88.13	467.06	0.844	0	03:09:34
Sub-05	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-06	104.36	0.00	0.00	9.19	89.72	62.78	0.860	0	01:01:58
Sub-07	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-08	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-09	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-10	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-11	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-12	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-13	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-14	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-15	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-16	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35
Sub-17	104.36	0.00	0.00	9.19	90.02	65.76	0.863	0	00:48:35

****
Node Depth Summary
****

Node ID	Average Depth Attained m	Maximum Depth Attained m	Maximum HGL Attained m	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume ha-mm	Total Time Flooded minutes	Retention Time hh:mm:ss
EndNullStruct0	0.00	0.00	0.00	0	00:00	0	0	0:00:00
MH 1 (Proposed Storm)	0.05	0.22	194.01	0	12:12	0	0	0:00:00

MH 10 (Proposed Storm)	0.13	0.58	194.21	0	12:13	0	0	0:00:00
MH 11 (Proposed Storm)	0.05	0.23	194.08	0	12:12	0	0	0:00:00
MH 12 (Proposed Storm)	0.10	0.29	194.04	0	12:12	0	0	0:00:00
MH 13 (Proposed Storm)	0.12	0.36	194.04	0	12:12	0	0	0:00:00
MH 2 (Proposed Storm)	0.15	0.32	193.96	0	12:12	0	0	0:00:00
MH 3 (Proposed Storm)	0.10	0.37	193.93	0	12:13	0	0	0:00:00
MH 4 (Proposed Storm)	0.26	0.71	194.09	0	12:13	0	0	0:00:00
MH 5 (Proposed Storm)	0.05	0.22	194.06	0	12:12	0	0	0:00:00
MH 6 (Proposed Storm)	0.05	0.22	194.32	0	12:12	0	0	0:00:00
MH 7 (Proposed Storm)	0.10	0.28	194.23	0	12:12	0	0	0:00:00
MH 8 (Proposed Storm)	0.10	0.36	194.19	0	12:12	0	0	0:00:00
MH 9 (Proposed Storm)	0.13	0.41	194.15	0	12:13	0	0	0:00:00
Out-01	0.00	0.00	192.50	0	00:00	0	0	0:00:00
POND	0.15	1.19	194.19	0	12:58	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow LPS	Peak Inflow LPS	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow LPS	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
EndNullStruct0	JUNCTION	0.00	0.00	0	00:00	0.00		
MH 1 (Proposed Storm)	JUNCTION	65.76	65.76	0	12:12	0.00		
MH 10 (Proposed Storm)	JUNCTION	65.76	524.10	0	12:13	0.00		
MH 11 (Proposed Storm)	JUNCTION	65.76	65.76	0	12:12	0.00		
MH 12 (Proposed Storm)	JUNCTION	65.76	131.33	0	12:12	0.00		
MH 13 (Proposed Storm)	JUNCTION	65.76	196.81	0	12:12	0.00		
MH 2 (Proposed Storm)	JUNCTION	65.76	196.97	0	12:12	0.00		
MH 3 (Proposed Storm)	JUNCTION	62.78	259.53	0	12:13	0.00		
MH 4 (Proposed Storm)	JUNCTION	65.76	848.50	0	12:13	0.00		

MH 5 (Proposed Storm)	JUNCTION	65.76	65.76	0	12:12	0.00
MH 6 (Proposed Storm)	JUNCTION	65.76	65.76	0	12:12	0.00
MH 7 (Proposed Storm)	JUNCTION	65.76	131.27	0	12:12	0.00
MH 8 (Proposed Storm)	JUNCTION	65.76	196.65	0	12:12	0.00
MH 9 (Proposed Storm)	JUNCTION	65.76	262.18	0	12:12	0.00
Out-01	OUTFALL	467.06	932.90	0	12:48	0.00
POND	STORAGE	0.00	848.51	0	12:14	0.00

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded (%)	Time of Max Ponded days hh:mm	Average Ponded Volume 1000 m³	Average Ponded (%)	Maximum Storage Node Outflow LPS	Maximum Exfiltration Rate cmm	Time of Max. Exfiltration hh:mm:ss	Total Exfiltrated Volume 1000 m³
POND	1.575	74	0 12:58	0.151	7	472.43	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
Out-01	97.29	160.08	932.90
System	97.29	160.08	932.90

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained m/sec	Length Factor	Peak Flow during Analysis LPS	Design Flow Capacity LPS	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Reported Time minutes	Condition
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)	CONDUIT	0 12:12	0.86	1.00	65.71	138.14	0.48	0.49	0	Calculated
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)	CONDUIT	0 12:14	1.44	1.00	523.97	559.91	0.94	0.77	0	Calculated
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)	CONDUIT	0 12:12	0.81	1.00	65.70	127.51	0.52	0.51	0	Calculated
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)	CONDUIT	0 12:13	0.96	1.00	131.27					

```
274.61      0.48      0.49           0  Calculated
  {Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CONDUIT      0  12:13      1.13    1.00      196.74
539.39      0.36      0.42           0  Calculated
  {Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CONDUIT      0  12:13      1.13    1.00      196.89      539.39
    0.37      0.42           0  Calculated
  {Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CONDUIT      0  12:13      1.21    1.00      259.45      539.39
    0.48      0.49           0  Calculated
  {Proposed Storm}.MH 4 - POND (Proposed Storm) CONDUIT      0  12:14      1.57    1.00      848.51      877.11
    0.97      0.79           0  Calculated
  {Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CONDUIT      0  12:12      0.86    1.00       65.67      138.14
    0.48      0.49           0  Calculated
  {Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CONDUIT      0  12:13      1.02    1.00      131.19      297.50
     0.44      0.46           0  Calculated
  {Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CONDUIT      0  12:13      1.12    1.00      196.64      297.50
    0.66      0.59           0  Calculated
  {Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CONDUIT      0  12:13      1.21    1.00      262.05      539.39
     0.49      0.49           0  Calculated
  {Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CONDUIT      0  12:12      0.86    1.00       65.66      138.14
     0.48      0.49           0  Calculated
  Orifice-01           ORIFICE      0  12:58                      472.43


  ******************************
  Highest Flow Instability Indexes
  ******************************
  Link {Proposed Storm}.MH 10 - MH 4 (Proposed Storm) (1)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
```

Average Iterations per Step :   1.46

Analysis began on: Sun Jun 09 19:38:06 2024
Analysis ended on: Sun Jun 09 19:38:06 2024
Total elapsed time: < 1 sec

Stormwater modelling output

EPA SWMM/Autodesk SSA

O Chippewa Avenue Development – Municipal portion

Regional Storm event

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.0.94 (Build 0)

****
Project Description
****

File Name ..... CHIPPEWA WITH STORM IMPORT.SPF
Description ..... S:\projects\2022\2278 Chippewa Ave Development\2278 Acad\Design\C3D-2278.03 P1 P2 P3 P4.dwg

****
Analysis Options
****

Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... Horton
Link Routing Method ..... Kinematic Wave
Storage Node Exfiltration.. None
Starting Date JUN-09-2024 00:00:00
Ending Date JUN-10-2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Wet Time Step 00:05:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****

Number of rain gages 3
Number of subbasins 14
Number of nodes 16

Number of links 14
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
100-yr storm	timmins	INTENSITY	6.00
10-yr storm	timmins	INTENSITY	6.00
timmins	timmins	INTENSITY	6.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
PRE DVLP	7.31	100.00	0.00	1.2600	timmins
Sub-05	0.60	60.00	25.00	1.2600	timmins
Sub-06	0.60	40.00	25.00	1.2600	timmins
Sub-07	0.60	60.00	25.00	1.2600	timmins
Sub-08	0.60	60.00	25.00	1.2600	timmins
Sub-09	0.60	60.00	25.00	1.2600	timmins
Sub-10	0.60	60.00	25.00	1.2600	timmins
Sub-11	0.60	60.00	25.00	1.2600	timmins
Sub-12	0.60	60.00	25.00	1.2600	timmins
Sub-13	0.60	60.00	25.00	1.2600	timmins
Sub-14	0.60	60.00	25.00	1.2600	timmins

Sub-15	0.60	60.00	25.00	1.2600	timmins
Sub-16	0.60	60.00	25.00	1.2600	timmins
Sub-17	0.60	60.00	25.00	1.2600	timmins

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
EndNullStruct0	JUNCTION	0.00	0.00	0.00	
MH 1 (Proposed Storm)	JUNCTION	193.79	195.60	0.00	
MH 10 (Proposed Storm)	JUNCTION	193.63	195.60	0.00	
MH 11 (Proposed Storm)	JUNCTION	193.85	195.64	0.00	
MH 12 (Proposed Storm)	JUNCTION	193.75	196.27	0.00	
MH 13 (Proposed Storm)	JUNCTION	193.68	196.11	0.00	
MH 2 (Proposed Storm)	JUNCTION	193.64	195.70	0.00	
MH 3 (Proposed Storm)	JUNCTION	193.56	195.26	0.00	
MH 4 (Proposed Storm)	JUNCTION	193.38	194.94	0.00	
MH 5 (Proposed Storm)	JUNCTION	193.84	196.27	0.00	
MH 6 (Proposed Storm)	JUNCTION	194.10	196.20	0.00	
MH 7 (Proposed Storm)	JUNCTION	193.95	196.68	0.00	
MH 8 (Proposed Storm)	JUNCTION	193.83	194.88	0.00	
MH 9 (Proposed Storm)	JUNCTION	193.74	196.10	0.00	
Out-01	OUTFALL	192.50	192.50	0.00	
POND	STORAGE	193.00	194.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness

---

{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)MH 1 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 33.9
0.2000 0.0120

{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)MH 10 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT
87.0 0.2529 0.0130

{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)MH 11 (Proposed Storm)MH 12 (Proposed Storm)CONDUIT
53.5 0.2000 0.0130

{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)MH 12 (Proposed Storm)MH 13 (Proposed Storm)CONDUIT
64.0 0.2000 0.0130

{Proposed Storm}.MH 13 - MH 10 (Proposed Storm)MH 13 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
96.8 0.2000 0.0120

{Proposed Storm}.MH 2 - MH 3 (Proposed Storm)MH 2 (Proposed Storm)MH 3 (Proposed Storm)CONDUIT 81.9
0.2000 0.0120

{Proposed Storm}.MH 3 - MH 4 (Proposed Storm)MH 3 (Proposed Storm)MH 4 (Proposed Storm)CONDUIT 74.9
0.2000 0.0120

{Proposed Storm}.MH 4 - POND (Proposed Storm)MH 4 (Proposed Storm)POND CONDUIT 25.0
0.2000 0.0120

{Proposed Storm}.MH 5 - MH 2 (Proposed Storm)MH 5 (Proposed Storm)MH 2 (Proposed Storm)CONDUIT 79.8
0.2000 0.0120

{Proposed Storm}.MH 7 - MH 88 (Proposed Storm)MH 7 (Proposed Storm)MH 8 (Proposed Storm)CONDUIT 99.8
0.2000 0.0120

{Proposed Storm}.MH 8 - MH 9 (Proposed Storm)MH 8 (Proposed Storm)MH 9 (Proposed Storm)CONDUIT 40.6
0.2000 0.0120

{Proposed Storm}.MH 9 - MH 10 (Proposed Storm)MH 9 (Proposed Storm)MH 10 (Proposed Storm)CONDUIT
109.7 0.2000 0.0120

{Proposed Storm}.MH 9 - MH 11 (Proposed Storm)MH 6 (Proposed Storm)MH 7 (Proposed Storm)CONDUIT 82.8
0.2000 0.0120

Orifice-01 POND Out-01 ORIFICE

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter	Width	No. of Barrels	Cross Sectional	Full Flow Hydraulic	Design Flow

			Area	Radius	Capacity		
	m	m	m²	m	LPS		
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	559.91	
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	127.51	
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	274.61	
{Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 4 - POND (Proposed Storm) CIRCULAR	0.90	0.90	1	0.64	0.23	877.11	
{Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	
{Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CIRCULAR	0.60	0.60	1	0.28	0.15	297.50	
{Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CIRCULAR	0.75	0.75	1	0.44	0.19	539.39	
{Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CIRCULAR	0.45	0.45	1	0.16	0.11	138.14	

**********	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
**********	---------	-------
Total Precipitation	2.875	189.404

Evaporation Loss	0.000	0.000
Infiltration Loss	0.105	6.950
Surface Runoff	2.713	178.774
Final Surface Storage	0.055	3.649
Continuity Error (%)	0.016	

**********	Volume	Volume
Flow Routing Continuity	hectare-m	Mliters
**********	---------	---------
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	2.714	27.142
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	2.709	27.094
Surface Flooding	0.000	0.000
Evaporation Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.178	

****
EPA SWMM Time of Concentration Computations Report
****

Tc = (0.94 * (L^0.6) * (n^0.6)) / ((i^0.4) * (S^0.3))

Where:

Tc = Time of Concentration (min)
L = Flow Length (ft)
n = Manning's Roughness

```
        i  = Rainfall Intensity (in/hr)
        S  = Slope (ft/ft)

--------------------
Subbasin PRE DVLP
--------------------

        Flow length (m):                            731.20
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.40000
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                 1.26000
        Computed TOC (minutes):                     113.17

------------------
Subbasin Sub-05
------------------

        Flow length (m):                            100.83
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                 1.26000
        Computed TOC (minutes):                      29.01

------------------
Subbasin Sub-06
------------------

        Flow length (m):                            151.25
        Pervious Manning's Roughness:              0.10000
        Impervious Manning's Roughness:            0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
```

```
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     37.00

------------------
Subbasin Sub-07
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-08
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-09
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
```

```
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-10
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-11
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-12
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
```

```
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-13
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-14
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-15
------------------

        Flow length (m):                           100.83
```

```
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-16
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01

------------------
Subbasin Sub-17
------------------

        Flow length (m):                           100.83
        Pervious Manning's Roughness:             0.10000
        Impervious Manning's Roughness:           0.01500
        Pervious Rainfall Intensity (mm/hr):     15.78370
        Impervious Rainfall Intensity (mm/hr):   15.78370
        Slope (%):                                1.26000
        Computed TOC (minutes):                     29.01


**********************
Subbasin Runoff Summary
**********************
```

Subbasin ID	Total Rainfall mm	Total Runon mm	Total Evap. mm	Total Infil. mm	Total Runoff mm	Peak Runoff LPS	Runoff Coefficient	Time of Concentration days	Time of Concentration hh:mm:ss
PRE DVLP	189.40	0.00	0.00	4.29	178.31	592.63	0.941	0	01:53:10
Sub-05	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-06	189.40	0.00	0.00	9.42	178.91	65.14	0.945	0	00:36:59
Sub-07	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-08	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-09	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-10	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-11	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-12	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-13	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-14	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-15	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-16	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00
Sub-17	189.40	0.00	0.00	9.42	179.23	66.69	0.946	0	00:29:00

****
Node Depth Summary
****

Node ID	Average Depth Attained m	Maximum Depth Attained m	Maximum HGL Attained m	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume ha-mm	Total Flooded Time minutes	Retention Time hh:mm:ss
EndNullStruct0	0.00	0.00	0.00	0	00:00	0	0	0:00:00
MH 1 (Proposed Storm)	0.06	0.22	194.01	0	07:06	0	0	0:00:00

MH 10 (Proposed Storm)	0.17	0.58	194.21	0	07:12	0	0	0:00:00
MH 11 (Proposed Storm)	0.07	0.23	194.08	0	07:06	0	0	0:00:00
MH 12 (Proposed Storm)	0.12	0.29	194.04	0	07:07	0	0	0:00:00
MH 13 (Proposed Storm)	0.14	0.37	194.05	0	07:08	0	0	0:00:00
MH 2 (Proposed Storm)	0.16	0.32	193.96	0	07:07	0	0	0:00:00
MH 3 (Proposed Storm)	0.13	0.37	193.93	0	07:12	0	0	0:00:00
MH 4 (Proposed Storm)	0.29	0.73	194.11	0	07:12	0	0	0:00:00
MH 5 (Proposed Storm)	0.06	0.22	194.06	0	07:06	0	0	0:00:00
MH 6 (Proposed Storm)	0.06	0.22	194.32	0	07:06	0	0	0:00:00
MH 7 (Proposed Storm)	0.11	0.28	194.23	0	07:08	0	0	0:00:00
MH 8 (Proposed Storm)	0.12	0.36	194.19	0	07:09	0	0	0:00:00
MH 9 (Proposed Storm)	0.15	0.41	194.15	0	07:10	0	0	0:00:00
Out-01	0.00	0.00	192.50	0	00:00	0	0	0:00:00
POND	0.34	1.45	194.45	0	08:06	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow LPS	Peak Inflow LPS	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow LPS	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
EndNullStruct0	JUNCTION	0.00	0.00	0	00:00	0.00		
MH 1 (Proposed Storm)	JUNCTION	66.69	66.69	0	07:06	0.00		
MH 10 (Proposed Storm)	JUNCTION	66.69	532.45	0	07:12	0.00		
MH 11 (Proposed Storm)	JUNCTION	66.69	66.69	0	07:06	0.00		
MH 12 (Proposed Storm)	JUNCTION	66.69	133.28	0	07:07	0.00		
MH 13 (Proposed Storm)	JUNCTION	66.69	199.85	0	07:08	0.00		
MH 2 (Proposed Storm)	JUNCTION	66.69	199.88	0	07:07	0.00		
MH 3 (Proposed Storm)	JUNCTION	65.14	264.76	0	07:12	0.00		
MH 4 (Proposed Storm)	JUNCTION	66.69	863.67	0	07:12	0.00		

MH 5 (Proposed Storm)	JUNCTION	66.69	66.69	0	07:06	0.00
MH 6 (Proposed Storm)	JUNCTION	66.69	66.69	0	07:06	0.00
MH 7 (Proposed Storm)	JUNCTION	66.69	133.24	0	07:08	0.00
MH 8 (Proposed Storm)	JUNCTION	66.69	199.72	0	07:09	0.00
MH 9 (Proposed Storm)	JUNCTION	66.69	266.26	0	07:12	0.00
Out-01	OUTFALL	592.63	1100.65	0	07:48	0.00
POND	STORAGE	0.00	863.65	0	07:12	0.00

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 m³	Average Ponded Volume (%)	Maximum Storage Node Outflow LPS	Maximum Exfiltration Rate cmm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 m³
POND	2.040	95	0 08:05	0.411	19	520.62	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
Out-01	98.99	316.66	1100.65
System	98.99	316.66	1100.65

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained m/sec	Length Factor	Peak Flow during Analysis LPS	Design Flow Capacity LPS	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Reported Time minutes	Condition
{Proposed Storm}.MH 1 - MH 2 (Proposed Storm)	CONDUIT	0 07:07	0.86	1.00	66.65	138.14	0.48	0.49	0	Calculated
{Proposed Storm}.MH 10 - MH 4 (Proposed Storm)	CONDUIT	0 07:12	1.44	1.00	532.42	559.91	0.95	0.78	0	Calculated
{Proposed Storm}.MH 11 - MH 12 (Proposed Storm)	CONDUIT	0 07:07	0.81	1.00	66.64	127.51	0.52	0.51	0	Calculated
{Proposed Storm}.MH 12 - MH 13 (Proposed Storm)	CONDUIT	0 07:08	0.96	1.00	133.25					

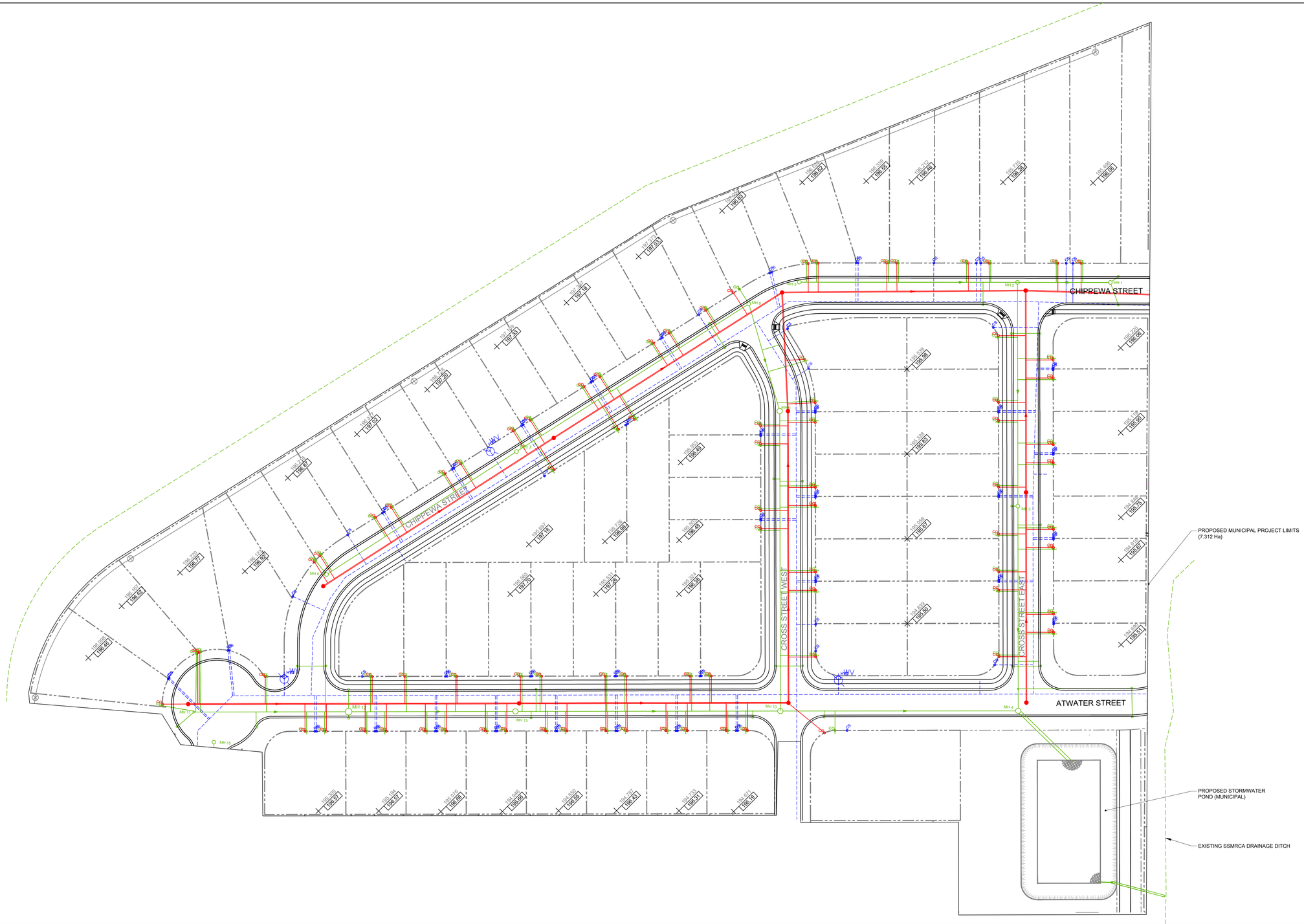
```
274.61      0.49      0.49           0  Calculated
  {Proposed Storm}.MH 13 - MH 10 (Proposed Storm) CONDUIT      0  07:09      1.13    1.00      199.80
539.39      0.37      0.42           0  Calculated
  {Proposed Storm}.MH 2 - MH 3 (Proposed Storm) CONDUIT      0  07:09      1.13    1.00      199.84      539.39
    0.37      0.42           0  Calculated
  {Proposed Storm}.MH 3 - MH 4 (Proposed Storm) CONDUIT      0  07:12      1.22    1.00      264.74      539.39
    0.49      0.49           0  Calculated
  {Proposed Storm}.MH 4 - POND (Proposed Storm) CONDUIT      0  07:12      1.57    1.00      863.65      877.11
    0.98      0.81           0  Calculated
  {Proposed Storm}.MH 5 - MH 2 (Proposed Storm) CONDUIT      0  07:08      0.86    1.00       66.62      138.14
    0.48      0.49           0  Calculated
  {Proposed Storm}.MH 7 - MH 88 (Proposed Storm) CONDUIT      0  07:10      1.02    1.00      133.17      297.50
     0.45      0.47           0  Calculated
  {Proposed Storm}.MH 8 - MH 9 (Proposed Storm) CONDUIT      0  07:10      1.13    1.00      199.71      297.50
    0.67      0.60           0  Calculated
  {Proposed Storm}.MH 9 - MH 10 (Proposed Storm) CONDUIT      0  07:12      1.22    1.00      266.26      539.39
     0.49      0.50           0  Calculated
  {Proposed Storm}.MH 9 - MH 11 (Proposed Storm) CONDUIT      0  07:08      0.86    1.00       66.62      138.14
     0.48      0.49           0  Calculated
  Orifice-01           ORIFICE      0  08:06                      520.62


  ******************************
  Highest Flow Instability Indexes
  ******************************
  Link Orifice-01 (1)


  *************************
  Routing Time Step Summary
  *************************
  Minimum Time Step           :    30.00 sec
  Average Time Step           :    30.00 sec
  Maximum Time Step           :    30.00 sec
  Percent in Steady State     :     0.00
```

Average Iterations per Step :   1.94

Analysis began on: Sun Jun 09 19:50:06 2024
Analysis ended on: Sun Jun 09 19:50:06 2024
Total elapsed time: < 1 sec

APPENDIX B

ENGINEERING DRAWINGS



NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

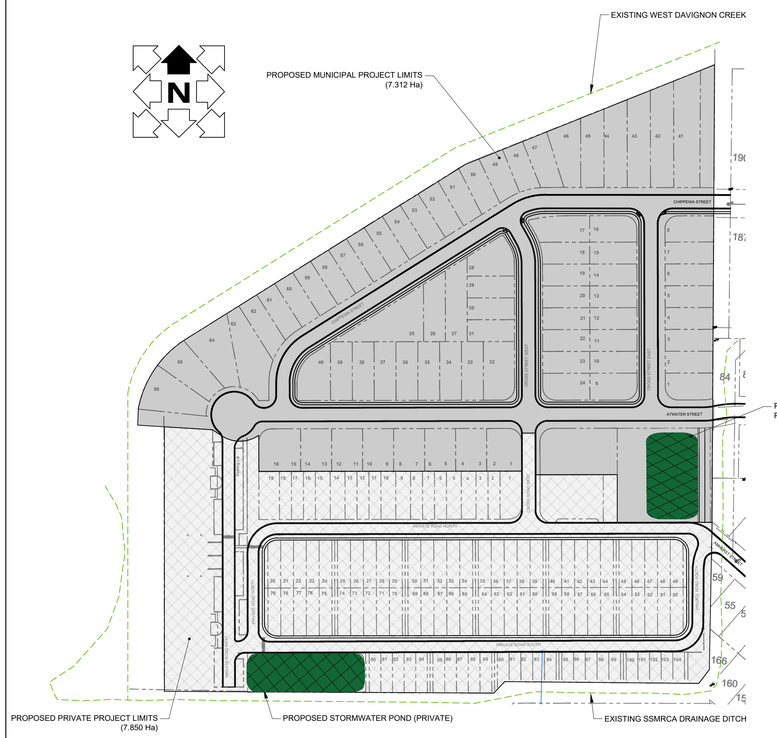
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

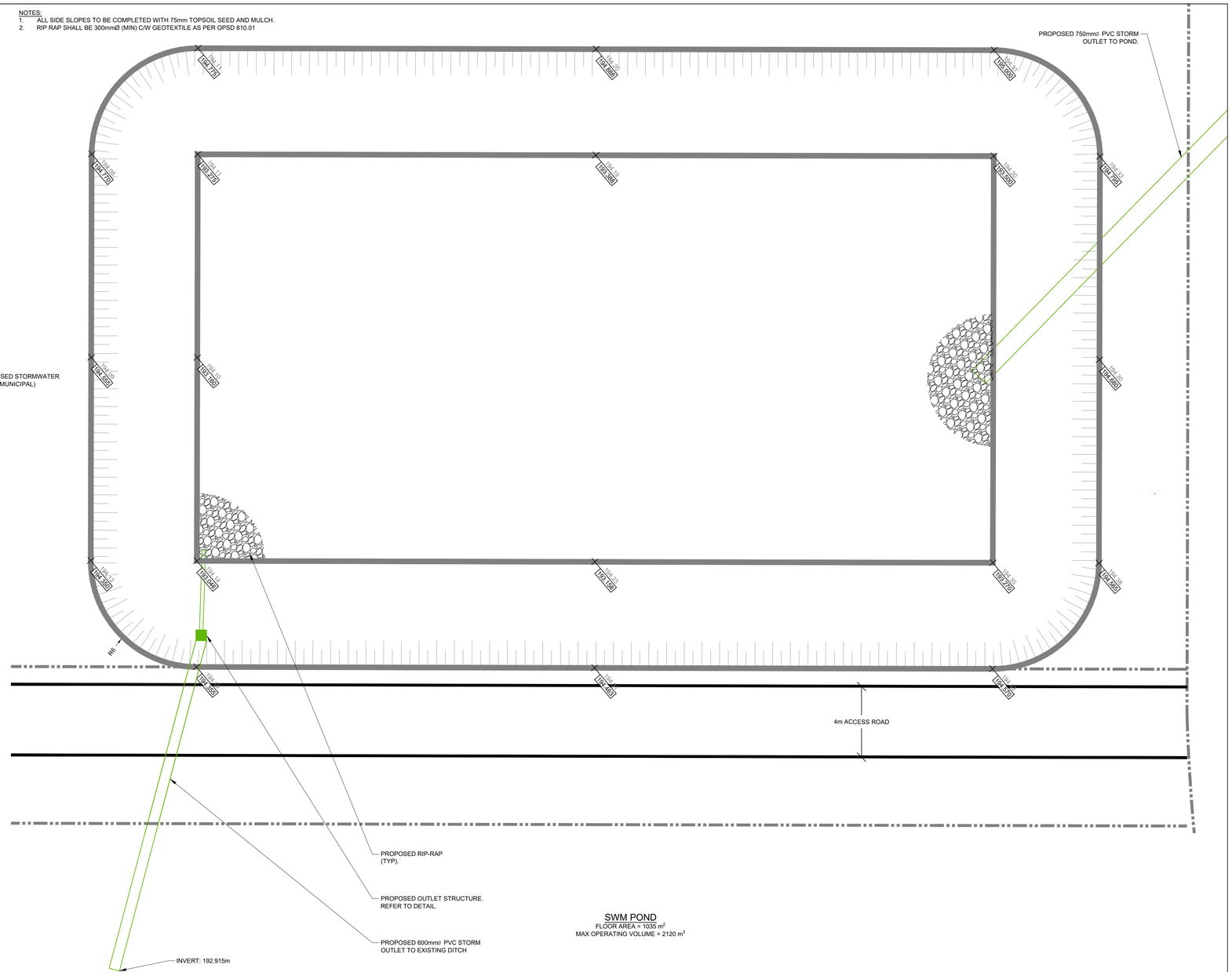
MAMTA HOMES
0 CHIPPEWA STREET
SITE GRADING

DRAWING NO.
G2

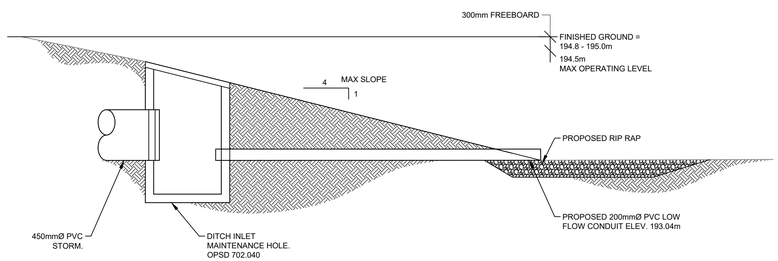


LOCATION PLAN
SCALE 1:2000

NOTES:
1. ALL SIDE SLOPES TO BE COMPLETED WITH 75mm TOPSOIL SEED AND MULCH.
2. RIP RAP SHALL BE 300mmØ (MIN) C/W GEOTEXTILE AS PER OPSD 810.01



SWM POND
FLOOR AREA = 1035 m²
MAX OPERATING VOLUME = 2120 m³



OUTLET STRUCTURE DETAIL
SCALE 1:25

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL

REVISIONS

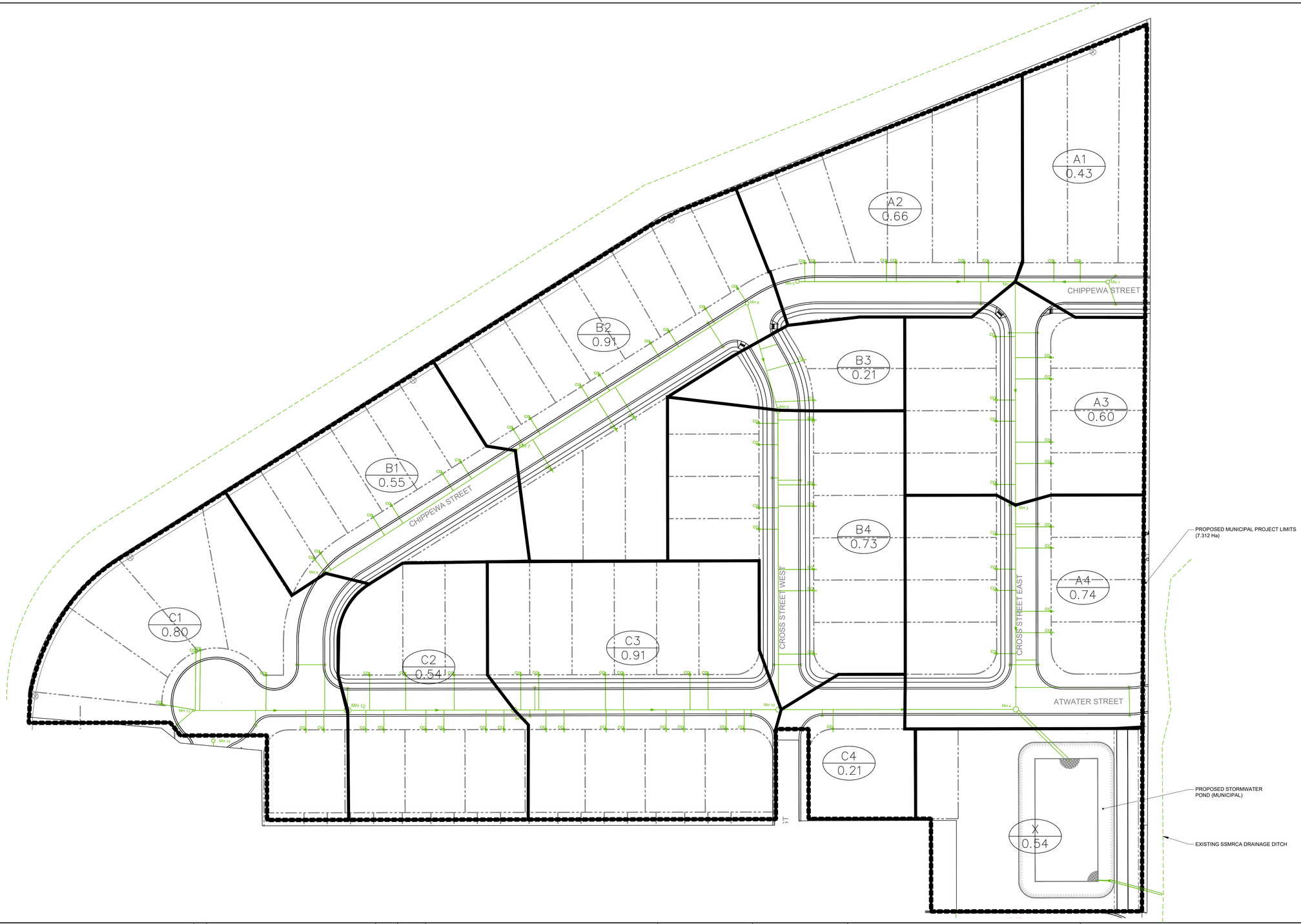
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
STORMWATER POND

DRAWING NO.
G3



NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL

REVISIONS

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/07/2024
DWG.	KS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
STORM DRAINAGE AREAS

DRAWING NO.

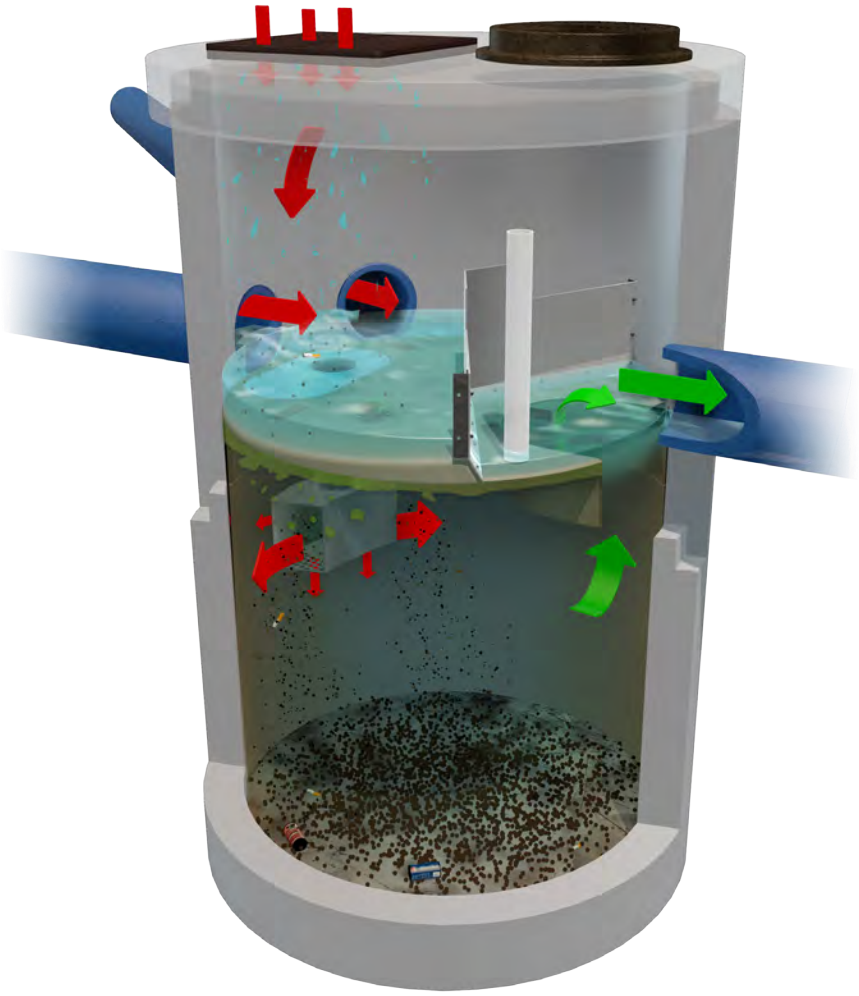
G4

APPENDIX C

STORMCEPTOR MANUAL

Stormceptor® EF

Owner's Manual



imbrium®

STORMCEPTOR® EF IS PATENT-PENDING.

TABLE OF CONTENTS

OVERVIEW

The **Stormceptor® EF** is a continuation and evolution of the most globally recognized oil-grit separator (OGS) stormwater treatment technology - ***Stormceptor®***. Also known as a hydrodynamic separator, fectively removes a wide variety of pollutants from stormwater and snowmelt runof original Stormceptor. Stormceptor EF captures and retains sediment (TSS), free oils, gross pollutants and other pollutants that attach to particles, such as nutrients and metals. Stormceptor EF's patent-pending treatment and scour prevention technology and internal bypass ensures sediment is retained during all rainfall events..

Stormceptor EF of inlet pipe, multiple inlet pipes, and/or from the surface through an inlet grate. Stormceptor EF can also

ensure performance in submerged conditions. With its scour prevention technology and internal bypass, Stormceptor EF can be installed online, eliminating the need for costly additional bypass structures.

OPERATION

- Stormwater enters the Stormceptor upper chamber through the inlet pipe(s) or a surface inlet grate. A s weir , sediment, and

  strong vortex draws water, sediment, oil, and debris down the drop pipe cone.
- The duct has two large rectangular outlet openings fused through these various opening in multiple directions and at low velocity into the lower chamber.
- sump. Pollutants are retained for later removal during maintenance cleaning.
- T , moves upward, and discharges to the top side of the insert downstream of the weir
- of the weir may exceed the height of the weir to the downstream side of the insert, and exits through the outlet pipe. This internal bypass feature allows for online installation, avoiding the cost of additional bypass structures. During bypass,

- Stormceptor EF'

  intensity storms.

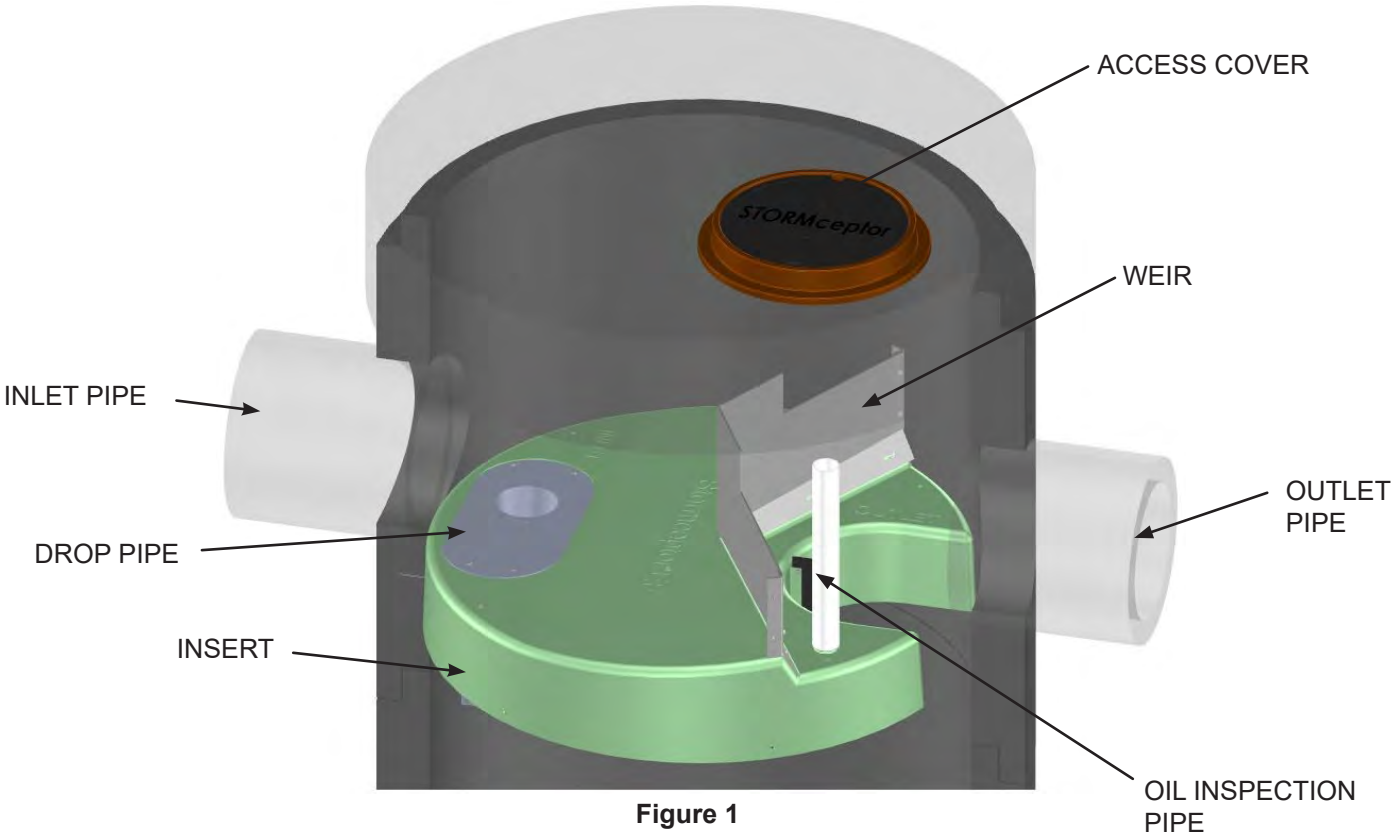


Figure 1

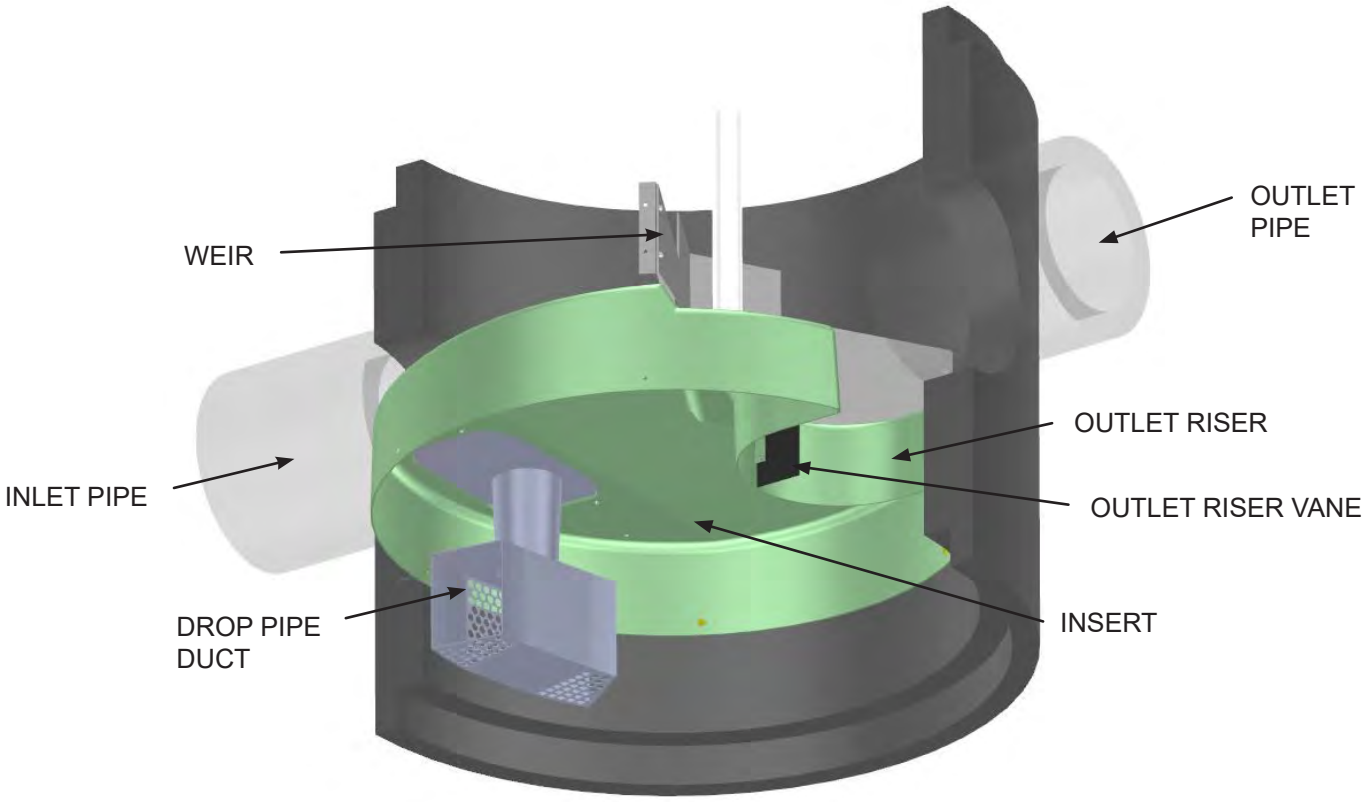


Figure 2

- Insert – separates vessel into upper and lower chambers, and provides double-wall containment of hydrocarbons
- Weir – creates stormwater ponding and driving head on top side of insert
- Drop pipe – conveys stormwater and pollutants into the lower chamber
- Outlet riser – conveys treated stormwater from the lower chamber to the outlet pipe, and provides primary inspection and maintenance access into the lower chamber
-
- Oil inspection pipe – primary access for measuring oil depth, and oil removal

IDENTIFICATION

trade name ***Stormceptor***® embossed on the access cover at grade as shown in **Figure 3**. The tradename ***Stormceptor***® is also embossed on the top of the insert upstream of the weir as shown in **Figure 3**.

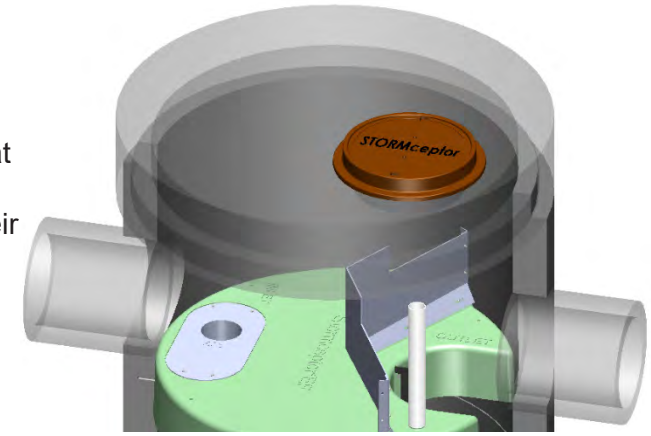


Figure 3

Figure 4.

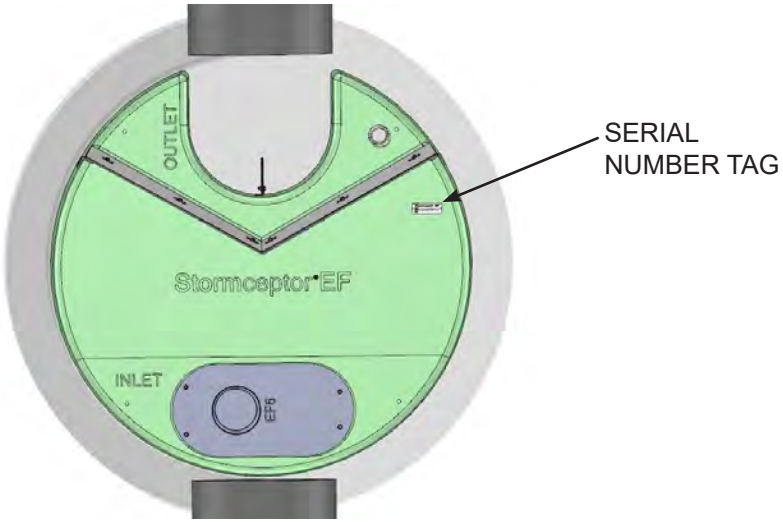


Figure 4

MODEL DETAILS

TABLE 1. METRIC DIMENSIONS AND CAPACITIES								
Stormceptor Model	Inside Diameter	Minimum Surface to Outlet Invert Depth	Depth Below Outlet Pipe Invert	Wet Volume	Sediment Capacity[1]	Hydrocarbon Storage Capacity[2]	Maximum Flow Rate into Lower Chamber[3]	Peak Conveyance Flow Rate[4]
	(m)	(mm)	(mm)	(L)	(m^3)	(L)	(L/s)	(L/s)
EF4 / EFO4	1.22	915	1524	1780	1.19	265	22.1 / 10.4	425
EF6 / EFO6	1.83	915	1930	5070	3.47	610	49.6 / 23.4	990
EF8 / EFO8	2.44	1219	2591	12090	8.78	1070	88.3 / 41.6	1700
EF10 / EFO10	3.05	1219	3251	23700	17.79	1670	138 / 65	2830
EF12 / EFO12	3.66	1524	3886	40800	31.22	2475	198.7 / 93.7	2830

TABLE 2. U.S. DIMENSIONS AND CAPACITIES								
Stormceptor Model	Inside Diameter	Minimum Surface to Outlet Invert Depth	Depth Below Outlet Pipe Invert	Wet Volume	Sediment Capacity[1]	Hydrocarbon Storage Capacity[2]	Maximum Flow Rate into Lower Chamber[3]	Peak Conveyance Flow Rate[4]
	(ft)	(in)	(in)	(gal)	(ft^3)	(gal)	(cfs)	(cfs)
EF4 / EFO4	4	36	60	471	42	70	0.78 / 0.37	15
EF6 / EFO6	6	36	76	1339	123	160	1.75 / 0.83	35
EF8 / EFO8	8	48	102	3194	310	280	3.12 / 1.47	60
EF10 / EFO10	10	48	128	6261	628	440	4.87 / 2.30	100
EF12 / EFO12	12	60	153	10779	1103	655	7.02 / 3.31	100

1.

2. Hydrocarbon Storage Capacity is measured from the bottom of the outlet riser to the underside of the insert. Hydrocarbon Storage Capacity

3. EF Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 1135 L/min/m^2 (27.9 gpm/ft^2). EFO Maximum Flow Rate into Lower Chamber is based on a maximum surface loading rate (SLR) into the lower chamber of 535 L/min/m^2 (13.1 gpm/ft^2).

4. Peak Conveyance Flow Rate is limited by a maximum velocity of 1. m/s (5 fps).

INSPECTION AND MAINTENANCE

It is important to perform regular inspection and maintenance. Regular inspection and maintenance , keeps maintenance costs low, and provides continued protection of natural waterways.

Quick Reference

- Typical inspection and maintenance is performed from grade
- Remove manhole cover(s) or inlet grate to access insert and lower chamber

  beneath inlet grate
- Use Sludge Judge® or similar sediment probe to check sediment depth through the outlet riser
- Oil dipstick can be inserted through the oil inspection pipe
- Visually inspect the insert for debris, remove debris if present
- Visually inspect the drop pipe opening for blockage, remove blockage if present
- Visually inspect insert and weir for damage, schedule repair if needed
-
-

When is inspection needed?

- Post-construction inspection is required prior to putting the Stormceptor into service.
-

  pollutant accumulation.
-

  year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

What equipment is typically required for inspection?

- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones and caution tape
- Hard hat, safety shoes, safety glasses, and chemical-resistant gloves

When is maintenance cleaning needed?

- If the post-construction inspection indicates presence of construction sediment of a depth greater than a few inches, maintenance is recommended at that time. For optimum performance and normal operation the unit should be cleaned out once the sediment depth reaches the recommended maintenance sediment depth, see **Table 3**.
- Maintain immediately after an oil, fuel, or other chemical spill.

TABLE 3
RECOMMENDED SEDIMENT DEPTHS FOR MAINTENANCE SERVICE*

MODEL	Sediment Depth	
	in	mm
EF4 / EFO4	8	203
EF6 / EFO6	12	305
EF8 / EFO8	24	610
EF10 / EFO10	24	610
EF12 / EFO12	24	610

* Based on a minimum distance of 40 inches (1,016 mm) from bottom of outlet riser to top of sediment bed

The frequency of inspection and maintenance may need to be adjusted based on site conditions to ensure the unit is operating and performing as intended. Maintenance costs will vary based on the size of the unit, site conditions, local requirements, disposal costs, and transportation distance.

What equipment is typically required for maintenance?

- Vacuum truck equipped with water hose and jet nozzle
- Small pump and tubing for oil removal
- Manhole access cover lifting tool
- Oil dipstick / Sediment probe with ball valve (typically ¾-inch to 1-inch diameter)
- Flashlight
- Camera
- Data log / Inspection Report
- Safety cones
- Hard hats, safety shoes, safety glasses, chemical-resistant gloves, and hearing protection for service providers
- Gas analyzer, respiratory gear
  entry is required (adhere to all OSHA / CCOSH standards)

What conditions can compromise Stormceptor performance?

- Presence of construction sediment and debris in the unit prior to activation
- Excessive sediment depth beyond the recommended maintenance depth
- Oil spill in excess of the oil storage capacity
- Clogging or restriction of the drop pipe inlet opening with debris
- Downstream blockage that results in a backwater condition

MAINTENANCE PROCEDURES

-
- Stormceptor is maintained from grade through a standard surface manhole access cover or inlet grate.
- In the case of submerged or tailwater conditions, extra measures are likely required, such as plugging the inlet and outlet pipes prior to conducting maintenance.
- Inspection and maintenance of upstream catch basins and other stormwater conveyance structures is also recommended to extend the time between future maintenance cycles.
- Sediment depth inspections are performed through the **Outlet Riser** and oil presence can be determined through the **Oil Inspection Pipe** (**see Figures 6 and 7**).
- Oil presence and sediment depth are determined by inserting a Sludge Judge® or measuring stick to quantify the pollutant depths.
- Visually inspect the insert, weir, and drop pipe inlet opening to ensure there is no damage or blockage.

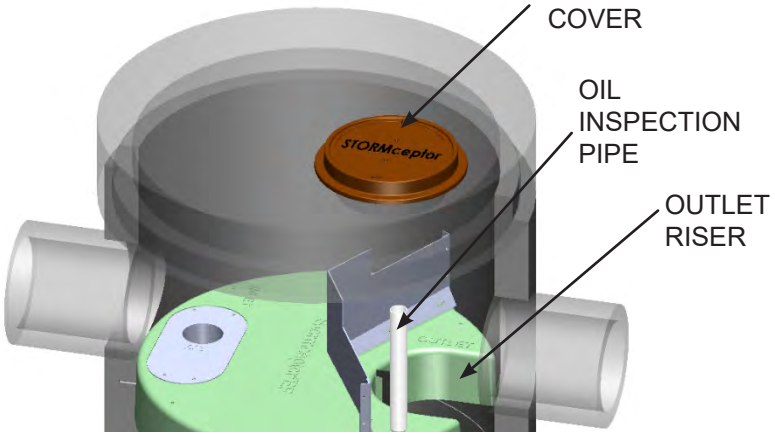


Figure 5

Figure 6

- When maintenance is required, a standard vacuum truck is used to remove the pollutants from the lower chamber of the unit through the **Outlet Riser** (**see Figure 7**).

Figure 7

- The Outlet Riser V
  minimal, if any, interference (**see Figure 8**).

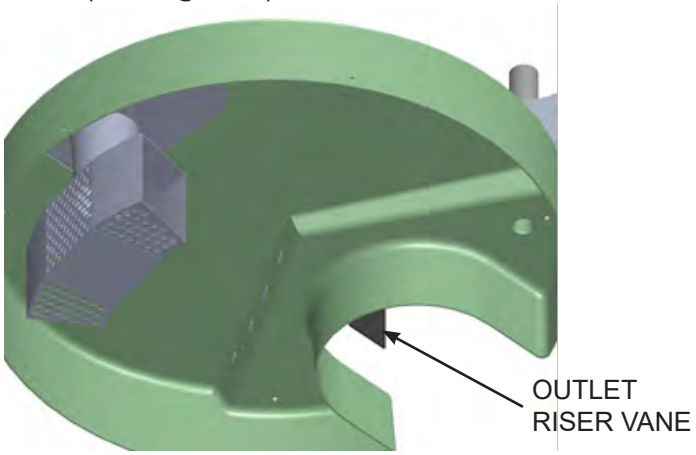


Figure 8

REMOVABLE FLOW DEFLECTOR

-

grade **(See Figure 9).** .

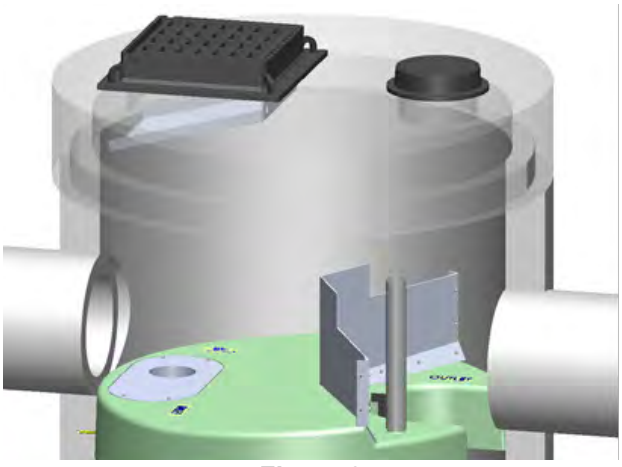
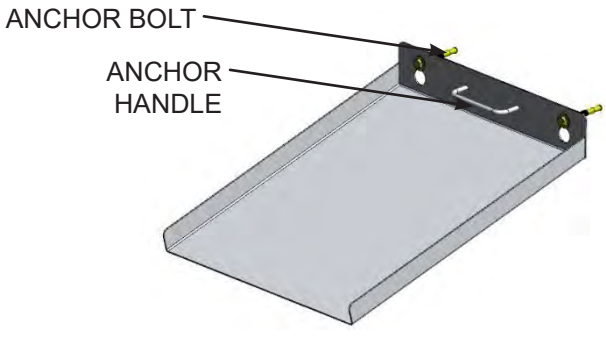


Figure 9



Removable Flow Detector

HYDROCARBON SPILLS

spill potential exists. Should a spill occur
unit should be cleaned immediately by a licensed liquid waste hauler.

Disposal

Maintenance providers are to follow all federal, state/ provincial, and local requirements for disposal of material.

Oil Sheens

When oil is present in stormwater runoff, a sheen may be noticeable at the Stormceptor outlet. An oil rainbow or sheen can be noticeable at very low oil concentrations (< 10 mg/L). Despite the appearance of a sheen, Stormceptor EF/EFO may still be functioning as intended.

Oil Level Alarm

To mitigate spill liability with 24/7 detection, an electronic Oil Level Alarm monitoring system can be employed to trigger a visual and audible alarm when a pre-set level of oil is captured within the lower chamber or when an oil spill occurs. The oil level alarm is available as an optional feature to include with Stormceptor EF/EFO as shown in **Figure 10**.

For additional details about the Oil Level Alarm, please visit
www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-systems.

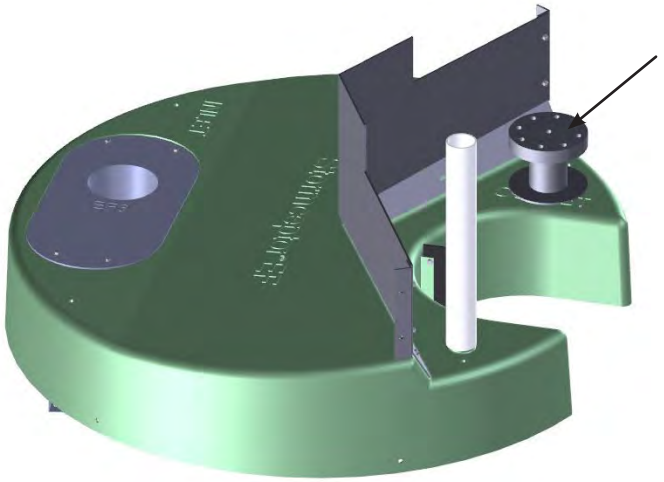


Figure 10

Optional Oil Alarm

REPLACEMENT PARTS

Stormceptor has no moving parts. Therefore, inspection and maintenance activities are generally focused on pollutant removal. Since there are no moving parts during operation in a Stormceptor, broken, damaged, or worn parts are not typically encountered. However, if replacement parts are necessary, they may be purchased by contacting your local Stormceptor representative.

STORMCEPTOR INSPECTION AND MAINTENANCE LOG

Stormceptor Model No: _____

Serial Number: _____

Installation Date: _____

Location Description of Unit: _____

Recommended Sediment Maintenance Depth: _____

DATE	SEDIMENT DEPTH	OIL DEPTH (inches or mm)	SERVICE REQUIRED (Y/N)	MAINTENANCE PERFORMED	MAINTENANCE PROVIDER	COMMENTS

Other Comments: _____

CONTACT INFORMATION

Questions regarding Stormceptor EF/EFO can be addressed by contacting your local Stormceptor representative.

Imbrium Systems Inc.
1-416-960-9900 / 1-800-565-4801 / 888-279-8826

www.imbriumsystems.com
www.stormceptor.com
info@imbriumsystems.com

APPENDIX D

STATEMENT OF LIMITATIONS

Statement of Limitations

This report has been prepared by Kresin Engineering Corporation (KEC) at the request of the Owner for use in support of the development of the Site (as defined in the report). KEC expressly excludes liability to any party for any use or reliance of the information contained in this report for any other purpose.

KEC denies all liability for any use of, or reliance on, this report by any other parties, or for anything other than support of the development of the Site.

Since transmitted files are not under KEC's control, the integrity of the report cannot be guaranteed. The original copy of the report on file at KEC shall govern. KEC denies all liability for unauthorized alterations to the report.

The report has been prepared in KEC's best professional judgement in accordance with accepted industry standards and is subject to limitations in information available at the time the work was carried out. In preparing the report, KEC has relied upon information from third parties which are considered reliable; however, KEC denies all liability for inaccuracies resulting from the use of this information.

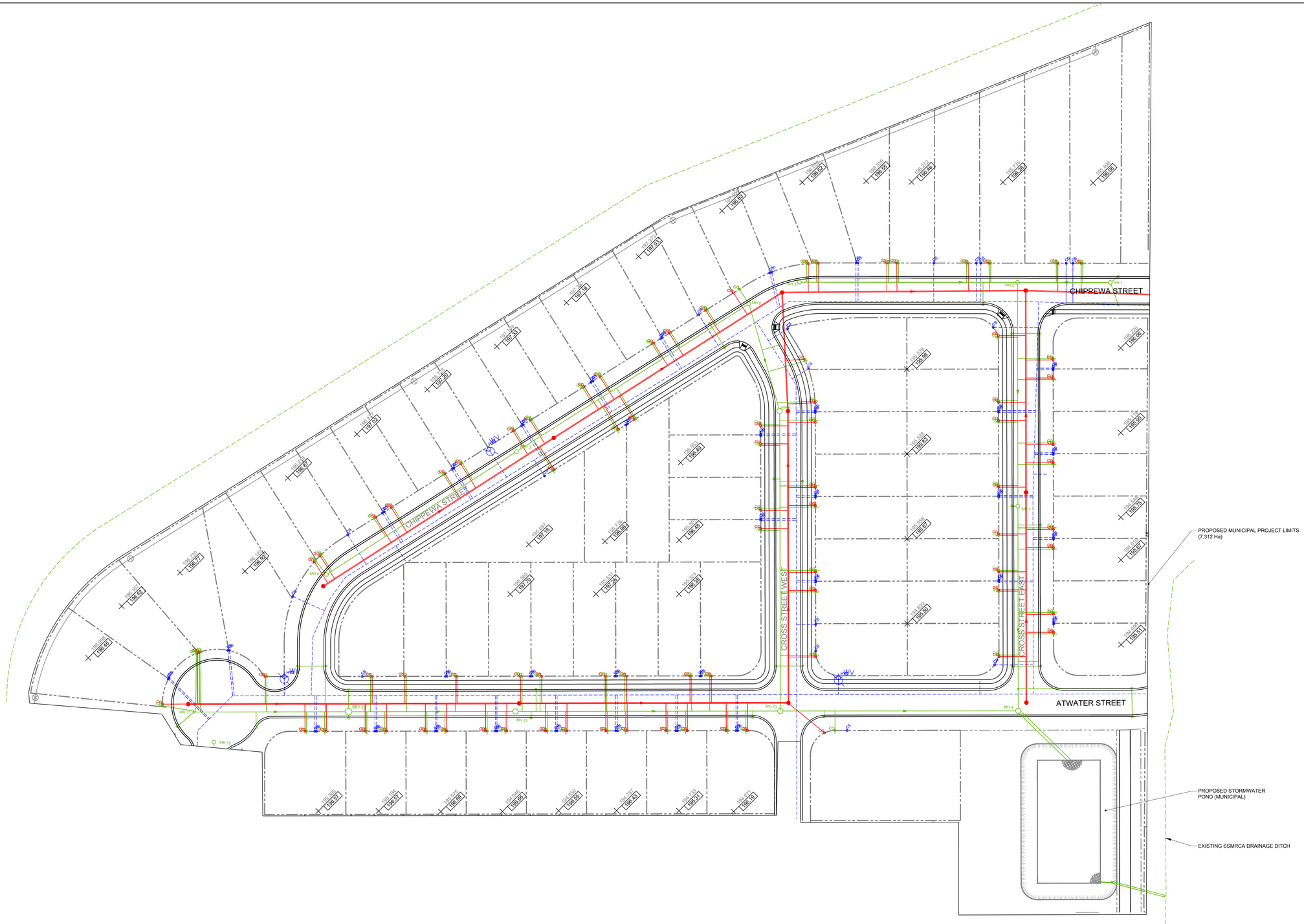
The report shall be considered in its entirety. Portions of the report shall not be used out of context.

KEC denies all liability for decisions made or actions taken as a result of this report unless KEC has been retained to participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the KEC, their officers, agents, and employees in excess of the fee paid for professional services.

This statement of limitations shall be considered a part of the report.

Appendix 5

Preliminary Site Grading Plan



NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
SITE GRADING

DRAWING NO.
G2

Appendix 7

Sanitary Sewer Design

Sanitary Sewer Design Sheet

Project: **Chippewa Avenue Subdivision**
Client: Mamta Homes

KEC Project: **2278.02**
Date Updated: **March 1, 2023**

Chippewa Ave Capacity Review

KRESIN Engineering Corporation

Area Types:

LD	3.5	low density domestic
MD	2	medium density domestic
HD		high density domestic (P - actual based on survey)
IND		industrial
SCHOOL		school (P - actual based on school population)
MALL		shopping centres
COM		commercial areas
HOTEL		hotel/motel (P - actual based on 5 bed spaces per room)

Design Flow Rates:

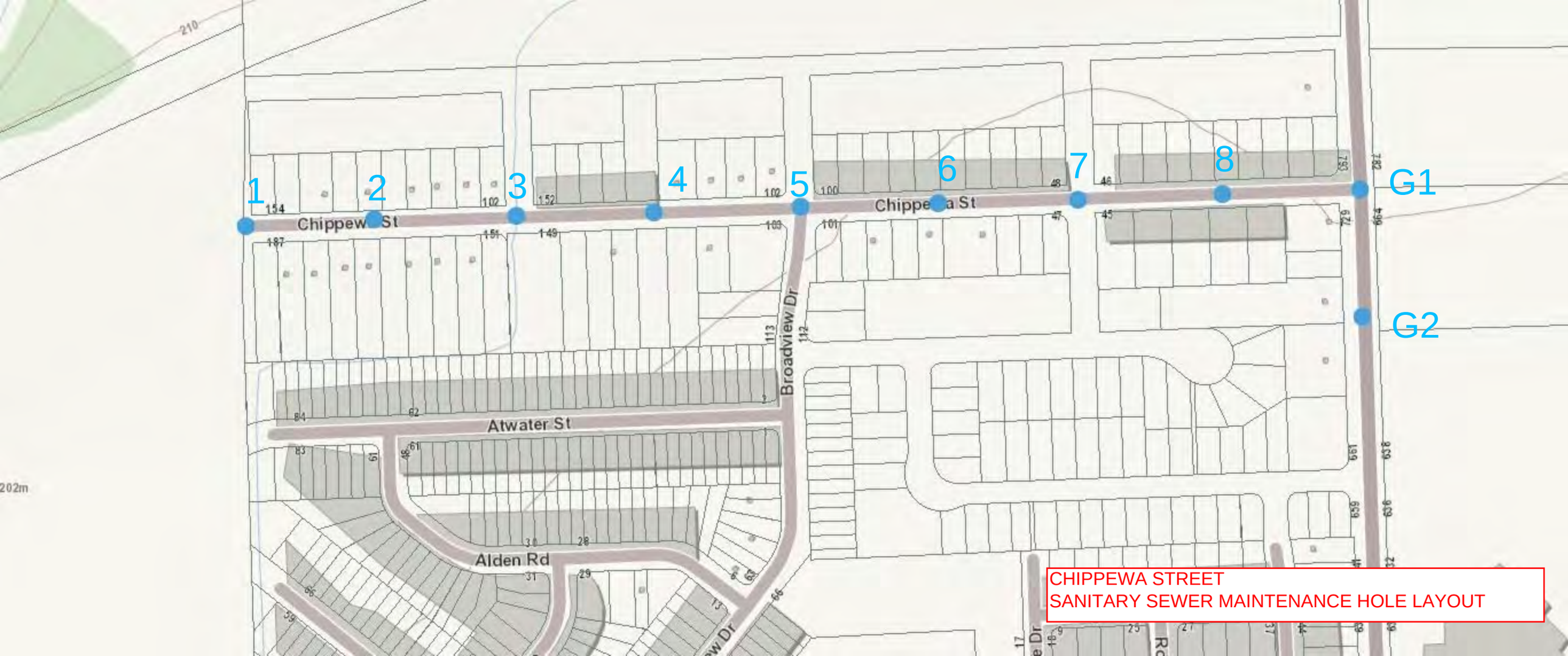
Domestic Sewage Flow Rate =	400	L/c/d
MALL flow rate =	5	$L/m^2/d$
IND flow rate =	35	$m^3/ha/d$
COM flow rate =	28	$m^3/ha/d$
SCHOOL flow rate =	140	L/student/d
HOTEL flow rate =	225	L/bedspace/d
Unit of peak extraneous flow (I) =	0.15	L/ha/s

Design Calculations:

Peaking Factor (Harmon) - $M = 1 + 14 / (4 + SQRT(0.001p))$
Peak Flow - $Q_p = P * q * M / 86400$ (L/s)
Peak Extraneous Flow - $Q_i = I*A$ (L/s)
Foundation Drain Flow - $Q_f = H * a$ (L/s)
Peak Design Flow - $Q_d = Q_p + Q_i + Q_f$ (L/s)

Mannings Equation - $Q = 1/n * A * R^{2/3} * S^{1/2}$
Roughness Coefficient (n) - 0.013
Hydraulic Radius (R) - 0.25 * pipe diameter
Design Flow Velocity - Hydraulic elements

LOCATION			DESIGN FLOWS													PIPE DESIGN								
			Tributary Area								Sewage Flows													
from MH	to MH	Street	Area ID	Number of Lots	Size (ha)	Type	Description	Flow Rate "q" (L/c/d)	Population, Students, or Area "P"		Average Flow (P*q / 86400) (L/s)	Peaking Factor "M"	Peak "Q_p" (L/s)	Peak Extraneous "Q_i" (L/s)	Flow (L/s)	Design Flow "Q_d" (L/s)	Length (m)	Pipe I.D. (mm)	Type of Pipe	Grade (%)	Full Capacity "Q_{cap}" (L/s)	Full flow Velocity (m/s)	Design Flow Velocity (m/s)	Pipe Utilization Q_d / Q_{cap}
Parcel A	Chippewa	Subdivision	RES	82	8.10	LD	Parcel A	400	287	persons	1.33	4.087	5.44	1.22	6.66	**6.66**								
1	2	Chippewa	1	10	1.47	LD	1	400	35	persons	0.16	4.344	0.69	0.22	0.91	**7.57**	94.8	250	CONC	0.32	33.64	0.69	0.46	**23%**
2	3	Chippewa	2	10	1.47	LD	2	400	35	persons	0.16	4.344	0.69	0.22	0.91	**8.48**	98.0	250	CONC	0.31	33.11	0.67	0.49	**26%**
3	4	Chippewa	3	10	1.47	LD	3	400	35	persons	0.16	4.344	0.69	0.22	0.91	**9.39**	101.8	250	CONC	0.27	30.90	0.63	0.51	**30%**
4	5	Chippewa	4	10	1.47	LD	4	400	35	persons	0.16	4.344	0.69	0.22	0.91	**10.30**	99.4	250	CONC	0.27	30.90	0.63	0.54	**33%**
5	6	Chippewa	5	10	1.47	LD	5	400	35	persons	0.16	4.344	0.69	0.22	0.91	**11.21**	102.7	250	CONC	0.22	27.89	0.57	0.54	**40%**
6	7	Chippewa	5	10	1.47	LD	6	400	35	persons	0.16	4.344	0.69	0.22	0.91	**12.12**	99.1	250	CONC	0.24	29.13	0.59	0.57	**42%**
7	8	Chippewa	6	10	1.47	LD	7	400	35	persons	0.16	4.344	0.69	0.22	0.91	**13.03**	100.0	250	CONC	0.28	31.47	0.64	0.62	**41%**
8	Goulais 1	Chippewa	7	10	1.47	LD	8	400	35	persons	0.16	4.344	0.69	0.22	0.91	**13.94**	101.5	250	CONC	0.37	36.17	0.74	0.69	**39%**
Goulais 1	2	Goulais	8	3	1.47	LD	9	400	11	persons	0.05	4.413	0.22	0.22	0.44	**14.38**	91.3	350	CONC	0.46	98.93	1.03	0.50	**15%**
					21.33				578						14.38									


1
2
3
4
5
6
7
8
G1
G2
Chippewa St
Broadview Dr
Atwater St
Alden Rd
CHIPPEWA STREET
SANITARY SEWER MAINTENANCE HOLE LAYOUT

Sanitary Sewer Design Sheet

Project: **Chippewa Avenue Subdivision**
Client: Mamta Homes

KEC Project: **2278.02**
Date Updated: **March 17, 2023**

Arden St. Capacity Review

KRESIN Engineering Corporation

Area Types:

LD	3.5	low density domestic
MD	2	medium density domestic
HD		high density domestic (P - actual based on survey)
IND		industrial
SCHOOL		school (P - actual based on school population)
MALL		shopping centres
COM		commercial areas
HOTEL		hotel/motel (P - actual based on 5 bed spaces per room)

Design Flow Rates:

Domestic Sewage Flow Rate =	400	L/c/d
MALL flow rate =	5	$L/m^2/d$
IND flow rate =	35	$m^3/ha/d$
COM flow rate =	28	$m^3/ha/d$
SCHOOL flow rate =	140	L/student/d
HOTEL flow rate =	225	L/bedspace/d
Unit of peak extraneous flow (I) =	0.15	L/ha/s

Design Calculations:

Peaking Factor (Harmon) - $M = 1 + 14 / (4 + SQRT(0.001p))$
Peak Flow - $Q_p = P * q * M / 86400$ (L/s)
Peak Extraneous Flow - $Q_i = I*A$ (L/s)
Foundation Drain Flow - $Q_f = H * a$ (L/s)
Peak Design Flow - $Q_d = Q_p + Q_i + Q_f$ (L/s)

Mannings Equation - $Q = 1/n * A * R^{2/3} * S^{1/2}$
Roughness Coefficient (n) - 0.013
Hydraulic Radius (R) - 0.25 * pipe diameter
Design Flow Velocity - Hydraulic elements

LOCATION			DESIGN FLOWS													PIPE DESIGN								
			Tributary Area								Sewage Flows													
from MH	to MH	Downstream MH Location	Area ID	Number of Lots	Size (ha)	Type	Description	Flow Rate "q" (L/c/d)	Population, Students, or Area "P"		Average Flow (P*q / 86400) (L/s)	Peaking Factor "M"	Peak "Q_p" (L/s)	Peak Extraneous "Q_i" (L/s)	Flow (L/s)	Design Flow "Q_d" (L/s)	Length (m)	Pipe I.D. (mm)	Type of Pipe	Grade (%)	Full Capacity "Q_{cap}" (L/s)	Full flow Velocity (m/s)	Design Flow Velocity (m/s)	Pipe Utilization Q_d / Q_{cap}
PROP	J	160 Arden	PROP	180	1.48	MD	Parcel C	400	360	persons	1.67	4.043	6.75	0.22	6.97									
PROP	J	160 Arden	PROP	112	5.52	LD	Parcel B	400	392	persons	1.81	4.026	7.29	0.83	8.12									
J	I	144 Arden	9	8	1.38	LD		400	28	persons	0.13	4.359	0.57	0.21	0.78	**15.87**	72.0	300	AC	0.33	55.55	0.79	0.62	**29%**
I	H	Alpine Street	8	9	0.69	LD		400	32	persons	0.15	4.351	0.65	0.10	0.75	**16.62**	68.0	300	AC	0.30	52.97	0.75	0.62	**31%**
H	G	Broadview	7	16	1.38	LD		400	56	persons	0.26	4.305	1.12	0.21	1.33	**17.95**	75.0	300	AC	0.35	57.21	0.81	0.67	**31%**
G	F	84 Arden	Broadview	259	13.30	LD		400	907	persons	4.20	3.827	16.07	2.00	18.07	**36.02**	26.0	300	AC	0.70	80.91	1.15	1.14	**45%**
F	E	70 Arden	6	8	0.73	LD		400	28	persons	0.13	4.359	0.57	0.11	0.68	**36.70**	53.0	300	AC	0.32	54.70	0.77	0.86	**67%**
E	D	Ascot Ave	5	9	0.74	LD		400	32	persons	0.15	4.351	0.65	0.11	0.76	**37.46**	107.0	300	AC	0.37	58.82	0.83	0.92	**64%**
D	C	36 Arden	4	40	3.87	LD		400	140	persons	0.65	4.201	2.73	0.58	3.31	**40.77**	61.0	300	PVC	0.15	37.45	0.53	0.43	**109%**
C	B	Winfield Drive	3	7	0.67	LD		400	25	persons	0.11	4.368	0.48	0.10	0.58	**41.35**	61.0	300	AC	0.15	37.45	0.53	0.41	**110%**
B	A	2nd Line	1+2	44	4.08	LD		400	154	persons	0.71	4.187	2.97	0.61	3.58	**44.93**	91.0	375	AC	0.18	74.39	0.67	0.73	**60%**
					33.84				2152						44.93									

I.D.	LOTS	AREA (ha)
1	4	0.46
2	40	3.62
3	7	0.67
4	40	3.87
5	9	0.74
6	8	0.73

I.D.	LOTS	AREA (ha)
BROADVIEW	(FROM AMHERST DESIGN SHEET)	
7	16	1.38
8	9	0.69
9	8	0.43

Sanitary Sewer Design Sheet

KRESIN Engineering Corporation

Project: **Chippewa Avenue Subdivision** KEC Project: **2278.02**
Client: Mamta Homes Date Updated: **March 1, 2023**

Area Types:

LD	low density domestic LD persons per lot = 4
MD	medium density domestic (P - actual based on survey) = 3
HD	high density domestic (P - actual based on survey)
IND	industrial
SCHOOL	school (P - actual based on school population)
MALL	shopping centres
COM	commercial areas = 2
HOTEL	hotel/motel (P - actual based on 5 bed spaces per room)
	Amenity Space Capacity= 200

Design Flow Rates:

Domestic Sewage Flow Rate =	450	L/c/d
MALL flow rate =	5	$L/m^c/d$
Amenity Building flow rate=	36	L/c/d
COM flow rate =	650	L/station/d
SCHOOL flow rate =	140	L/student/d
HOTEL flow rate =	225	L/bedspace/d
Unit of peak extraneous flow (I) =	0.15	L/ha/s
Foundation Drain Allowance (a) =	0	L/s/house (from MEA - 0.071)

Design Calculations:

Peaking Factor (Harmon) - $M = 1 + 14 / (4 + SQRT(0.001p))$
Peak Flow - $Q_p = P * q * M / 86400$ (L/s)
Peak Extraneous Flow - $Q_i = I*A$ (L/s)
Foundation Drain Flow - $Q_f = H * a$ (L/s)
Peak Design Flow - $Q_d = Q_p + Q_i + Q_f$ (L/s)

Mannings Equation - $Q = 1/n * A * R^{2/3} * S^{1/2}$
Roughness Coefficient (n) - 0.013
Hydraulic Radius (R) - 0.25 * pipe diameter
Design Flow Velocity - Hydraulic elements

LOCATION			DESIGN FLOWS														PIPE DESIGN								
			Tributary Area								Sewage Flows														
from MH	to MH	Street	Area ID	Number of Lots	Size (ha)	Type	Description	Flow Rate "q" (L/d)	Population, Students, or Area "P"		Average Flow (P*q / 86400) (L/s)	Peaking Factor "M"	Peak "Q_p" (L/s)	Peak Extraneous "Q_i" (L/s)	Foundation Drain "Q_f" (L/s)	Flow (L/s)	Design Flow "Q_d" (L/s)	Length (m)	Pipe I.D. (mm)	Type of Pipe	Grade (%)	Full Capacity "Q_{cap}" (L/s)	Full flow Velocity (m/s)	Design Flow Velocity (m/s)	Pipe Utilization Q_d / Q_{cap}
D	C	Parcel A		7	0.39	LD	Residential	450	28	persons	0.15	4.359	0.65	0.06	0.00	0.71	**0.71**	91.2	300	Sanitite HP	0.22	45.36	0.64	0.08	**2%**
C	B	Parcel A		11	0.74	LD	Residential	450	44	persons	0.23	4.326	0.99	0.11	0.00	1.10	**1.81**	111.6	300	Sanitite HP	0.22	45.36	0.64	0.13	**4%**
B	A	Parcel A		5	0.44	LD	Residential	450	20	persons	0.10	4.380	0.44	0.07	0.00	0.51	**2.32**	83.3	300	Sanitite HP	0.22	45.36	0.64	0.15	**5%**
E	F	Parcel A Street 2		6	0.36	LD	Residential	450	24	persons	0.13	4.369	0.57	0.05	0.00	0.62	**0.62**	46.9	300	Sanitite HP	0.22	45.36	0.64	0.08	**1%**
F	G	Parcel A Street 2		6	0.32	LD	Residential	450	24	persons	0.13	4.369	0.57	0.05	0.00	0.62	**1.24**	77.3	300	Sanitite HP	0.22	45.36	0.64	0.10	**3%**
K		Atwater		9	0.76	LD	Residential	450	36	persons	0.19	4.341	0.82	0.11	0.00	0.93	**1.69**	114.2	300	Sanitite HP	0.22	45.36	0.64	0.12	**4%**
	L	Atwater		10	0.39	MD	Residential	450	30	persons	0.16	4.355	0.70	0.06	0.00	0.76									
L		Atwater		4	0.51	LD	Residential	450	16	persons	0.08	4.393	0.35	0.08	0.00	0.43	**2.68**	81.0	300	Sanitite HP	0.22	45.36	0.64	0.17	**6%**
	G	Atwater		6	1.15	MD	Residential	450	18	persons	0.09	4.386	0.39	0.17	0.00	0.56									
G	H	Atwater		4	0.26	COM	Residential	650	8	persons	0.06	4.423	0.27	0.04	0.00	0.31	**2.99**	85.5	300	Sanitite HP	0.22	45.36	0.64	0.18	**7%**
H	J	Parcel A Street 1		8	0.44	LD	Residential	450	32	persons	0.17	4.350	0.74	0.07	0.00	0.81	**3.80**	75.4	300	Sanitite HP	0.22	45.36	0.64	0.21	**8%**
J	A	Parcel A Street 1		8	0.44	LD	Residential	450	32	persons	0.17	4.350	0.74	0.07	0.00	0.81	**4.61**	72.3	300	Sanitite HP	0.22	45.36	0.64	0.24	**10%**
A	Existing	Chippewa		2	0.27	LD	Residential	450	8	persons	0.04	4.423	0.18	0.04	0.00	0.22	**7.15**	53.5	300	Sanitite HP	0.22	45.36	0.64	0.33	**16%**
				51.00	4.21											4.83									

Sanitary Sewer Design Sheet

KRESIN Engineering Corporation

Project: **Chippewa Avenue Subdivision** KEC Project: **2278.02**
Client: Mamta Homes Date Updated: **March 1, 2023**

Area Types:

LD	low density domestic LD persons per lot = 4
MD	medium density domestic (P - actual based on survey) = 3
HD	high density domestic (P - actual based on survey)
IND	industrial
SCHOOL	school (P - actual based on school population)
MALL	shopping centres
COM	commercial areas = 2
HOTEL	hotel/motel (P - actual based on 5 bed spaces per room)
	Amenity Space Capacity= 200

Design Flow Rates:

Domestic Sewage Flow Rate =	400	L/c/d
MALL flow rate =	5	L/m^2/d
Amenity Building flow rate=	36	L/c/d
COM flow rate =	650	L/station/d
SCHOOL flow rate =	140	L/student/d
HOTEL flow rate =	225	L/bedspace/d
Unit of peak extraneous flow (I) =	0.15	L/ha/s
Foundation Drain Allowance (a) =	0	L/s/house (from MEA - 0.071)

Design Calculations:

Peaking Factor (Harmon) - $M = 1 + 14 / (4 + SQRT(0.001p))$
Peak Flow - $Q_p = P * q * M / 86400$ (L/s)
Peak Extraneous Flow - $Q_i = I*A$ (L/s)
Foundation Drain Flow - $Q_f = H * a$ (L/s)
Peak Design Flow - $Q_d = Q_p + Q_i + Q_f$ (L/s)

Mannings Equation - $Q = 1/n * A * R^{2/3} * S^{1/2}$
Roughness Coefficient (n) - 0.013
Hydraulic Radius (R) - 0.25 * pipe diameter
Design Flow Velocity - Hydraulic elements

LOCATION			DESIGN FLOWS														PIPE DESIGN								
			Tributary Area								Sewage Flows														
from MH	to MH	Street	Area ID	Number of Lots	Size (ha)	Type	Description	Flow Rate "q" (L/d)	Population, Students, or Area "P"		Average Flow (P*q / 86400) (L/s)	Peaking Factor "M"	Peak "Q_p" (L/s)	Peak Extraneous "Q_i" (L/s)	Foundation Drain "Q_f" (L/s)	Flow (L/s)	Design Flow "Q_d" (L/s)	Length (m)	Pipe I.D. (mm)	Type of Pipe	Grade (%)	Full Capacity "Q_{cap}" (L/s)	Full flow Velocity (m/s)	Design Flow Velocity (m/s)	Pipe Utilization Q_d / Q_{cap}
U	V	Parcel B	m	13	0.67	MD	Residential	400	39	persons	0.18	4.335	0.78	0.10	0.00	0.88	**0.88**	72.0	300	Sanitite HP	0.22	45.36	0.64	0.09	**2%**
V	W	Parcel B	m	25	0.60	MD	Residential	400	75	persons	0.35	4.276	1.50	0.09	0.00	1.59	**2.47**	118.0	300	Sanitite HP	0.22	45.36	0.64	0.16	**5%**
W		Parcel B	m	8	0.277	MD	Residential	400	24	persons	0.11	4.369	0.48	0.04	0.00	0.52	**0.87**	81.0	300	Sanitite HP	0.22	45.36	0.64	0.09	**2%**
	Y	Parcel B	m	1	0.151	Amenity	Residential	36	200	persons	0.08	4.148	0.33	0.02	0.00	0.35									
Y	Z	Parcel B	m	19	0.75	MD	Residential	400	57	persons	0.26	4.303	1.12	0.11	0.00	1.23	**2.10**	99.0	300	Sanitite HP	0.22	45.36	0.64	0.14	**5%**
Z	T	Parcel B	m	19	0.70	MD	Residential	400	57	persons	0.26	4.303	1.12	0.11	0.00	1.23	**3.33**	87.0	300	Sanitite HP	0.22	45.36	0.64	0.19	**7%**
M	N	Parcel C	f	90	0.41	MD	Residential	400	270	persons	1.25	4.098	5.12	0.06	0.00	5.18	**5.18**	92.0	300	Sanitite HP	0.22	45.36	0.64	0.26	**11%**
N	P	Parcel C	e	90	0.40	MD	Residential	450	270	persons	1.41	4.098	5.78	0.06	0.00	5.84	**11.02**	41.0	300	Sanitite HP	0.22	45.36	0.64	0.45	**24%**
P	Q	Parcel B	d	6	0.21	MD	Residential	400	18	persons	0.08	4.386	0.35	0.03	0.00	0.38	**11.40**	117.0	300	Sanitite HP	0.22	45.36	0.64	0.46	**25%**
Q	R	Parcel B	c	17	0.56	MD	Residential	450	51	persons	0.27	4.313	1.16	0.08	0.00	1.24	**12.64**	99.0	300	Sanitite HP	0.22	45.36	0.64	0.50	**28%**
R	S	Parcel B	c	18	0.60	MD	Residential	450	54	persons	0.28	4.308	1.21	0.09	0.00	1.30	**13.94**	73.0	300	Sanitite HP	0.22	45.36	0.64	0.53	**31%**
S	T	Parcel B	c	14	0.47	MD	Residential	450	42	persons	0.22	4.329	0.95	0.07	0.00	1.02	**14.96**	66.0	300	Sanitite HP	0.22	45.36	0.64	0.55	**33%**
T	Existing	Arden	m	3	0.28	MD	Residential	400	9	persons	0.04	4.419	0.18	0.04	0.00	0.22	**18.51**	62.0	300	PVC DR 35	0.22	45.36	0.64	0.62	**41%**
				238.00	2.93											15.18									

Appendix 8

Fire Flow Design

Domestic

S.F lots	66	3.5	231
S.D. lots	16	3.5	56
Townhouse lots	104	2	208
Apartment units	180	2	360
			855

Population	855	persons
Design Demand	400	L/capita/day
Development Demand	3.96	L/s
Maximum Day Factor	2.75	
Maximum daily demand	10.89	L/s
Peak Rate Factor (hour)	4.13	
Maximum hourly demand	16.35	L/s

Design fire

Fire (UL)

RFF = 220CvA

C	1	Common Construction	
A	3000	Based on Fire Area of one townhouse block	
	1500	sq. m per floor	
	2	floors	
RFF	12049.9	L/m	
	12000	L/m	rounded to nearest 1000

Content Adjustment

factor	-15%	Group C - Limited combustible contents
adjusdment	-1800	L/m

Exposure Adjustment

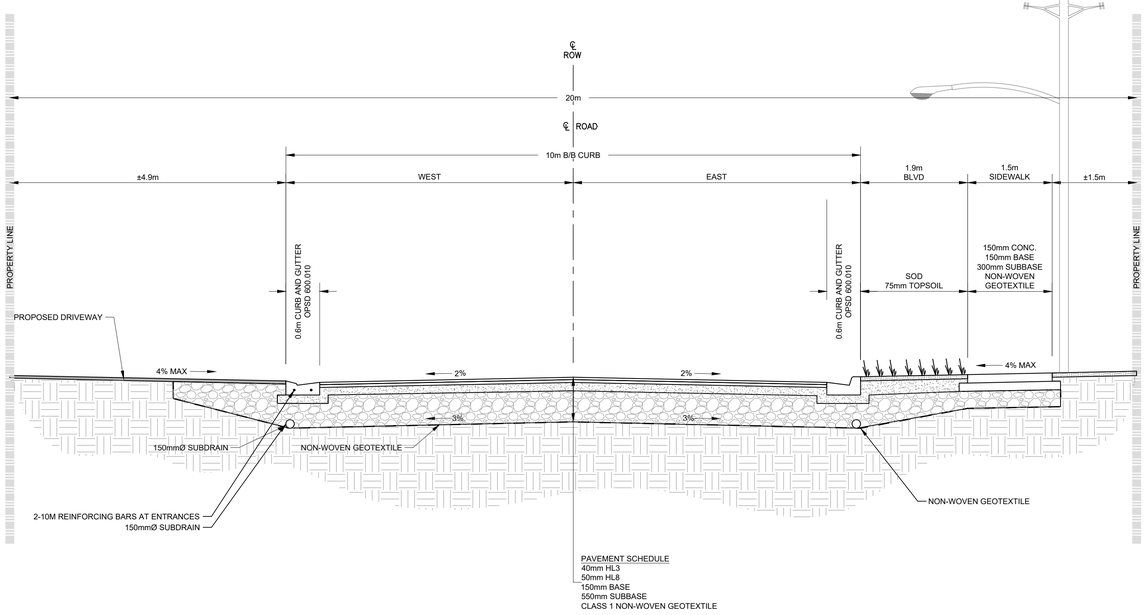
20%	side yard 1
20%	side yard 2
10%	rear yard
50%	
adjusdment 6000	L/m

Adjusted RFF

RFF	16000	L/m	(Note OBC max rate is 9,000 L/m)
	265	L/s	rounded

Appendix 9

Engineering Drawings



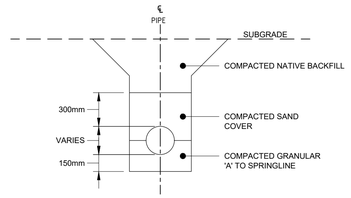
TYPICAL CROSS SECTION
SCALE 1:50

GENERAL:

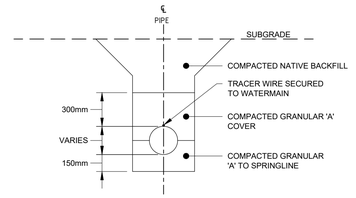
1. ALL SERVICES ARE TO REMAIN UNINTERRUPTED FOR THE DURATION OF THE CONTRACT.
2. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS TO PRE-CONSTRUCTION CONDITION,OR BETTER AND TO THE SATISFACTION OF THE ENGINEER.
3. CONCRETE SIDEWALK CONSTRUCTION SHALL BE AS PER OPSD 310.010 WITH RAMPS AT INTERSECTIONS CONFORMING TO CITY OF SAULT STE. MARIE STANDARDS.
4. ALL ENTRANCE RESTORATION SHALL ENSURE WIDTHS, SURFACE, CURB AND FINISHED GRADE MATCH EXISTING AT LIMITS AS DIRECTED BY THE ENGINEER ON-SITE. ENSURE POSITIVE SURFACE DRAINAGE TO STORM WATER COLLECTION SYSTEM.
5. GRADE TO MATCH EXISTING ASPHALT AND CURB AT INTERSECTIONS. ENSURE POSITIVE SURFACE DRAINAGE TO STORM WATER COLLECTION SYSTEM.
6. THE POSITION AND SIZE OF POLE LINES, CONDUITS, DUCTS, WATER MAINS, SEWERS AND OTHER UNDER GROUND AND ABOVE GROUND UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. THE CONTRACTOR SHALL BE RESPONSIBLE TO DETERMINE THE EXACT LOCATION AND SIZE OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME LIABILITY FOR DAMAGE TO THEM.

SANITARY AND STORM SEWERS:

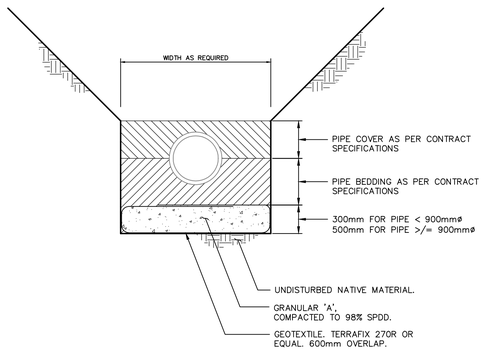
1. ALL SANITARY SEWER PIPE TO BE CSA 182.2 PVC SDR 35, SIZED AS NOTED ON DRAWINGS. ALL FITTINGS AND APPURTENANCES TO BE 100% COMPATIBLE.
2. ALL STORM SEWER PIPE TO BE CSA 182.2 PVC SDR35, OR CSA A257.2 REINFORCED CONCRETE PIPE,SIZED AS NOTED ON DRAWINGS. ALL FITTINGS & APPURTENANCES TO BE 100% COMPATIBLE.
3. ALL SANITARY AND STORM MAINTENANCE HOLES TO BE SIZED AS NOTED ON THE PROFILE DRAWING(S) AND SHALL CONFORM TO THE RELEVANT OPSD UNLESS OTHERWISE NOTED.
4. ALL CATCH BASIN LEADS SHALL BE CSA 182.2 PVC SDR 35 250mmØ UNLESS NOTED.
5. ALL SUBDRAINS TO BE CSA 182.8 PERFORATED HIGH DENSITY POLYETHYLENE PIPE OR APPROVED ALTERNATIVE; WRAPPED IN FILTER FABRIC CONFORMING TO OPSS 1840; 150mmØ.



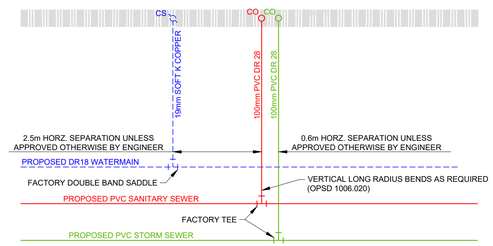
BEDDING DETAIL - SEWERS AND SERVICES
SCALE 1:25



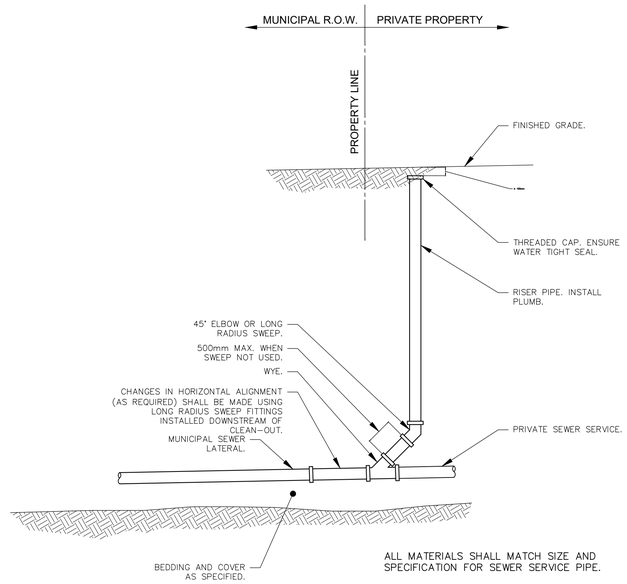
BEDDING DETAIL - WATERMAIN AND SERVICES
SCALE 1:25



REINFORCED PIPE BEDDING
SCALE NTS



TYPICAL SANITARY AND WATER SERVICE DETAIL
N.T.S.



SEWER SERVICE CLEAN-OUT
SCALE NTS

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL

REVISIONS

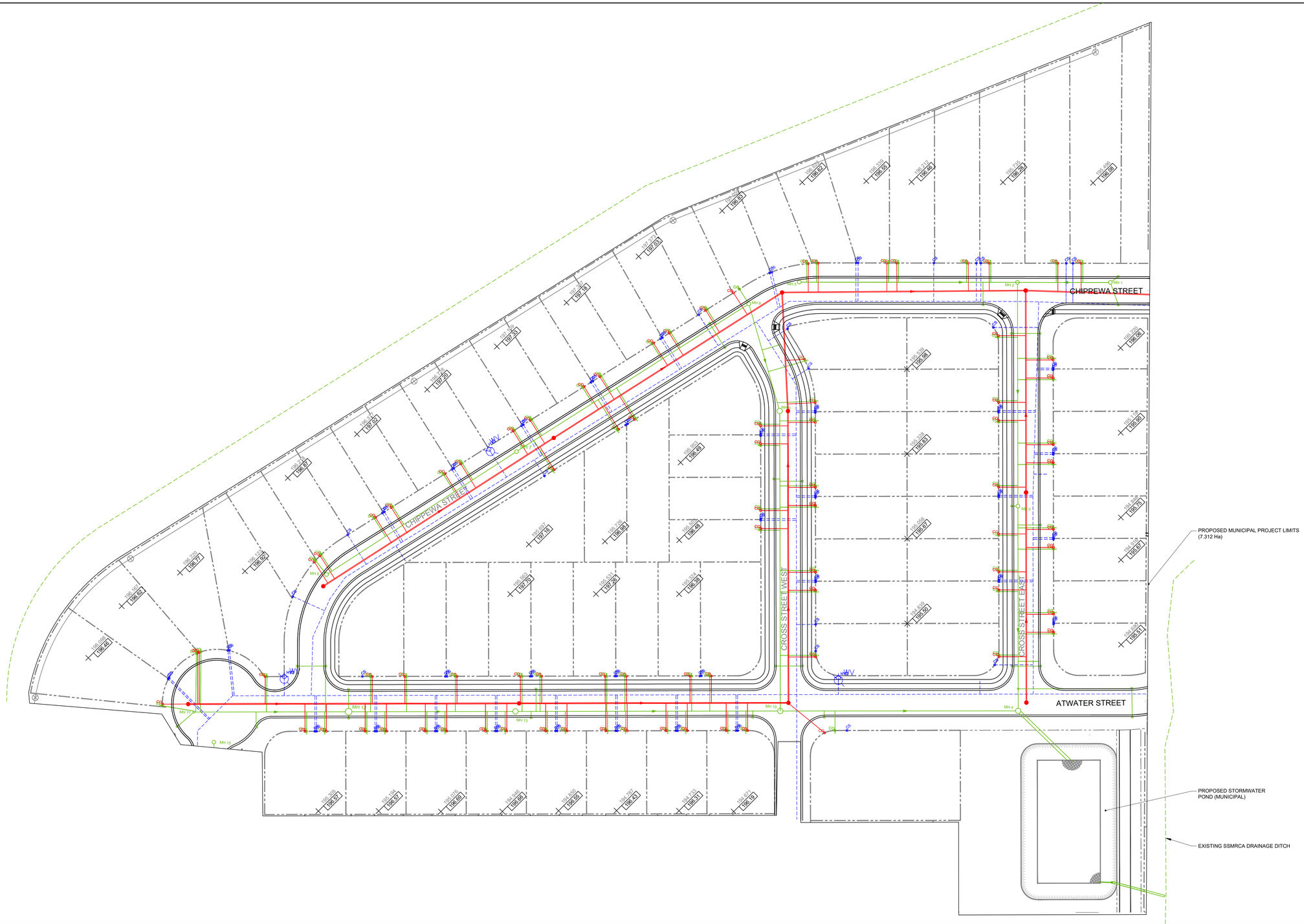
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
DETAILS AND NOTES

DRAWING NO.
G1



NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

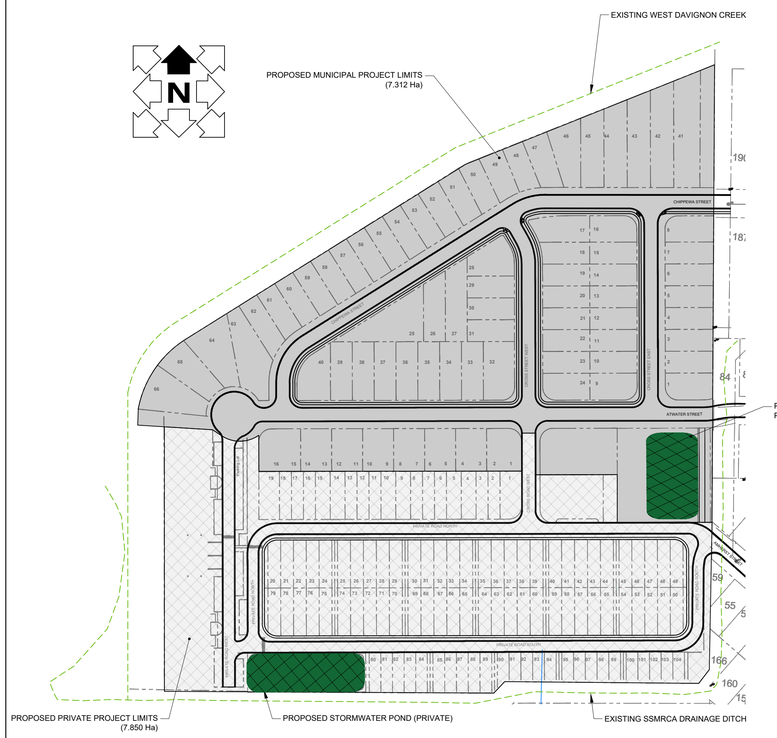
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

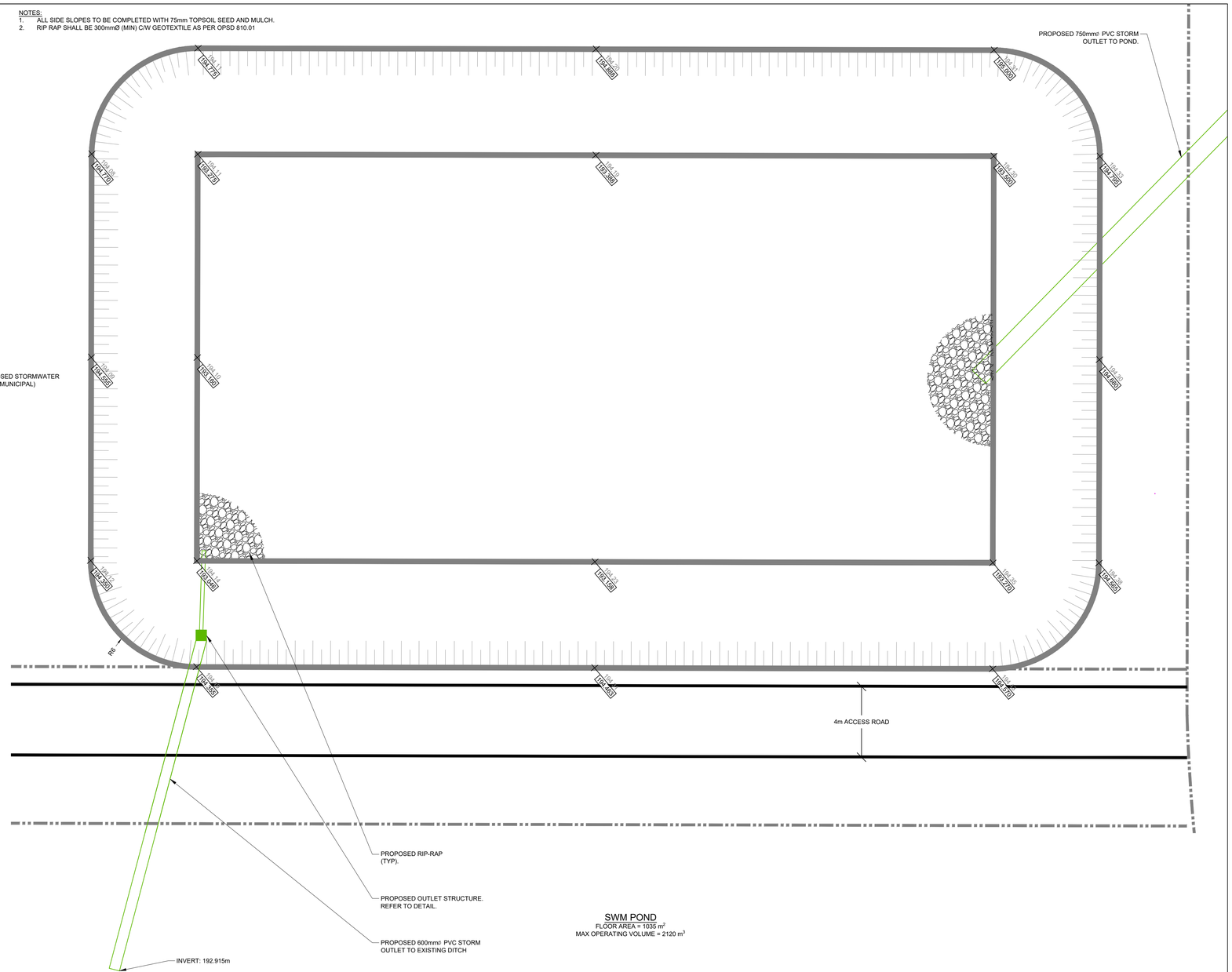
MAMTA HOMES
0 CHIPPEWA STREET
SITE GRADING

DRAWING NO.
G2

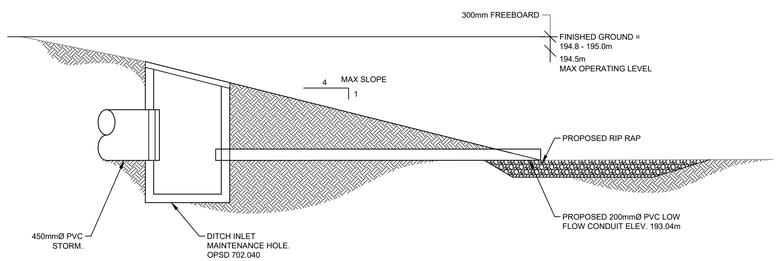


LOCATION PLAN
SCALE 1:2000

NOTES:
1. ALL SIDE SLOPES TO BE COMPLETED WITH 75mm TOPSOIL SEED AND MULCH.
2. RIP RAP SHALL BE 300mmØ (MIN) C/W GEOTEXTILE AS PER OPSD 810.01



SWM POND
FLOOR AREA = 1035 m²
MAX OPERATING VOLUME = 2120 m³



OUTLET STRUCTURE DETAIL
SCALE 1:25

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL

REVISIONS

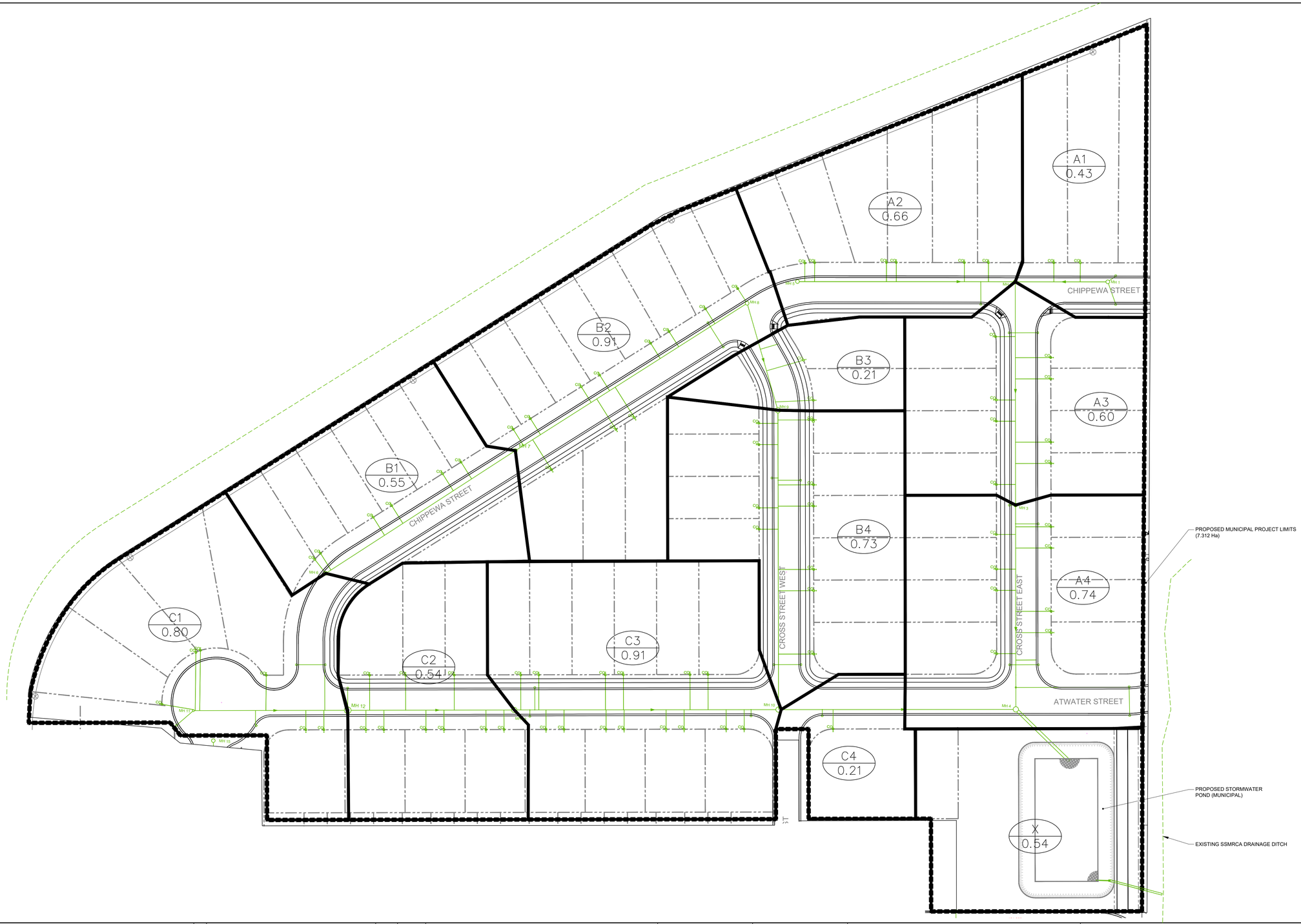
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	RS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
STORMWATER POND

DRAWING NO.
G3



NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL

REVISIONS

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

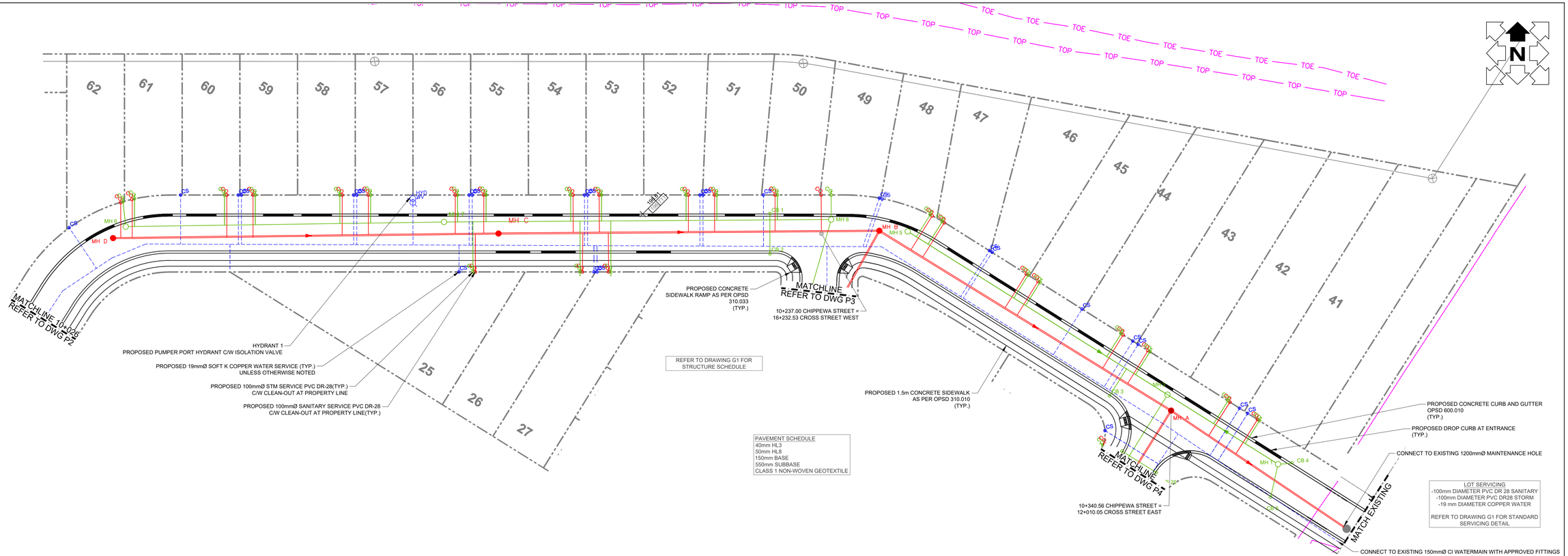
SCALE	1:500
CHK	M. KRESIN
DATE	06/07/2024
DWG.	KS
GEO BM	
FILE	2278.03 G1 G2 G3.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
STORM DRAINAGE AREAS

DRAWING NO.

G4



NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.
2. DO NOT SCALE DRAWING.
3. DRAWING SHOWS PROPOSED CONSTRUCTION EMPHASIZED.
4. EXISTING CONDITIONS APPEAR SCREENED IN BACKGROUND.
5. LOCATION OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE ONLY AND MUST BE VERIFIED BY CONTRACTOR.
6. FOR BOREHOLE INFORMATION, REFER TO GEOTECHNICAL REPORT.

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

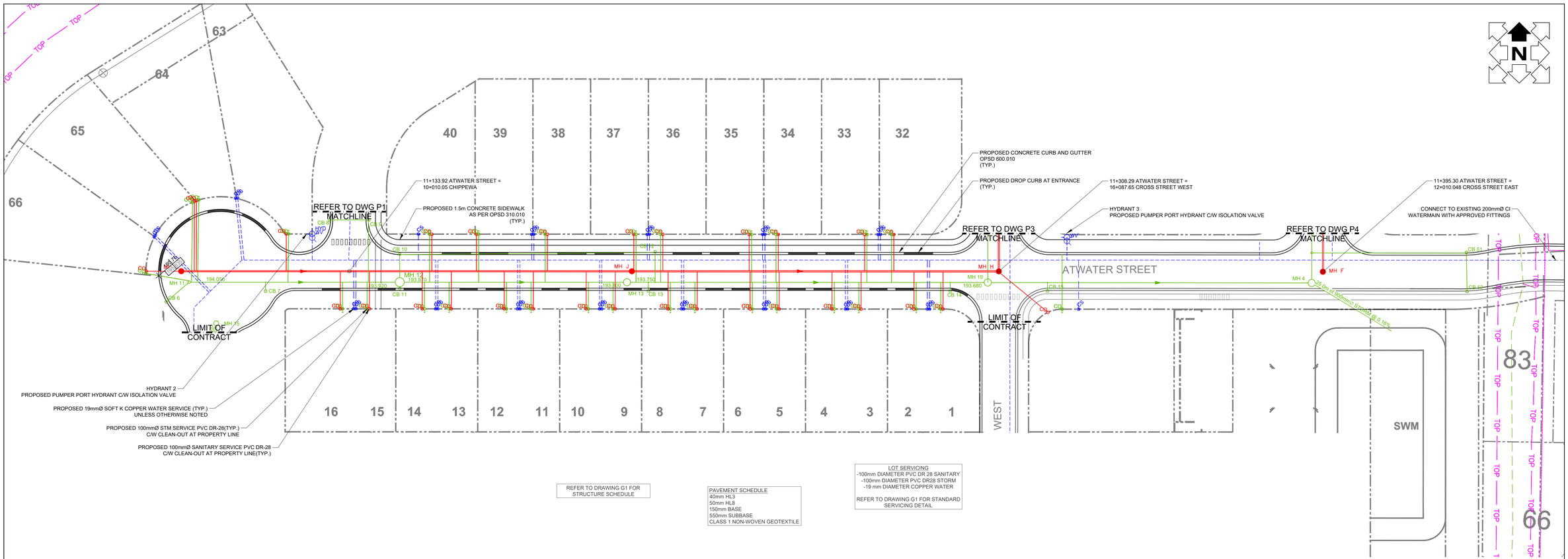
SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	KS
GEO BM	
FILE	2278.03 DESIGN.DWG

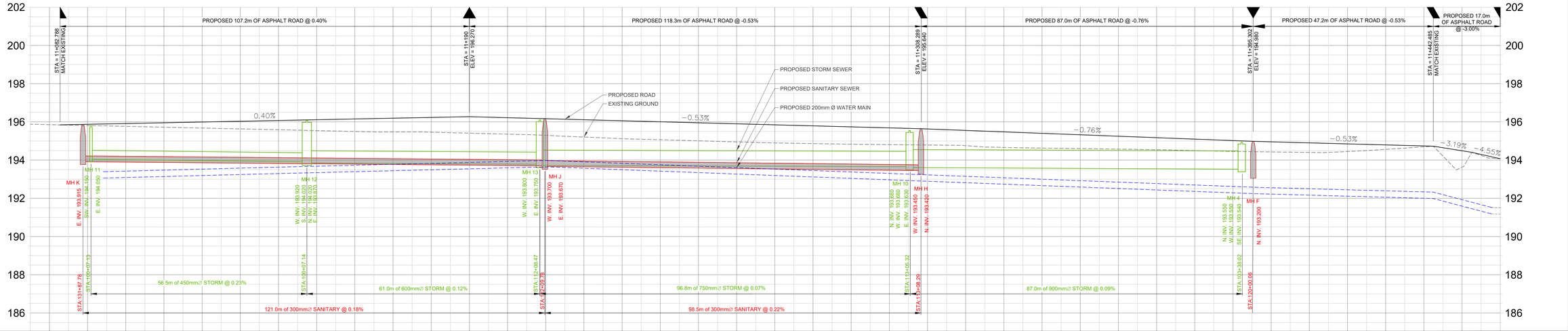
FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
CHIPPEWA STREET

DRAWING NO.

P1





CL ELEV.	195.843	195.872	195.912	195.951	195.991	196.031	196.071	196.111	196.151	196.190	196.230	196.270	196.217	196.163	196.110	196.057	196.004	195.950	195.897	195.844	195.791	195.737	195.684	195.627	195.551	195.475	195.399	195.324	195.248	195.172	195.096	195.020	194.965	194.902	194.849	194.795	194.742	194.489	194.069	CL ELEV.
STA.	11+080	11+090	11+100	11+110	11+120	11+130	11+140	11+150	11+160	11+170	11+180	11+190	11+200	11+210	11+220	11+230	11+240	11+250	11+260	11+270	11+280	11+290	11+300	11+310	11+320	11+330	11+340	11+350	11+360	11+370	11+380	11+390	11+400	11+410	11+420	11+430	11+440	11+450	11+460	STA.

NOTES:

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

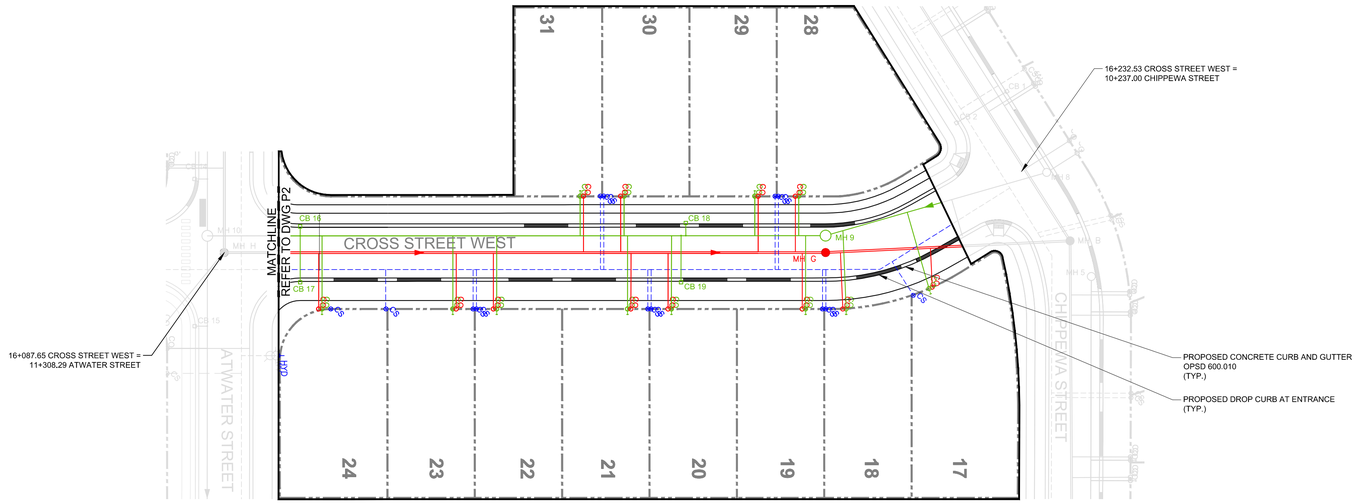
SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	KS
GEO BM	
FILE	2278.03 DESIGN.DWG

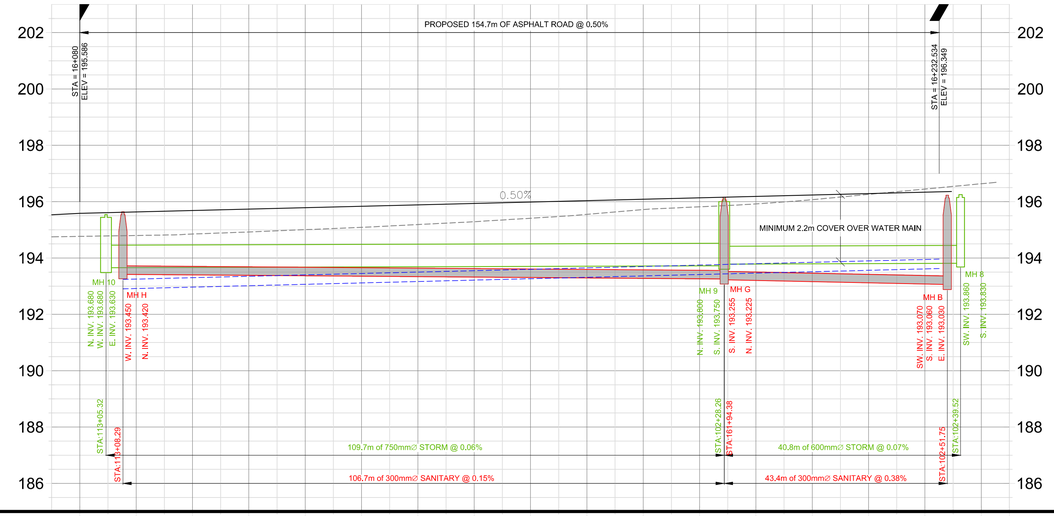
FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
ATWATER STREET

DRAWING NO.

P2





CL ELEV.	195.586	195.636	195.686	195.736	195.786	195.836	195.886	195.936	195.986	196.036	196.086	196.136	196.186	196.236	196.286	196.336			CL ELEV.
STA.	16+080	16+090	16+100	16+110	16+120	16+130	16+140	16+150	16+160	16+170	16+180	16+190	16+200	16+210	16+220	16+230	16+240	16+245	STA.

NOTES:

No	DESCRIPTION	DATE	INITIAL
	REVISIONS		

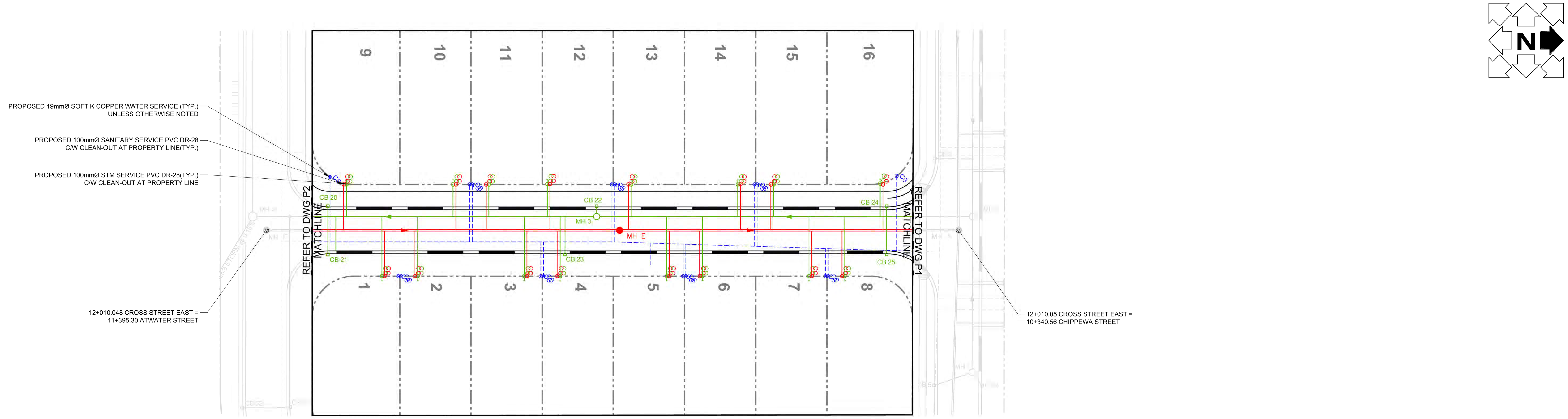
KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	06/10/2024
DWG.	KS
GEO BM	
FILE	2278.03 DESIGN.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
CROSS ROAD WEST

DRAWING NO.
P3

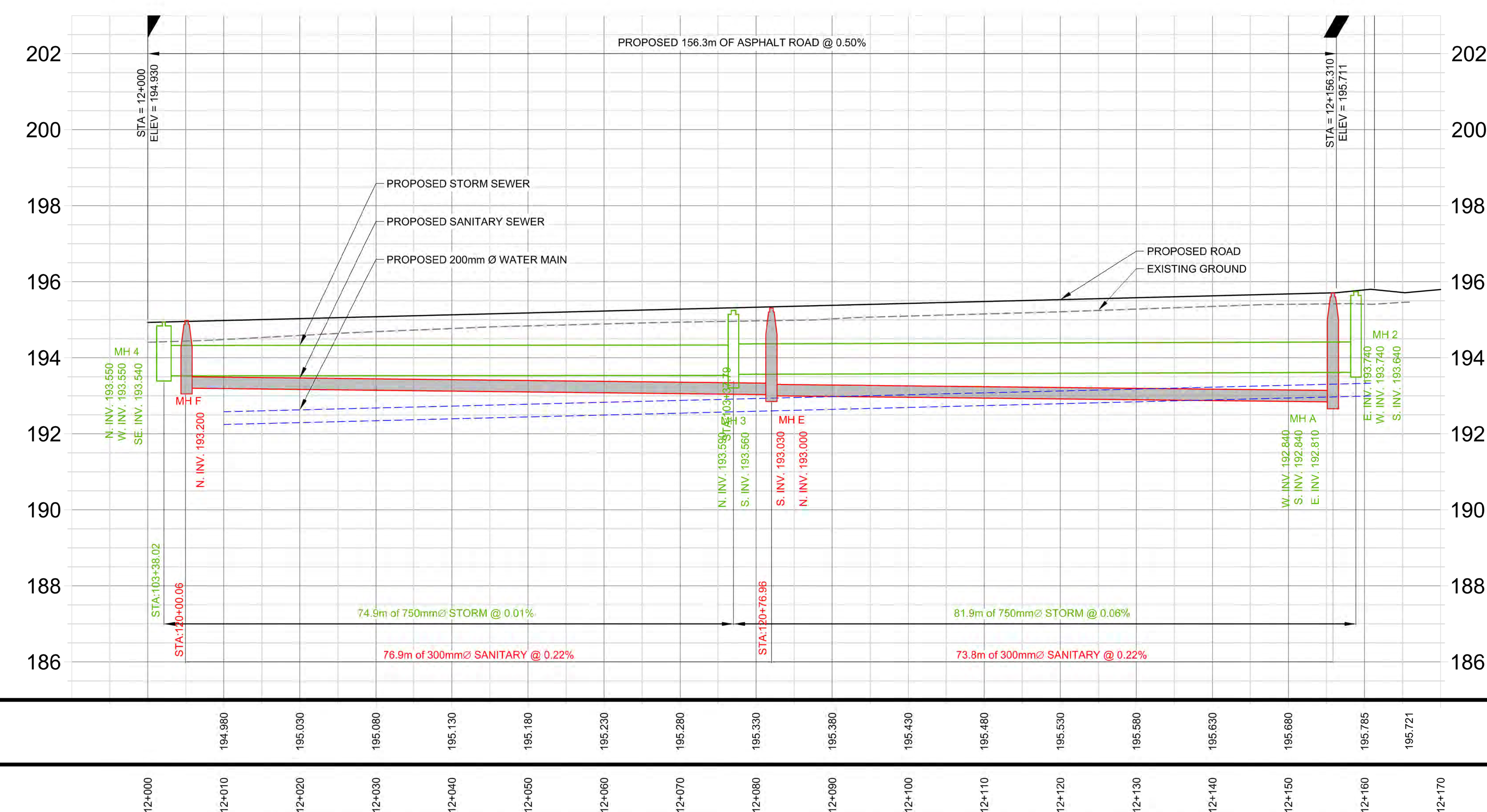


REFER TO DRAWING G1 FOR STRUCTURE SCHEDULE

PAVEMENT SCHEDULE
40mm HL3
50mm HL8
150mm BASE
550mm SUBBASE
CLASS 1 NON-WOVEN GEOTEXTILE

LOT SERVICING
-100mm DIAMETER PVC DR 28 SANITARY
-100mm DIAMETER PVC DR28 STORM
-19 mm DIAMETER COPPER WATER

REFER TO DRAWING G1 FOR STANDARD SERVICING DETAIL



NOTES:

No	DESCRIPTION	DATE	INITIAL

REVISIONS

KRESIN Engineering Corporation
Sault Ste. Marie, Ontario
(705) 949-4900

SCALE	1:500
CHK	M. KRESIN
DATE	05/2024
DWG.	DMKS
GEO BM	
FILE	2278.03 DESIGN.DWG

FOR APPROVAL

MAMTA HOMES
0 CHIPPEWA STREET
CROSS STREET EAST

DRAWING NO.
P4