For Office Use Only:

File Number	SPPL2023171	Public Notice Sign	-
Related File Number	SPPL2022351	Application Fee	~~$4000.00~~
Pre-consultation Meeting	June 8, 2022	Conservation Authority Fee	N/A
Application Submitted	May 26, 2023	Well & Septic Info Provided	N/A
Complete Application	June 6, 22023	Planner	Hanne Yager

Check the type of planning application(s) you are submitting.

- ☐ Official Plan Amendment
- ☐ Zoning By-Law Amendment
- ☐ Temporary Use By-law
- ☐ Draft Plan of Subdivision/Vacant Land Condominium
- ☐ Condominium Exemption
- ☒ Site Plan Application
- ☐ Extension of a Temporary Use By-law
- ☐ Part Lot Control
- ☐ Cash-in-Lieu of Parking
- ☐ Renewable Energy Project or Radio Communication Tower

Please summarize the desired end result of this application (for example: a special zoning provision on the subject lands to include additional use(s), changing the zone and/or official plan designation of the subject lands, creating a certain number of lots, or similar)

Construction of a Self Storage Facility

Property Assessment Roll Number: 40100131000

A. Applicant Information

Name of Owner 5046331 Ont inc o/a JCM CUSTOM HOMES

It is the responsibility of the owner or applicant to notify the planner of any changes in ownership within 30 days of such a change.

Address 1354 windham east quarter line road

Town and Postal Code N0A2A0

Phone Number

Cell Number 9055379200

Email julia_guasta84@hotmail.com

Name of Applicant Nicholas Hiemstra

Address 557 Alberta Ave

Town and Postal Code Woodstock, ON, N4V 0A3

Phone Number

Cell Number 905-512-2377

Email office@dlxengineering.com

Name of Agent

Address

Town and Postal Code

Phone Number

Cell Number

Email

Please specify to whom all communications should be sent. Unless otherwise directed, all correspondence and notices in respect of this application will be forwarded to both owner and agent noted above.

▣ Owner ☐ Agent ▣ Applicant

Names and addresses of any holder of any mortgagees, charges or other encumbrances on the subject lands:

B. Location, Legal Description and Property Information

1. Legal Description (include Geographic Township, Concession Number, Lot Number, Block Number and Urban Area or Hamlet):

   Townsend Con. 14, Pt. Lot 1

   Municipal Civic Address: 561 Bank St. Simcoe, ON.

   Present Official Plan Designation(s): Schedule B-15: Industrial

   Present Zoning: MG General Industrial Zone

2. Is there a special provision or site specific zone on the subject lands?

   ☐ Yes ■ No If yes, please specify corresponding number:

3. Present use of the subject lands:
   Solar Power Generation

4. Please describe **all existing** buildings or structures on the subject lands and whether they are to be retained, demolished or removed. If retaining the buildings or structures, please describe the type of buildings or structures, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:
   Existing Run-Down Small Building to be demolished and removed. Existing Solar P
   storage units. Existing storage trailer to be removed.

5. If an addition to an existing building is being proposed, please explain what it will be used for (for example: bedroom, kitchen, or bathroom). If new fixtures are proposed, please describe.

6. Please describe **all proposed** buildings or structures/additions on the subject lands. Describe the type of buildings or structures/additions, and illustrate the setback, in metric units, from front, rear and side lot lines, ground floor area, gross floor area, lot coverage, number of storeys, width, length, and height on your attached sketch which must be included with your application:
   Two 64.01m x 7.62m Cinderblock Buildings for Personal Storage Containers
   One 6.1m x 6.1m building. Half to be used for Aministrative, Half to be used for pers

7. Are any existing buildings on the subject lands designated under the *Ontario Heritage Act* as being architecturally and/or historically significant? Yes ☐ No ■

   If yes, identify and provide details of the building:

8. If known, the length of time the existing uses have continued on the subject lands:
   Unknown
9. Existing use of abutting properties:
   Flooring Store to the North (ML) Empty Lot to the South (MG) Residential across th
10. Are there any easements or restrictive covenants affecting the subject lands?

    ☐ Yes ■ No If yes, describe the easement or restrictive covenant and its effect:

C. Purpose of Development Application

Note: Please complete all that apply.

1. Please explain what you propose to do on the subject lands/premises which makes this development application necessary:
   Construction of the buildings above.
   Lot Grading of compacted granular.
2. Please explain why it is not possible to comply with the provision(s) of the Zoning By-law/and or Official Plan:
3. Does the requested amendment alter all or any part of the boundary of an area of settlement in the municipality or implement a new area of settlement in the municipality? ☐ Yes ■ No If yes, describe its effect:
4. Does the requested amendment remove the subject land from an area of employment? ☐ Yes ■ No If yes, describe its effect:

5. Does the requested amendment alter, replace, or delete a policy of the Official Plan? ☐ Yes ■ No If yes, identify the policy, and also include a proposed text of the policy amendment (if additional space is required, please attach a separate sheet):

_____

_____

_____

6. Description of land intended to be severed in metric units:
   Frontage: _____
   Depth: _____
   Width: _____
   Lot Area: _____
   Present Use: _____
   Proposed Use: _____
   Proposed final lot size (if boundary adjustment): _____
   If a boundary adjustment, identify the assessment roll number and property owner of the lands to which the parcel will be added: _____

   _____

   Description of land intended to be retained in metric units:
   Frontage: _____
   Depth: _____
   Width: _____
   Lot Area: _____
   Present Use: _____
   Proposed Use: _____
   Buildings on retained land: _____
7. Description of proposed right-of-way/easement:
   Frontage: _____
   Depth: _____
   Width: _____
   Area: _____
   Proposed use: _____
8. Name of person(s), if known, to whom lands or interest in lands to be transferred, leased or charged (if known):

_____

9. **Site Information**	**Zoning**	**Proposed**
Please indicate unit of measurement, for example: m, m^2 or %		
Lot frontage	30m	44.27m
Lot depth	-	92.0m
Lot width	-	44.27m
Lot area	1855m^2	4089.84m^2
Lot coverage	-	11.9%
Front yard	6m	6.0m
Rear yard	9m	9.13m
Left Interior side yard	6.0m	6.46m
Right Interior side yard	6.0m	7.0m
Exterior side yard (corner lot)	6m	N/A
Landscaped open space	-	15%
Entrance access width	-	8.24m
Exit access width	-	8.24m
Size of fencing or screening	-	1.8m
Type of fencing	-	Chain-Link
10. Building Size		
Number of storeys	-	1
Building height	-	2.44m
Total ground floor area	-	1012.7m^2
Total gross floor area	-	1012.7m^2
Total useable floor area	-	1012.7m^2
11. Off Street Parking and Loading Facilities		
Number of off street parking spaces	6	6
Number of visitor parking spaces	-	5
Number of accessible parking spaces	1	1
Number of off street loading facilities	0	0

12. Residential (if applicable)

Number of buildings existing: _____

Number of buildings proposed: _____

Is this a conversion or addition to an existing building? ☐ Yes ☐ No

If yes, describe: _____

Type	**Number of Units**	**Floor Area per Unit in m2**
Single Detached		
Semi-Detached		
Duplex		
Triplex		
Four-plex		
Street Townhouse		
Stacked Townhouse		
Apartment - Bachelor		
Apartment - One bedroom		
Apartment - Two bedroom		
Apartment - Three bedroom		

Other facilities provided (for example: play facilities, underground parking, games room, or swimming pool):

13. Commercial/Industrial Uses (if applicable)

Number of buildings existing: 1

Number of buildings proposed: 3

Is this a conversion or addition to an existing building? ☐ Yes ■ No

If yes, describe:

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

Storage: 994.12m^2

Office:18.6m^2

Seating Capacity (for assembly halls or similar): _____

Total number of fixed seats: _____

Describe the type of business(es) proposed: Mini Storage

Total number of staff proposed initially: 1

Total number of staff proposed in five years: 1

Maximum number of staff on the largest shift: 1

Is open storage required: ☐ Yes ■ No

Is a residential use proposed as part of, or accessory to commercial/industrial use?

☐ Yes ■ No If yes please describe:

_____

_____

14. Institutional (if applicable)

Describe the type of use proposed: _____

Seating capacity (if applicable): _____

Number of beds (if applicable): _____

Total number of staff proposed initially: _____

Total number of staff proposed in five years: _____

Maximum number of staff on the largest shift: _____

Indicate the gross floor area by the type of use (for example: office, retail, or storage):

_____

_____

_____

15. Describe Recreational or Other Use(s) (if applicable)

_____

_____

_____

_____

_____

D. Previous Use of the Property

1. Has there been an industrial or commercial use on the subject lands or adjacent lands? ■ Yes ☐ No ☐ Unknown

   If yes, specify the uses (for example: gas station or petroleum storage):
   Flooring Store to the North.

2. Is there reason to believe the subject lands may have been contaminated by former uses on the site or adjacent sites? ☐ Yes ■ No ☐ Unknown
3. Provide the information you used to determine the answers to the above questions:

4. If you answered yes to any of the above questions in Section D, a previous use inventory showing all known former uses of the subject lands, or if appropriate, the adjacent lands, is needed. Is the previous use inventory attached? ☐ Yes ☐ No

E. Provincial Policy

1. Is the requested amendment consistent with the provincial policy statements issued under subsection 3(1) of the *Planning Act, R.S.O. 1990, c. P. 13*? ■ Yes ☐ No

   If no, please explain:

2. It is owner's responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals, including the Endangered Species Act, 2007. Have the subject lands been screened to ensure that development or site alteration will not have any impact on the habitat for endangered or threatened species further to the provincial policy statement subsection 2.1.7? ☐ Yes ■ No

   If no, please explain:
   Existing Lot is entirely Gravel. Some invasive shrubbery and grasses have grown in
   was completely cleared in years past.

3. Have the subject lands been screened to ensure that development or site alteration will not have any impact on source water protection? ☐ Yes ■ No

   If no, please explain:

   _____

   _____

   Note: If in an area of source water Wellhead Protection Area (WHPA) A, B or C please attach relevant information and approved mitigation measures from the Risk Manager Official.

4. Are any of the following uses or features on the subject lands or within 500 metres of the subject lands, unless otherwise specified? Please check boxes, if applicable.

   Livestock facility or stockyard (submit MDS Calculation with application)

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Wooded area

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Municipal Landfill

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Sewage treatment plant or waste stabilization plant

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Provincially significant wetland (class 1, 2 or 3) or other environmental feature

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Floodplain

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Rehabilitated mine site

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Non-operating mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Active mine site within one kilometre

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Industrial or commercial use (specify the use(s))

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Active railway line

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Seasonal wetness of lands

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Erosion

   ☐ On the subject lands or ☐ within 500 meters – distance _____

   Abandoned gas wells

   ☐ On the subject lands or ☐ within 500 meters – distance _____

F. Servicing and Access

1. Indicate what services are available or proposed:
   Water Supply
   - ■ Municipal piped water
   - ☐ Individual wells
   - ☐ Communal wells
   - ☐ Other (describe below)

   _____

   Sewage Treatment
   - ■ Municipal sewers
   - ☐ Septic tank and tile bed in good working order
   - ☐ Communal system
   - ☐ Other (describe below)

   _____

   Storm Drainage
   - ■ Storm sewers
   - ☐ Other (describe below)
   - ☐ Open ditches

   _____

2. Existing or proposed access to subject lands:
   - ■ Municipal road
   - ☐ Unopened road
   - ☐ Provincial highway
   - ☐ Other (describe below)

   Name of road/street: _____

G. Other Information

1. Does the application involve a local business? ■ Yes ☐ No
   If yes, how many people are employed on the subject lands?
   _____
2. Is there any other information that you think may be useful in the review of this application? If so, explain below or attach on a separate page.
   _____
   _____
   _____
   _____

H. Supporting Material to be submitted by Applicant

In order for your application to be considered complete, **folded** hard copies (number of paper copies as directed by the planner) and an **electronic version (PDF) of the properly named site plan drawings, additional plans, studies and reports** will be required, including but not limited to the following details:

1. Concept/Layout Plan
2. All measurements in metric
3. Key map
4. Scale, legend and north arrow
5. Legal description and municipal address
6. Development name
7. Drawing title, number, original date and revision dates
8. Owner's name, address and telephone number
9. Engineer's name, address and telephone number
10. Professional engineer's stamp
11. Existing and proposed easements and right of ways
12. Zoning compliance table – required versus proposed
13. Parking space totals – required and proposed
14. All entrances to parking areas marked with directional arrows
15. Loading spaces, facilities and routes (for commercial developments)
16. All dimensions of the subject lands
17. Dimensions and setbacks of all buildings and structures
18. Location and setbacks of septic system and well from all existing and proposed lot lines, and all existing and proposed structures
19. Gross, ground and useable floor area
20. Lot coverage
21. Floor area ratio
22. Building entrances, building type, height, grades and extent of overhangs
23. Names, dimensions and location of adjacent streets including daylighting triangles
24. Driveways, curbs, drop curbs, pavement markings, widths, radii and traffic directional signs
25. All exterior stairways and ramps with dimensions and setbacks
26. Retaining walls including materials proposed
27. Fire access and routes
28. Location, dimensions and number of parking spaces (including visitor and accessible) and drive aisles
29. Location of mechanical room, and other building services (e.g. A/C, HRV)
30. Refuse disposal and storage areas including any related screening (if indoors, need notation on site plan)
31. Winter snow storage location

32. Landscape areas with dimensions
33. Natural features, watercourses and trees
34. Fire hydrants and utilities location
35. Fencing, screening and buffering – size, type and location
36. All hard surface materials
37. Light standards and wall mounted lights (plus a note on the site plan that all outdoor lighting is to be dark sky compliant)
38. Business signs (make sure they are not in sight lines)
39. Sidewalks and walkways with dimensions
40. Pedestrian access routes into site and around site
41. Bicycle parking
42. Architectural elevations of all building sides
43. All other requirements as per the pre-consultation meeting

In addition, the following additional plans, studies and reports, including but not limited to, **may** also be required as part of the complete application submission:

☐ Zoning Deficiency Form

☐ On-Site Sewage Disposal System Evaluation Form (to verify location and condition)

☐ Architectural Plan

☒ Buildings Elevation Plan

☐ Cut and Fill Plan

☐ Erosion and Sediment Control Plan

☒ Grading and Drainage Control Plan (around perimeter and within site) (existing and proposed)

☐ Landscape Plan

☒ Photometric (Lighting) Plan

☐ Plan and Profile Drawings

☐ Site Servicing Plan

☒ Storm water Management Plan

☐ Street Sign and Traffic Plan

☐ Street Tree Planting Plan

☐ Tree Preservation Plan

☐ Archaeological Assessment

☐ Environmental Impact Study

☐ Functional Servicing Report

☐ Geotechnical Study / Hydrogeological Review

☐ Minimum Distance Separation Schedule

☐ Noise or Vibration Study

☐ Record of Site Condition

☒ Storm water Management Report

☒ Traffic Impact Study – please contact the Planner to verify the scope required

Site Plan applications will require the following supporting materials:

1. Two (2) complete sets of the site plan drawings folded to 8½ x 11 and an electronic version in PDF format
2. Letter requesting that the Holding be removed (if applicable)
3. A cost estimate prepared by the applicant's engineer
4. An estimate for Parkland dedication by a certified land appraiser
5. Property Identification Number (PIN) printout

Standard condominium exemptions will require the following supporting materials:

☐ Plan of standard condominium (2 paper copies and 1 electronic copy)

☐ Draft condominium declaration

☐ Property Identification Number (PIN) printout

Your development approval might also be dependent on Ministry of Environment and Climate Change, Ministry of Transportation or other relevant federal or provincial legislation, municipal by-laws or other agency approvals.

All final plans must include the owner's signature as well as the engineer's signature and seal.

I. Development Agreements

A development agreement may be required prior to approval for site plan, subdivision and condominium applications. Should this be necessary for your development, you will be contacted by the agreement administrator with further details of the requirements including but not limited to insurance coverage, professional liability for your engineer, additional fees and securities.

J. Transfers, Easements and Postponement of Interest

The owner acknowledges and agrees that if required it is their solicitor's responsibility on behalf of the owner for the registration of all transfer(s) of land to the County, and/or transfer(s) of easement in favour of the County and/or utilities. Also, the owner further acknowledges and agrees that it is their solicitor's responsibility on behalf of the owner for the registration of postponements of any charges in favour of the County.

K. Permission to Enter Subject Lands

Permission is hereby granted to Norfolk County officers, employees or agents, to enter the premises subject to this application for the purposes of making inspections associated with this application, during normal and reasonable working hours.

L. Freedom of Information

For the purposes of the *Municipal Freedom of Information and Protection of Privacy Act*, I authorize and consent to the use by or the disclosure to any person or public body any information that is collected under the authority of the *Planning Act, R.S.O. 1990, c. P. 13* for the purposes of processing this application.

Nicholas Hiemstra _____ 2023-05-26

Owner/Applicant Signature Date

M. Owner's Authorization

If the applicant/agent is not the registered owner of the lands that is the subject of this application, the owner(s) must complete the authorization set out below.

I/We 5046331 Ont inc _____ am/are the registered owner(s) of the lands that is the subject of this application.

I/We authorize Nicholas Hiemstra _____ to make this application on my/our behalf and to provide any of my/our personal information necessary for the processing of this application. Moreover, this shall be your good and sufficient authorization for so doing.

_____ 2023-05-26

Owner Date

_____ 2023-05-26

Owner Date

N. Declaration

I, Nicholas Hiemstra of Woodstock ON.

solemnly declare that:

all of the above statements and the statements contained in all of the exhibits transmitted herewith are true and I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of *The Canada Evidence Act*.

Declared before me at:

Woodstock

Owner/Applicant Signature

In County of Oxford

This 26th day of May

A.D., 2023

Marlene Matheson

A Commissioner, etc.

Marlene Elizabeth Matheson,
a Commissioner, etc,
Province of Ontario, for
White Coad LLP, Barristers & Solicitors
Expires December 1, 2023

GRIT ENGINEERING INC

Geotechnical Investigation

New Development
Mini Storage Buildings

Project Location
561 Bank Street North
Simcoe, Ontario

Prepared For:
DLX Design Engineering
nick@dlxengineering.com

Prepared by:
GRIT Engineering Inc.
169 Huron Street
Stratford, ON N5A 5S9

August 11, 2022

GRIT File No: GE22-0224-1-GEO-RPT-GEOTECHNICAL INVESTIGATION-REV-0-2022-08-10

PASSION, DETERMINATION, RESOLVE

GRIT ENGINEERING INC

Contents

Appendices

GRIT ENGINEERING INC

1.0 Introduction

GRIT Engineering Inc. (GRIT) was retained by DLX Design Engineering to perform a geotechnical investigation at 561 Bank Street North, located in Simcoe, Ontario as shown on Figure 1 in Appendix A. This work was authorized by Nick Hiemstra, P.Eng, of DesignLogix Engineering Inc. via email on July 7, 2022.

The Site comprises commercial land, and is bounded by commercial land to the north, agricultural land to the east, vacant land to the south, and Bank Street North followed by residential land to the south. It is understood that the project involves the development of two new mini storage buildings and associated site works as shown in DesignLogix Engineering Inc. Site Plan SP-1, dated March 14, 2022.

The purpose of this geotechnical investigation is to determine the soil and groundwater conditions in the area of the proposed structure and provide geotechnical engineering recommendations for site preparation, site servicing, pavement design and subdrainage, and foundations.

2.0 Geological Setting

Based on the Surficial Geology of Southern Ontario map prepared by the Ontario Geological Survey (OGS), the Site is situated in coarse-textured glaciolacustrine deposits comprising sand, gravel, and minor silt and clay.

The Site is underlain by bedrock of the Onondaga Formation which comprises limestone, as shown on the Paleozoic Geology of Southern Ontario map prepared by the OGS. Based on the Bedrock Topography and Overburden Thickness map prepared by OGS and the Ministry of the Environment, Conservation and Parks (MECP) Well Records Map, the drift thickness at the Site is approximately 20 to 30 metres.

3.0 Field and Laboratory Program

3.1 Field Investigation

GRIT completed the fieldwork for this investigation on August 5th, 2022 which involved the excavation of three sampled Test Pits (Test Pit TP01-22 to TP03-22) throughout the Site. The test pits were excavated to depth of approximately 1.83 metres below existing ground surface (mbgs).

The approximate spatial locations of the test pits are summarized in the table below.

Table 1 – Borehole Locations (UTM Zone 17 North)

Borehole Number	Easting	Northing	Elevation (mASL)
TP01-22	4744316.748	556712.703	220.544
TP02-22	4744325.365	556739.124	221.294
TP03-22	4744306.668	556740.587	221.104

Private and public utilities were contacted by the client prior to the start of excavation activities in order to demarcate underground utilities near the test pit locations. The test pits were excavated with the use of a mini-excavator supplied and operated by RVM Trucking.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Groundwater observations were carried out in the test pits during excavation and upon completion. The observations are summarized in Section 5.0.

Upon completion of excavation, the test pits were backfilled with the excavated soil.

The fieldwork was monitored throughout by a member of our geotechnical engineering staff, who documented the excavating and sampling procedures; documented soil stratigraphies; monitored groundwater conditions; and transported the recovered soil samples for visual classification and analysis.

3.2 Laboratory Testing

All soil samples recovered during this investigation were returned to our office for visual examination as well as moisture content tests. The moisture content test results are shown in the test pit logs in Tables 1 and 2 in Section 4.0.

The soil samples are stored for a period of 30 days from the date of sampling. After this time, they will be discarded unless prior arrangements have been made for longer storage.

4.0 Soil Conditions

Fill was encountered surficially in all test pits and was 200 mm thick. The fill comprised sandy gravel with some silt and was damp at the time of fieldwork.

Sand was encountered below the gravel in all test pits and extends to the termination depth of 1.83 mbgs. The sand comprised brown to red sand with some to trace silt.

Moisture content in the sand ranges from 3 to 4%, indicating damp conditions. The moisture content results are plotted on the test pit logs in Table 2 and 3. It is noted that test pit sidewalls were stable upon completion. Photographs of the test pits are provided in Appendix B.

Table 2 – TP01-22 Soil Conditions

Soil Strata	Soil Description	Depth (mbgs)	Sample(s) (mbgs)	Moisture Content (%)
Fill	grey, sandy gravel, some silt, damp	0-0.20	-	-
Sand	brown, sand, trace silt, damp	0.20-1.83	Sa1 (0.61-1.22) Sa2 (1.22-1.83)	3.8

Table 3 – TP02-22 Soil Conditions

Soil Strata	Soil Description	Depth (mbgs)	Sample(s) (mbgs)	Moisture Content (%)
Fill	grey, sandy gravel, some silt, damp	0-0.20	Sa1 (0.10-0.20)	-
Sand	red, sand, some organics (roots), some silt, damp	0.20-0.76	Sa2 (0.30-0.50)	-
	brown, sand, trace silt, damp	0.76-1.83	Sa3 (1.22-1.83)	3.8

Table 4 – TP03-22 Soil Conditions

Soil Strata	Soil Description	Depth (mbgs)	Sample(s) (mbgs)
Fill	grey, sandy gravel, some silt, damp	0-0.20	Sa1 (0.10-0.20)
Sand	red, sand, some organics (roots), some silt, damp	0.20-1.22	Sa2 (0.30-0.50)
	brown, sand, trace silt, damp	1.22-1.83	Sa3 (1.22-1.83)

GRIT ENGINEERING INC

5.0 Groundwater Conditions

Groundwater observations and measurements were carried out in the open test pits at the time of excavation. No free groundwater was not encountered in the test pits upon completion.

It should also be noted that the groundwater levels can vary and are subject to seasonal fluctuations and local variations.

6.0 Discussion and Recommendations

6.1 General

The project will involve the development of two new mini storage buildings and associated site works. The subsurface stratigraphy at the site comprises gravel overlying native sand deposits. No free groundwater was noted at the time of fieldwork.

Based on the results of our exploratory test pits, the site is suitable for the proposed development. The following subsections of this report contain geotechnical recommendations including site preparation, site servicing, pavement design and subdrainage, and foundations

6.2 Site Preparation

The first construction activity that will be required for the proposed development will be area grading. Following removal of any topsoil or fill, the subgrade should be inspected by qualified geotechnical personnel and any soft/unstable areas should be subexcavated to compact native soil.

If engineered fill is required to raise grades it should be placed in maximum 300 mm thick lifts and compacted to the following minimum percentages of Standard Proctor Maximum Dry Density (SPMDD):

Table 5 – Compaction Specifications

Fill Use	Minimum Compaction
Structural fill to support the pad	100% SPMDD
Subgrade fill beneath parking areas	95% SPMDD

Structural fill pads should comprise OPSS Granular 'B' or approved equivalent and extend a minimum 0.3 m beyond the edge of the footing envelope of any building and down to subgrade at an angle of 45 degrees to the horizontal. Full time testing by geotechnical personnel is required during fill placement and compaction to monitor material quality, lift thickness, and verify the compaction by in-situ density testing (as per the 2012 Ontario Building Code).

6.3 Site Servicing

6.3.1 Excavations and Dewatering

It is anticipated that the development will be serviced to provide the buildings with water services and possibly storm sewer connections. It is anticipated that the invert levels for the services will be at conventional depths.

Temporary excavations to conventional depths for installation of underground pipes at this site must comply with the Ontario Occupational Health and Safety Act and Regulations for Construction Projects. The predominant soils encountered at the site are classified as Type 3 soils, and temporary side slopes through this material must be cut at an inclination of 1.0 horizontal to 1.0 vertical or less from the base of the excavation. Where wet to saturated conditions are encountered, excavation side slopes should be expected to slough to flatter inclinations, potentially 3.0 horizontal to 1.0 vertical or flatter. Trench side slopes must be continuously inspected especially after periods of heavy rainfall or snow melt to identify areas of instability. Surface water should be directed away from entering the trench.

Minor perched groundwater inflow may be expected for shallow excavations above 1.8 mbgs. It is anticipated that conventional sump pumping techniques will be able to handle the infiltration in the areas of any perched groundwater. A Permit to Take Water (PTTW), will not be required if excavations remain above the 1.8 mbgs. The contractor should notify the prime consultant in the event that they feel that an EASR/PTTW will be needed.

6.3.2 Pipe Bedding

It is anticipated invert elevation of site services will be at conventional 2 to 3 m depths below the ground surface. No bearing problems are anticipated for pipes set on properly dewatered native inorganic subsoil or imported structural fill. The bedding material may need to be thickened if excavations encounter soft or spongy soil from the base of the service trench.

Pipe bedding for water and sewer services should be conventional Class 'B' pipe bedding comprising a minimum 150 mm thick layer of OPSS Granular 'A' aggregate below the pipe invert. The bedding course may be thickened if portions of the subgrade become unduly

wet during excavation. Granular 'A' type aggregate should be provided around the pipe to at least 300 mm above the pipe. The bedding aggregate should be compacted to a minimum 95% SPMDD. Water and sewer lines installed outside of heated areas should be provided with a minimum 1.2 m of soil cover or equivalent insulation for frost protection.

6.3.4 Trench Backfilling

The trenches above the specified pipe bedding should be backfilled with inorganic on-site soils placed in maximum 300 mm thick lifts and compacted to at least 95% SPMDD. Wet or saturated native mineral soils are not considered suitable for reuse as trench backfill. Any additional material required at the site should comprise imported inorganic soils such as OPSS 1010 Select Subgrade Material specifications.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to protect side slopes of excavations by diverting surface run-off away from the excavations. If construction extends into the winter, then additional steps should be taken to minimize frost and ensure that frozen material is not used as backfill.

6.4 Pavement Structure

The subgrade soils will consist of native sand or compacted trench backfill. The pavement component thicknesses in the following table are recommended based on the and the frost-susceptibility and strength of the subgrade soils;

Table 6 – Pavement Design Recommendations

Pavement Component	Design
Asphalt Hot Mix	50 mm
OPSS 1010 Granular 'A' Base	150 mm
OPSS Granular 'B' Subbase	300 mm

It is noted the thickness of Granular 'B' required may be minimized in areas of sand subgrade. This can be further determined during onsite inspection during construction. Samples of aggregates should be checked for conformance to OPSS 1010 prior to utilization on site and during construction. The Granular 'B' subbase and Granular 'A' base courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The asphaltic concrete paving materials should conform to the requirements of OPSS 1150. The asphalt should be placed and compacted in accordance with OPSS 310. The

Performance Graded Asphalt Cement (PG-AC) designation for the asphaltic concrete is 58-28.

The asphaltic concrete should comprise 50 mm 50 mm of HL8 or HL4..

The pavement design is based on the assumption that construction will be carried out during the drier time of the year and that the subgrade soil is stable as determined by proof-rolling inspected by qualified geotechnical personnel. If the subgrade is wet and unstable, additional granular subbase will be required.

All materials and construction services required for the work should be in accordance with the relevant sections of the Ontario Provincial Standard Specifications.

6.5 Curbs and Gutter and Sidewalks

The concrete for curbs, gutters and sidewalks should be proportioned, mixed, placed and cured in accordance with the requirements of OPSS 353, and OPSS.MUNI 1350 and shall meet the following specific requirements (OPSS 353.05.01):

- Minimum compressive strength = 30 MPa at 28 days
- Coarse aggregate = 19.0 mm nominal max. size
- Maximum slump = 60 mm for curbs and gutter, 70 mm for sidewalks
- Air entrainment = 7.0 ± 1.5%

Field sampling and testing of concrete shall be according to OPSS 904. Three cylinders from each day's pour should be taken for compressive strength testing. Air entrainment, temperature, and slump tests should be made from the same batch of concrete from which test cylinders are made.

6.6 Foundation Design

It is understood that the proposed buildings for the development may be constructed with slab-on-grade floors. In general, the undisturbed native soils or approved structural fill are considered suitable to support foundations.

Conventional spread footings founded on the suitable undisturbed native soils or approved structural fill may be designed for a factored geotechnical bearing resistance at Ultimate Limit States (ULS) of 150 kPa, and soil bearing resistance for 25 mm of settlement at Serviceability Limit States (SLS) of 100 kPa.

The soil in trenches beneath footings for sewer and watermain services shall be compacted by tamping up to the level of the footing base or shall be filled with concrete

having a strength not less than 10 MPa, to support the footing. Consideration should also be given to adding rebar to the footing in the areas of utility crossings.

All founding surfaces for the mini storage buildings on structural fill or native soils should be checked by experienced geotechnical personnel prior to placing concrete. The purpose of the inspection is to ensure that the subgrade soils can support the foundations, and to confirm that the house envelope does not extend beyond the limits of the structural fill pad. Where a shallow foundation is to be placed on soil, the soil shall be cleared of loose and unsound material and shall be adequate to support the design load.

The subgrade soils are considered to be frost susceptible and must be protected from freezing at all times including during construction. The exterior footings or footings in unheated areas should be provided with a minimum 1.20 m of earth cover upon final grading for frost protection

A modulus of subgrade reaction of 25 to 30 MPa/m should be used in the design of the floor slab.

Fill material required to raise grades below the floor slab should be compacted to 98% SPMDD. A minimum 150 mm thick layer of Granular 'A' material uniformly compacted to 100% SPMDD should be provided directly beneath the floor slab for leveling and support purposes.

Where spread footings are constructed at different elevations, the difference in elevation in the individual footing should not be greater than one half of the clear distance between the footings. The lower footing should be constructed first so that if it is necessary to construct the lower footings at a greater depth than anticipated, the elevation of the upper footings can be adjusted accordingly. Stepped strip footings should be constructed in accordance with OBC Section 9.15.3.8.

A Site Classification 'D' should be used for earthquake load and effects in accordance with Table 4.1.8.4.A. of the 2012 Ontario Building Code.

7.0 Statement of Conditions and Limitations

This Report has been prepared in a manner consistent with that level of care and skill ordinarily exercised by other members of the engineering profession currently practicing in the same or similar locality, under the same or similar conditions, subject to the time limits and financial, physical or other constraints applicable to the Services.

The recommendations provided in this report are applicable only to the specific site, development, design objectives and purposes that are described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the final design were unknown at the time of report preparation, GRIT Engineering Inc. recommends being retained during the final design phase to verify that the recommendations have been correctly interpreted in the design.

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The Report may not be used by a Third Party without the expressed written consent of GRIT Engineering Inc. and the Client.

GRIT Engineering Inc. does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on data contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, acquire or sell land.

A geotechnical investigation involves a limited number of samples of site material at specific test hole locations and the recommendations in the Report are based on this limited information. It must be recognized that the passage of time, natural occurrences and direct or indirect human interference at or near the site have potential to alter the subsurface conditions. If subsurface conditions encountered are materially difference from those used in the design and as indicated on the drawings, the design shall be reassessed by the designer. If during construction, climatic or any other conditions (i.e. seepage, excavations, chemical spills, etc.) have changed the properties of the soil, rock or groundwater, the design shall be reassessed by the designer (as per Article 4.2.2.3 of the Ontario Building Code if applicable).

Yours respectfully,

GRIT Engineering Inc.

Samantha Kerekes

Samantha Kerekes, BASc.
Geotechnical/Environmental Technician

Montana Wilson, EMBA, M.Eng, P.Eng, PMP
CEO & Founder

GRIT ENGINEERING INC

Appendix A

Site Location

GRIT ENGINEERING INC
169 HURON STREET
STRATFORD, ON N5A 5S9
www.gritengineering.ca

Legend

SITE LOCATION

Note: Not to Scale
Reference: Plan produced from the Norfolk County Online Interactive Mapping Service

Project:
GE22-0224-1
NEW MINI STORAGE BUILDINGS
561 BAND STREET NORTH, SIMCOE ON

Figure Title:
SITE LOCATION
GEOTECHNICAL INVESTIGATION

Figure No:
1

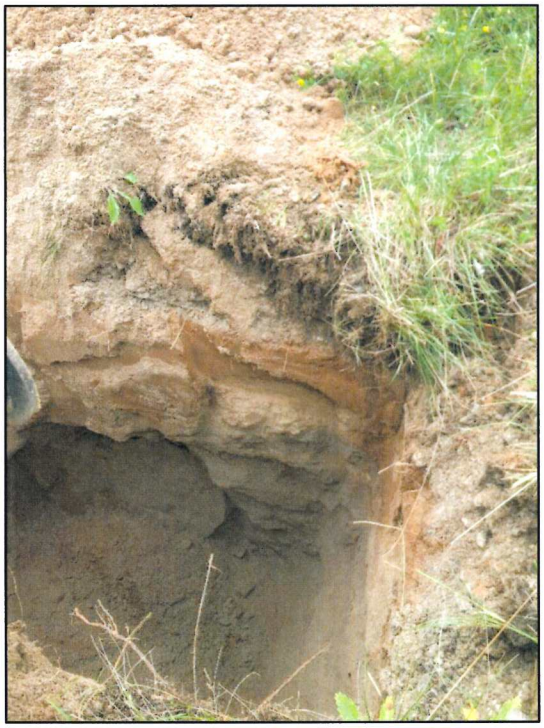
GRIT ENGINEERING INC

Appendix B

Test Pit Photos

Photo 1: Test Pit TP01-22

Photo 2: Test Pit TP03-22



Mini Storage Development

Servicing Report

Project Location:
516 Bank Street North,
Simcoe, Ontario

Prepared For:
Design Logix Engineering Inc.
557 Alberta Avenue, Woodstock, Ontario

Prepared by:
GRIT Engineering Inc.
169 Huron Street, Stratford, Ontario

May 11, 2023
Revision 2

GRIT File No: GE22-0224-2

PASSION, DETERMINATION, RESOLVE

Contents

Appendices

Figures

1.0 Introduction

GRIT Engineering Inc. (GRIT) was retained by Design Logix Engineering Inc. to review and design the private sanitary, water, and stormwater management system for the construction of a new mini storage development to satisfy the site plan approval requirements set forth by the County of Norfolk.

The subject site (Site) is located northeast of Bank Street North in Simcoe, Ontario and is approximately 0.409 hectares in size. The site is bounded by existing Light Industrial (ML) lands to the north and south, General Industrial (MG) lands to the west, and Residential (R2) lands and Bank Street North to the east. Figure 1 provides an aerial image, illustrating the site location and surrounding characteristics.

This Servicing Report will provide the necessary background and proposed design information to address the site plan approval requirements for the Site. Furthermore, this report is to be read in conjunction with the included GRIT engineering design drawings, which provides details of the proposed design and construction details.

2.0 Sanitary Servicing

The development is proposed to be serviced by the existing sanitary service that outlets to the existing 200mm diameter sanitary sewer within Bank Street North right-of-way (ROW). It is recommended that the private drain connection for the proposed building is a 150mm diameter PVC service installed at a minimum slope of 1.0%.

Based on the sanitary design peak flow demand of 0.51 L/s, the site is serviceable via the existing 150mm diameter sanitary service. Flows from the site can maintain the Norfolk County velocity minimum and maximum full flow velocity of 0.75 m/s and 4.5 m/s at a slope of 0.5% or greater. The designed full flow capacity of the on-site sanitary service is 15.22 L/s at a 1.0% slope, ensuring adequate capacity for the development.

Refer to Appendix A for detailed sanitary demand calculations.

3.0 Water Servicing

3.1 Design Approach

The water distribution requirements and performance criteria for the different demand conditions are based on the Ministry of the Environment, Conservation, and Parks *Design Guidelines for Drinking Water Systems (2008)* (DGDWS), Norfolk County's *Design Criteria (February 2019)* (NCDC), and the Fire Underwriters Survey *Water Supply for Public Fire Protection 2020* (FUS). The design parameters used are:

- An industrial average daily Domestic Demand of 35 m^3 per hectare per day (DGDWS),

- Minimum water pressures of (DGDWS):
  - 140 kPa (20 psi) for Fire-Flow plus Maximum Day Demand,
  - 275 kPa (40 psi) for Maximum Day Demand,
  - 275 kPa (40 psi) for Average Day Demand, and
  - 550 kPa (80 psi) Maximum residual pressure.
- Peaking Factors of 2.25 and 2.0 for Maximum Day and Maximum Hour respectively for residential and commercial use (NCDC),
- Water turnover less than 72 Hours under Average Day Demand for Water Quality (DGDWS), and
- Fire-Flow Demand per the Fire Underwriters Survey *Water Supply for Public Fire Protection 2020* (NCDC).

See Appendix B for all water demand calculations.

3.2 Domestic Water Demand

The Domestic Water Demand was calculated based on the Proposed Site Plan by GRIT – provided separately. The area of the site was multiplied by the Industrial Average Day Demand and the corresponding Peaking Factors and is summarized in the table below.

Table 3.1: Domestic Water Demand

	Units	Area (ha)	Population	Average Day (L/s)	Maximum Day (L/s)	Maximum Hour (L/s)
Residential	0	0	0	0.000	0.000	0.000
Commercial	N/A	0	0	0	0	0
Industrial	N/A	0.4089	0	0.165642	0.372695	0.331285
Totals	**0**	**0.4089**	**0**	**0.166**	**0.373**	**0.331**

3.3 Fire-Flow Demand

As the Ontario Building Code matrices are unavailable for the proposed buildings on site, the fire-flow demand has been calculated for both the proposed office building and the storage unit buildings. The Fire-Flow Demand was calculated per FUS and is summarized in the tables below.

Table 3.2: Office Building Fire-Flow Demand

Building Area (m^2)	Required Flow without Factors (L/min)	Required Flow with Factors (L/min)	Max Day (L/min)	Fire Flow + Max. Day (L/min)
37.21	1,000	1,000	22.36	1,022.36

Table 3.3: Storage Buildings Fire-Flow Demand

Building Area (m^2)	Required Flow without Factors (L/min)	Required Flow with Factors (L/min)	Max Day (L/min)	Fire Flow + Max. Day (L/min)
487.76	5,000	6,000	22.36	6,022.36

The OBC states that fire hydrants for self-storage buildings shall be located so the distance from the hydrant to the pumper vehicle is 45 m and from the pumper vehicle to the openings is 45 m. The existing municipal hydrant on Bank Street does not meet these criteria, therefore a site hydrant has been added to meet this requirement. Pre-consultation comments from Norfolk County indicate that a connection is available to the existing 150 mm diameter watermain in the Bank Street ROW and that the domestic service can reuse the existing water service to the site.

Refer to Appendix B for detailed water demand and fire flow demand calculations.

4.0 Stormwater Management Design

4.1 Storm Water Management Requirements for Approval

In accordance with the Norfolk County Record of Site Plan Consultation received June 8th 2022, the stormwater quantity requirements are as follows:

- *Ensure the peak flows discharged from the site shall not increase as a result of the proposed development for the calculated 2 through 100-year storm events;*
- *All stormwater management measures shall provide an "Enhanced" level of protection in accordance with the MOE Stormwater Management Planning and Design Manual (March 2003)*
- *Maintain / reproduce predevelopment hydro geologic /hydrologic / water quality conditions by promoting pre-development infiltration and runoff characteristics (quantity and distribution);*
- *Minimize footprint of development (i.e. impervious areas);*
- *Reduce downstream flooding / erosion; and*
- *Promote pollutant removal.*
- *Protect and enhance water quality and associated aquatic resources and water supplies;*
- *Protect and enhance groundwater quantity and quality; and*
- *Minimize the threat to life and destruction of property and natural resources from flooding and erosion.*

4.2 Infiltration Target

Section 7.3.02 of the Norfolk County *Design Criteria (February 2019)* states "The volume of runoff discharged from the site during the 25 mm storm shall not increase as a result of the proposed development. Infiltration measures shall be employed where soils and water table conditions support such measures."

4.3 Infiltration Design

To provide pre-treatment and prevent untreated runoff from entering the gallery and avoid the potential for pollutants to enter the groundwater via infiltration, each catch basin that is connected to the infiltration gallery will have a FlexStorm Inlet Filter installed post-construction. The inlet filter provides for the removal of Total Suspended Solids (TSS) and hydrocarbons prior to water entering the on-site storm sewer system.

The infiltration gallery will be four 200mm diameter perforated PVC DR28 2.2 m wide by 1.0 m long and 1.0 m in depth. The gallery will be lined with non-woven geotextile to prevent the migration of fines into the gallery and will be filled with 19 mm clear stone that has a void ratio of 0.4. The gallery has a total storage capacity of 63.0m^3. The gallery is designed to have a minimum cover of 1.20 m to prevent frost penetration and provide year-round use.

Refer to Appendix C for the detailed infiltration gallery EPA SWMM modelling output results.

4.4 Design Approach

Calculation Method

The contributing drainage area from the subject site to the ultimate outlet is approximately 0.409 hectares and AutoDesk Storm and Sanitary Analysis 2023 (Version 13.5.255.0) has been used to complete the modelling using the United States' Environmental Protection Agency's Stormwater Management Model (EPA SWMM) hydrology engine and the SCS Curve Number method for infiltration as per Norfolk Design Criteria section 7.3.03. Modelling was completed using local rainfall intensity (IDF) from Norfolk County, time of concentration, and runoff coefficient parameters to review the pre-development (allowable) and post-development peak flow rates.

Site Review Methodology

The stormwater management (SWM) design for the development achieves the following design goals and requirements set forth by Norfolk County:

- Review of the existing drainage and overland flow route patterns and existing site characteristics to determine the allowable outlets,
- Confirmation of the allowable peak flow rates for the 25mm, 2, 5, 10, 25, 50, and 100-year design storm events,

- Calculation of the post-development runoff coefficients and peak flow rates for the 25mm, 2, 5, 10, 25, 50, and 100-year design storm events,
- Calculation of the required on-site stormwater storage volume and the Stormwater Management Facility (SWMF) ponding elevations, and
- Review, evaluation, and recommendation of stormwater quality control techniques and structures. to meet the *Enhanced* level (80%) of Total Suspended Solids (TSS) removal.

4.5 Pre-Development Condition

In the pre-development condition, the subject site is a private gravel site, with an asphalt driveway, one building, and various grassed/treed areas. The Site generally flows from the northeast to the southwest via overland sheet flow. Table 4.1 below defines the existing catchment characteristics for the site.

Table 4.1: Existing Site Characteristics

Catchment Number	Area (ha)	Percent Impervious	Flow Length (m)	Overland Slope (%)	SCS Curve Number	Manning's Pervious n
101	0.41	54%	30.0	2.65	77.94	0.4

Pre-development modelling for the 2-year through 100-year design storms using a 3-hour Chicago Distribution was completed using the catchment characteristics above to establish the pre-development runoff rates. See Appendix C for the calculated Chicago Distribution Hyetographs for all design storm events. Table 4.2 below summarizes the pre-development flows for all design storms.

Table 4.2: Pre-Development Runoff Rates

Catchment Number	2-Year Flow (L/S)	5-Year Flow (L/S)	10-Year Flow (L/S)	25-Year Flow (L/S)	50-Year Flow (L/S)	100-Year Flow (L/S)
101	53.61	79.54	96.54	121.77	141.36	155.54

See Appendix E for the full EPA SWMM pre-development modelling output results.

4.6 Post-Development Condition

In the post-development condition, the Site is comprised of two storage buildings, one administrative building, a gravel driveway, a parking lot, and various grassed/landscaped areas.

Minor and major flows from Catchment 201 are uncontrolled and outlet southwest toward Bank Street North via overland flow. The uncontrolled flows from Catchment 201 are accounted for by overcontrolling the controlled flows from Catchment 202.

Major and minor flows from Catchment 202 will flow to the west side of the site and are directed to an infiltration gallery underneath the parking lot. Flows from Catchment 202 will be controlled through infiltration storage, parking lot storage, and storm structures. Major storm events surpassing the 100-year storm event will outlet through the Site entrance that acts as a V-Notch weir and directs the flow toward Bank Street.

See Figure 2 for the post-development catchment areas and the engineering drawings by GRIT – provided separately – for grading and servicing plans. Table 4.3 below defines the proposed site characteristics for the site.

Table 4.3: Proposed Site Characteristics

Catchment Number	Area (ha)	Percent Impervious (%)	Flow Length (m)	Overland Slope (%)	Composite SCS Curve Number	Manning's Pervious n	Manning's Impervious n
201	0.039	23	19.99	15.0	69.57	0.4	0.015
202	0.370	86	75.01	2.50	87.47	0.4	0.016

Post-development modelling for the 25mm, and 2-year through 100-year design storms using a 3-hour Chicago Distribution was completed using the catchment characteristics above to establish the post-development runoff rates. See Appendix C for the calculated Chicago Distribution Hyetographs for all design storm events. Table 4.4 below summarizes the post-development flows for all design storms.

Table 4.4: Post-Development Runoff Rates

Catchment Number	2-Year Flow (L/S)	5-Year Flow (L/S)	10-Year Flow (L/S)	25-Year Flow (L/S)	50-Year Flow (L/S)	100-Year Flow (L/S)
201	3.23	4.61	5.35	7.19	9.18	9.72
202	81.24	121.03	145.77	183.11	211.75	233.43

See Appendix E for the full EPA SWMM post-development modelling output results.

4.7 Quantity Control Summary

To meet the stormwater management quantity control criteria as noted in Section 4.1 of this report, the allowable post-development runoff rate has been set as the pre-development runoff rate for Catchment 101 less the uncontrolled flows from Catchment 201. For the SWM design, the 2-year through 100-year design storms were modelled to establish the flow controls needed to meet the allowable release rate established from the pre-development modelling. Table 4.5 below summarizes the allowable release rates, the storage required, the amount of water infiltrated, and the post-development release rate for each design storm.

Table 4.5: Post-Development Allowable Release & Storage Requirements

	2-year	5-Year	10-Year	25-Year	50-Year	100-Year
Allowable Release (L/s)	50.38	74.93	91.19	114.58	132.18	145.82
Storage Required (m^3)	58	63	63	63	63	63
Infiltration Amount (m^3)	75	84	85	85	85	85
Post-Development Release (L/s)	3.16	35.12	62.78	11.02	117.33	121.43
Reduction in Flow (%)	94.11%	55.85%	34.97%	90.95%	17.00%	21.93%

To control the post-development 2 through 100-year design storm events to the allowable existing peak flows, a 225mm diameter orifice will be installed at an elevation of 217.15m in the proposed structure ST-CBMH1. Sufficient stormwater retention volume is provided for the major storm events while being controlled by the proposed outlet. The entrance to the site will act as an emergency overflow V-Notch weir for storm events that exceed the 100-year design storm event to be safely conveyed to Bank Street. Table 4.6 below summarizes the stage storage for the combined infiltration and surface storage and the storage requirements for the 25mm, and 5-year through 100-year design storm storage requirements.

Table 4.6: Stage Storage Summary

Storm Event	Elevation (m)	Storage Required (m^3)	Depth of Surface Ponding (m)
25mm	217.09	63.0	0.0
5-Year	217.37	63.0	0.0
10-Year	217.59	63.0	0.0
25-Year	218.08	63.0	0.0
50-Year	218.37	63.0	0.0
100-Year	218.45	63.0	0.0

See Appendix F for the full EPA SWMM post-development modelling output results.

4.8 Quality Control Summary

To meet the recommended stormwater management quality control criteria, as noted in Section 4.1 of this report, a treatment train approach using FlexStorm Inlet Filters and the infiltration gallery has been used to achieve the required 80% Total Suspended Solids (TSS) removal. The FlexStorm Inlet Filters will be installed in each catch basin to provide pre-treatment for the removal of TSS and hydrocarbons before the runoff enters the storm sewers. Table 3.2 in the Ministry of Environment, Parks, and Conservation's *Stormwater Management Planning & Design Manual (2003)* (SWMPDM) provides infiltration volumes required to meet 80% TSS removal. Catchments 201 and 202 have a composite impervious area of 81% which results in a required infiltration volume of

$40m^3/ha$ per Table 3.2 in the SWMPDM or $16.48m^3$ when multiplied by the Site's area. In the 25mm design storm event, the infiltration gallery's total volume of water infiltrated is $76m^3$; thus the infiltration design achieves the required 80% TSS removal. In addition, all catch basins on Site are proposed with 600mm deep sumps for additional sediment suspension. Refer to Appendix D for details and Operations and Maintenance information for the FlexStorm Inlet Filter.

4.9 Erosion & Sedimentation Control

Erosion and sediment controls are proposed for the site design as illustrated on GRIT Engineering Drawing C300, and further detailed on C500 (Appendix E). The proposed measures include sediment control fencing and silt sacks in all catch basins to be installed prior to the start of any construction for any existing catch basins or immediately after installation for any proposed catch basins. Maintenance of the erosion and sediment controls will be completed by the owner's contractor at regular intervals and after any rainfall event until the development is complete with the final surfaces and vegetation stabilized with mature growth.

5.0 Design Conclusions

The design requirements for sanitary, water, and stormwater management are based on the Norfolk County *Design Criteria (February 2019)* and are summarized in Sections 2, 3, and 4. The design and calculations in the above sections, along with the Figures and Appendices, demonstrate compliance with the above requirements. We trust this report satisfies the County's requirements. If there are any questions regarding the report, please do not hesitate to contact our office.

6.0 Statement of Conditions and Limitations

This document was prepared for *Design Logix Engineering Inc.* (the Client) and *Norfolk County* and has been prepared in a manner consistent with that level of care and skill ordinarily exercised by other members of the engineering profession currently practicing in the same or similar locality, under the same or similar conditions, subject to the time limits and financial, physical, or other constraints applicable to the Services.

The recommendations and conclusions provided in this document are applicable only to the specific site, development, design objectives, and purposes that are described in the text and are based on the information that was available and provided to GRIT Engineering Inc. at the time this document was prepared. This document is not intended to be exhaustive in scope and it shall be recognized that the passage of time may alter the opinions, recommendations, and conclusions that are contained in this document. The design is limited to the documents reference and any other drawings or documents

prepared by GRIT Engineering Inc. provided separately. GRIT Engineering Inc. accepts no responsibility or liability for the accuracy of any information provided by others.

The information, opinions, conclusions, and recommendations expressed in the document, or any portion thereof, are for the sole benefit of the Client. The document may not be used by a third party without the expressed written consent of GRIT Engineering Inc. and the Client. Any third-party use of the document without express written consent denies any claims in Contract, Tort, and/or any other cause of action in law against GRIT Engineering Inc. and the Client.

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Any referenced benchmarks or other know elevations provided in this document should be verified by a registered surveyor prior to use for any other purposes such as, planning, development, layout, and/or construction.

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Yours respectfully,

GRIT Engineering Inc.

Professional Engineers Ontario
2023-05-11
Licensed Engineering Technologist
Name: J. S. ERB
Number: 100562767
Limitations: Design, review and evaluate site grading, erosion and sediment control, local sanitary and storm sewers and watermain for residential, industrial and commercial site developments.
Association of Professional Engineers of Ontario

Justin Erb, L.E.T., C.E.T.
Civil Design Manager

Montana Wilson, EMBA, M.Eng, P.Eng, PMP
Founder & CEO

Figures

GRIT ENGINEERING INC
117 REGENT STREET
STRATFORD, ON
N5A 3W2
www.gritengineering.ca

Project:

MINI STORAGE DEVELOPMENT

516 BANK STREET NORTH

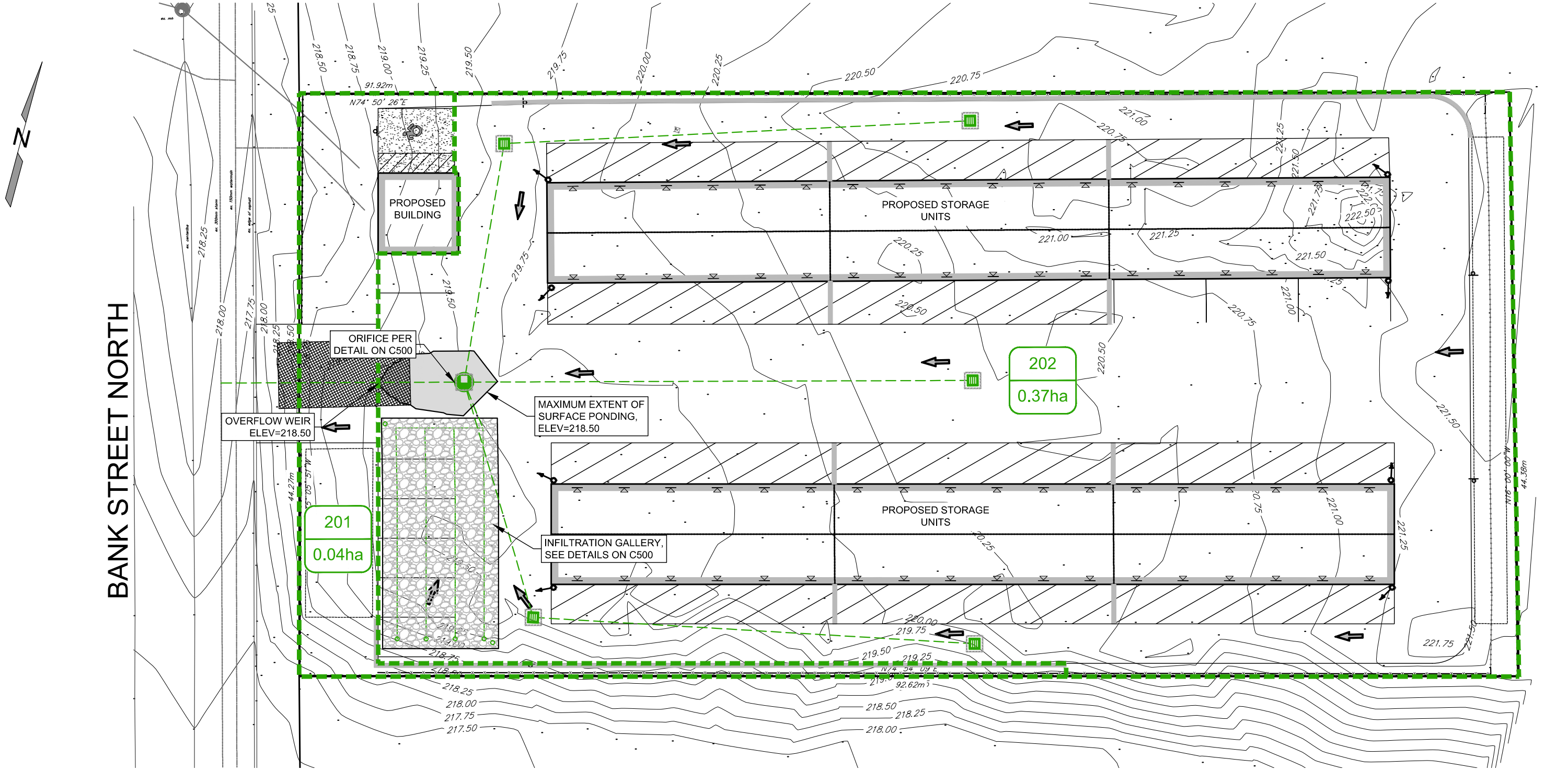
Figure Title:

SITE LOCATION

SIMCOE, ON

Figure No:

FIGURE 1



1 : 300 METRIC

0 4 8 12 16

GRIT ENGINEERING INC

117 REGENT STREET
STRATFORD, ON
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Legend

CATCHMENT BOUNDARY

CATCHMENT PARAMETER — 201 / 0.123

PROPOSED MAXIMUM PONDING ELEVATION

PROPOSED OVERLAND FLOW ROUTE

PROPOSED STORM SEWER

PROPOSED SWALE — 0.2%

EX. STORM SEWER

EX. OVERLAND FLOW ROUTE

Project:
MINI STORAGE DEVELOPMENT
516 BANK STREET NORTH

Figure Title:
POST-DEVELOPMENT CATCHMENT FIGURE

Figure No:
FIGURE 2

Appendix A

Sanitary Design Flow Calculations

516 Bank Street, Simcoe, ON

EXTERNAL SANITARY SEWER DESIGN SHEET

Norfolk County, Ontario

Date Calculated:

AVERAGE RESIDENTIAL RATE = **0.004** l/s/cap (345.6 l/d/cap)

INDUSTRIAL RATE = **0.64** l/s/ha (55m3/d/ha)

COMMERCIAL RATE = **1.15** l/s/ha

INSTITUTIONAL. RATE = **0.64** l/s/ha

AVERAGE INFILTRATION RATE = **0.28** l/s/ha

AVERAGE PEOPLE PER UNIT= **2.40** people/unit

INDUSTRIAL TRIBUTARY POP = **120.0** people/ha

DESIGN PARAMETERS

RESIDENTIAL HARON PEAKING FACTOR

n = 0.013

Vmax = **4.6** m/sec (peak flow)

Vmin = **0.75** m/sec (peak flow)

INFILTRATION ALLOWANCE = **0.28** l/s/ha

SHEET NO. 1 OF 1

JOB No.:

CALCULATED BY:

CHECKED BY:

DATE: May 5, 2020

FILE: Y:\Project Work\GE22\224-2\CIV\3-Design Calculations\Sanitary\GE22-0224-2-Sanitary Sewer Design Sheet-2022-11-22.xlsx

GRIT ENGINEERING INC

LOCATION				RESIDENTIAL AREAS (0.004 L/s/person)							SCHOOL				COMMERCIAL				INDUSTRIAL					INFILTRATION (0.28 L/s/ha)			DESIGN						
											HECTARES AND FLOW OF EACH ZONING																						
											0.64 L/s/ha				1.15 L/s/ha				0.64 L/s/ha														
STREET	AREA NO.	MANHOLE LOCATION		POPULATION DENSITY				POPUL.	ACCUM. POPUL.	PEAK FACTOR "PF"	PEAK RES. FLOW	AREA	ACCUM AREA	PF	PEAK FLOW	AREA	ACCUM AREA	PF	PEAK FLOW	AREA	ACCUM AREA	PF	PEAK FLOW	TOTAL S-C-I FLOW	AREA	ACCUM AREA	INFIL FLOW	TOTAL VOLUME FLOW	DIST	SLOPE	PIPE SIZE	CAPACITY	FULL FLOW VELOCITY	ACTUAL VELOCITY
		FROM MH	TO MH	*Area*	*# Units*	R1 **20**	FR-1 **25**																											
						ha	*ha*				*L/s*	*ha*	*ha*		*L/s*	*ha*	*ha*		*L/s*	*ha*	*ha*		*L/s*	*L/s*	*ha*	*ha*	*L/s*	*L/s*	*m*	*%*	*mm*	*L/s*	*m/s*	*m/s*
516 Bank Street		site	ex.mh	0.00				0	0	4.5	0.00		0.00	2.5	0.00		0.00	2.5	0.00	0.41	0.41	1.8	0.47	0.47	0.41	0.41	0.04	0.51	20.6	1.00	150	15.22	0.86	0.40

Appendix B

Water Demand Calculations

Domestic Water Requirement, Velocity, and Turnover

Project	Industrial Development
Project Number	GE22-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street, Simcoe, ON
Date	Thursday, May 11, 2023

Domestic Water Demand

Average Day Demand =[1]	450	L/day/cap
Average Day Demand =[1]	0.005208333	L/s/cap
Maximum Day Peaking Factor =[1]	2.25	
Maximum Hour Peaking Factor =[1]	2	
Industrial Area Allowance Average Flow= 35m3/(ha d) =[2]	35000.0	L/day/ha

	Units	Area (ha)	Population	Average Day (L/s)	Maximum Day (L/s)	Maximum Hour (L/s)
Low Density Residential[3]	0	N/A	0	0.000	0.000	0.000
Medium Density Resitential[3]	0	N/A	0	0.000	0.000	0.000
High Density Residential[3]	0	N/A	0	0.000	0.000	0.000
Commercial Area[3]	N/A	0.00	0	0.000	0.000	0.000
Industrial Area[3]	N/A	0.41	0	0.166	0.373	0.331
Totals	**0**	**0.41**	**0**	**0.166**	**0.373**	**0.331**

Velocity Check in Service Pipe

Pipe Diameter (mm)	Demand (L/s)	Velocity (m/s)
25	0.331	0.67

Therefore, the maximum velocity of 0.67 m/s is less than the maximum allowable velocity of 4.6 m/sec in the Maximum Hour Senerio.[2]

Water Volume & Turnover Calculation

Pipe Size (mm)	Length (m)	Volume (L)
25	6.4	3.14
	0.0	0.00
	0.0	0.00
	0.0	0.00
Total Volume		**3.14**

Volume (L)	Average Day Demand (L/s)	Hours	Days
3.14	0.166	0.01	0.00

Therefore, the water turnover of 0.01 hours is less than the maximum allowable time of 72 hours.[2]

References

1. Norfolk County Design Criteria (Feb 2019)
2. MECP *Design Guidelines for Drinking Water Systems 2008*
3. See Site Plan prepared by GRIT Engineering Inc.

Fire Underwriters Survey Fire-Fighting Flow Requirements

Offce Building

Project	Norwich Mini Storage
Project Number	GE22-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street, Simcoe, ON
Date	Thursday, May 11, 2023

Maximum Fire Underwriters Fire-Flow Required[1]

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

Type of Construction=[1]	Type III Ordinary	
Construction Coefficient=[1]	1.0	
Total Effective Floor Area=[1]	37.21	m^2
Required Flow without Factors=[1]	**1,000**	**L/min**
Occupancy & Contents=[1]	Limited Combustible	
Occupancy & Contents Factor=[1]	0.85	
Sprinkler Adjustment=[1]	N/A	
Sprinkler Adjustment Factor=[1]	1.00	
Exposure Adjustment=[1]	3.1 m to 10 m	
Exposure Adjustment Factor=[1]	1.06	
Fire-Fighting Required Flow=[1]	**1,000.00**	**L/min**
Domestic Maximum Day Demand=[2]	0.37	L/s
=	**22.36**	**L/min**
Total Required - Fire-Flow + Max. Day=	**1,022.36**	**L/min**

References

1. Fire Underwriters Survey *Water Supply for Public Fire Protection 2020*
2. See *Domestic Water Demand Calculations* by GRIT Engineering Inc.

Fire Underwriters Survey Fire-Fighting Flow Requirements

Storage Building

Project	Norwich Mini Storage
Project Number	GE22-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street, Simcoe, ON
Date	Thursday, May 11, 2023

Maximum Fire Underwriters Fire-Flow Required[1]

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

Type of Construction=[1]	Type III Ordinary	
Construction Coefficient=[1]	1.0	
Total Effective Floor Area=[1]	487.76	m^2
Required Flow without Factors=[1]	**5,000**	**L/min**
Occupancy & Contents=[1]	Combustible	
Occupancy & Contents Factor=[1]	1.00	
Sprinkler Adjustment=[1]	N/A	
Sprinkler Adjustment Factor=[1]	1.00	
Exposure Adjustment=[1]	3.1 m to 10 m	
Exposure Adjustment Factor=[1]	1.11	
Fire-Fighting Required Flow=[1]	**6,000.00**	**L/min**
Domestic Maximum Day Demand=[2]	0.37	L/s
=	**22.36**	**L/min**
Total Required - Fire-Flow + Max. Day=	**6,022.36**	**L/min**

References

1. Fire Underwriters Survey *Water Supply for Public Fire Protection 2020*
2. See *Domestic Water Demand Calculations* by GRIT Engineering Inc.

Appendix C

3 Hour Chicago Distributions for 25mm and 5-Year through 100-Year Design Storms

Storm Water Management

Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
25mm Rainfall Event			
2-Year	529.711	4.501	0.745
5-Year	583.017	3.007	0.703
10-Year	670.324	3.007	0.698
25-Year	721.533	2.253	0.679
50-Year	766.038	1.898	0.668
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

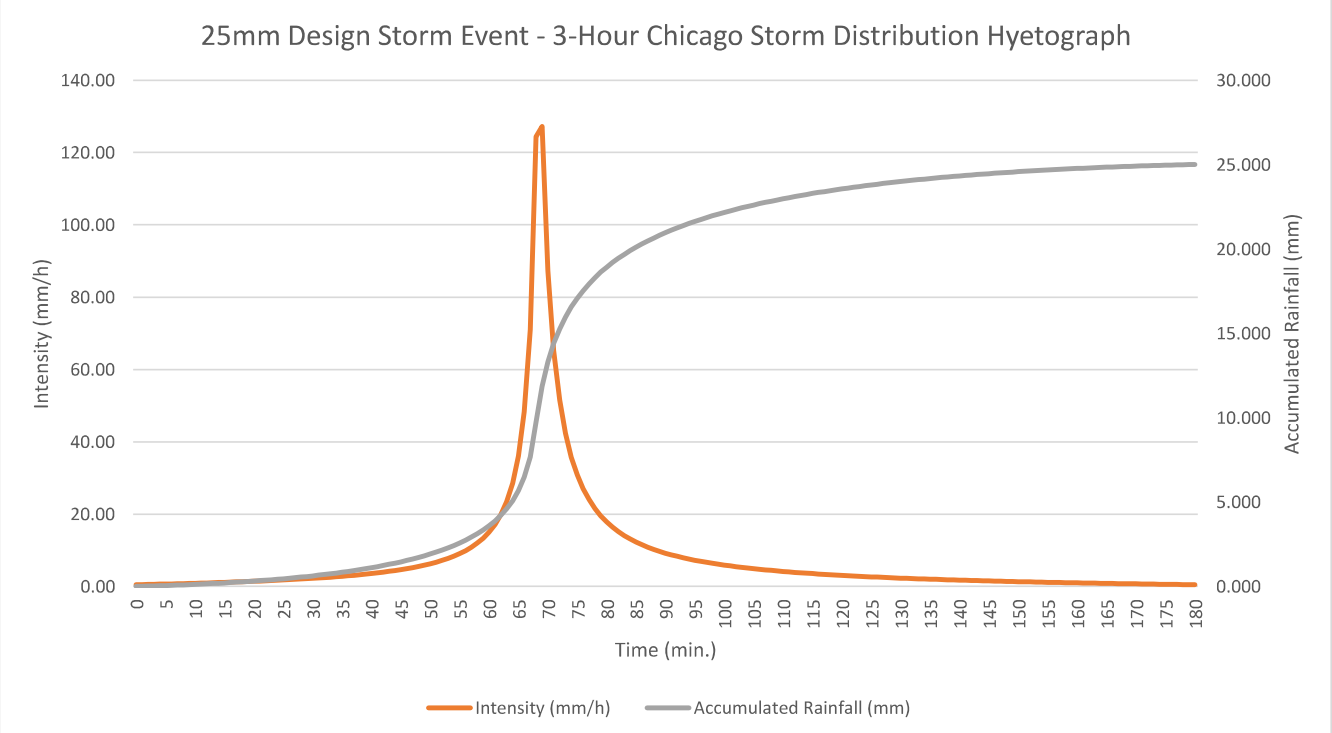
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	$t_d*(1-r)$=	0.62	
Starting Time=	0:00		i_p=	148.7	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	25.00	mm



25mm Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	0.49	0.008	0.008
67.4	1	0:01	0.52	0.009	0.017
66.4	2	0:02	0.56	0.009	0.026
65.4	3	0:03	0.59	0.010	0.036
64.4	4	0:04	0.63	0.011	0.047
63.4	5	0:05	0.67	0.011	0.058
62.4	6	0:06	0.71	0.012	0.070
61.4	7	0:07	0.75	0.013	0.082
60.4	8	0:08	0.80	0.013	0.095
59.4	9	0:09	0.84	0.014	0.109
58.4	10	0:10	0.88	0.015	0.124
57.4	11	0:11	0.93	0.016	0.140
56.4	12	0:12	0.98	0.016	0.156
55.4	13	0:13	1.03	0.017	0.173
54.4	14	0:14	1.08	0.018	0.191
53.4	15	0:15	1.13	0.019	0.210
52.4	16	0:16	1.19	0.020	0.230
51.4	17	0:17	1.25	0.021	0.251
50.4	18	0:18	1.31	0.022	0.272
49.4	19	0:19	1.37	0.023	0.295
48.4	20	0:20	1.43	0.024	0.319
47.4	21	0:21	1.50	0.025	0.344
46.4	22	0:22	1.57	0.026	0.370
45.4	23	0:23	1.64	0.027	0.397
44.4	24	0:24	1.71	0.029	0.426
43.4	25	0:25	1.79	0.030	0.456
42.4	26	0:26	1.87	0.031	0.487
41.4	27	0:27	1.96	0.033	0.520
40.4	28	0:28	2.05	0.034	0.554
39.4	29	0:29	2.14	0.036	0.590
38.4	30	0:30	2.24	0.037	0.627
37.4	31	0:31	2.34	0.039	0.666
36.4	32	0:32	2.45	0.041	0.707
35.4	33	0:33	2.57	0.043	0.750
34.4	34	0:34	2.69	0.045	0.795
33.4	35	0:35	2.82	0.047	0.842
32.4	36	0:36	2.95	0.049	0.891
31.4	37	0:37	3.09	0.052	0.942
30.4	38	0:38	3.25	0.054	0.996
29.4	39	0:39	3.41	0.057	1.053
28.4	40	0:40	3.58	0.060	1.113
27.4	41	0:41	3.77	0.063	1.176
26.4	42	0:42	3.96	0.066	1.242
25.4	43	0:43	4.18	0.070	1.311
24.4	44	0:44	4.41	0.073	1.385
23.4	45	0:45	4.66	0.078	1.462
22.4	46	0:46	4.93	0.082	1.544
21.4	47	0:47	5.22	0.087	1.631
20.4	48	0:48	5.54	0.092	1.724
19.4	49	0:49	5.90	0.098	1.822
18.4	50	0:50	6.29	0.105	1.927
17.4	51	0:51	6.72	0.112	2.039
16.4	52	0:52	7.21	0.120	2.159
15.4	53	0:53	7.75	0.129	2.288

14.4	54	0:54	8.37	0.140	2.428
13.4	55	0:55	9.08	0.151	2.579
12.4	56	0:56	9.90	0.165	2.744
11.4	57	0:57	10.86	0.181	2.925
10.4	58	0:58	11.99	0.200	3.125
9.4	59	0:59	13.36	0.223	3.348
8.4	60	1:00	15.03	0.251	3.598
7.4	61	1:01	17.13	0.286	3.884
6.4	62	1:02	19.84	0.331	4.215
5.4	63	1:03	23.46	0.391	4.606
4.4	64	1:04	28.53	0.475	5.081
3.4	65	1:05	36.06	0.601	5.682
2.4	66	1:06	48.30	0.805	6.487
1.4	67	1:07	71.05	1.184	7.671
0.4	68	1:08	124.35	2.072	9.744
0.6	69	1:09	127.21	2.120	11.864
1.6	70	1:10	87.29	1.455	13.319
2.6	71	1:11	65.27	1.088	14.407
3.6	72	1:12	51.58	0.860	15.266
4.6	73	1:13	42.35	0.706	15.972
5.6	74	1:14	35.76	0.596	16.568
6.6	75	1:15	30.84	0.514	17.082
7.6	76	1:16	27.04	0.451	17.533
8.6	77	1:17	24.02	0.400	17.933
9.6	78	1:18	21.57	0.360	18.293
10.6	79	1:19	19.55	0.326	18.618
11.6	80	1:20	17.85	0.297	18.916
12.6	81	1:21	16.40	0.273	19.189
13.6	82	1:22	15.16	0.253	19.442
14.6	83	1:23	14.07	0.235	19.676
15.6	84	1:24	13.12	0.219	19.895
16.6	85	1:25	12.28	0.205	20.100
17.6	86	1:26	11.53	0.192	20.292
18.6	87	1:27	10.86	0.181	20.473
19.6	88	1:28	10.25	0.171	20.644
20.6	89	1:29	9.71	0.162	20.806
21.6	90	1:30	9.21	0.153	20.959
22.6	91	1:31	8.75	0.146	21.105
23.6	92	1:32	8.33	0.139	21.244
24.6	93	1:33	7.94	0.132	21.376
25.6	94	1:34	7.59	0.126	21.503
26.6	95	1:35	7.26	0.121	21.623
27.6	96	1:36	6.95	0.116	21.739
28.6	97	1:37	6.66	0.111	21.850
29.6	98	1:38	6.39	0.107	21.957
30.6	99	1:39	6.14	0.102	22.059
31.6	100	1:40	5.91	0.098	22.158
32.6	101	1:41	5.69	0.095	22.253
33.6	102	1:42	5.48	0.091	22.344
34.6	103	1:43	5.28	0.088	22.432
35.6	104	1:44	5.09	0.085	22.517
36.6	105	1:45	4.92	0.082	22.599
37.6	106	1:46	4.75	0.079	22.678
38.6	107	1:47	4.59	0.076	22.754
39.6	108	1:48	4.44	0.074	22.828
40.6	109	1:49	4.29	0.072	22.900
41.6	110	1:50	4.16	0.069	22.969
42.6	111	1:51	4.02	0.067	23.036

43.6	112	1:52	3.90	0.065	23.101
44.6	113	1:53	3.78	0.063	23.164
45.6	114	1:54	3.66	0.061	23.225
46.6	115	1:55	3.55	0.059	23.284
47.6	116	1:56	3.45	0.057	23.342
48.6	117	1:57	3.34	0.056	23.398
49.6	118	1:58	3.25	0.054	23.452
50.6	119	1:59	3.15	0.053	23.504
51.6	120	2:00	3.06	0.051	23.555
52.6	121	2:01	2.97	0.050	23.605
53.6	122	2:02	2.89	0.048	23.653
54.6	123	2:03	2.81	0.047	23.700
55.6	124	2:04	2.73	0.045	23.745
56.6	125	2:05	2.65	0.044	23.789
57.6	126	2:06	2.58	0.043	23.832
58.6	127	2:07	2.51	0.042	23.874
59.6	128	2:08	2.44	0.041	23.915
60.6	129	2:09	2.37	0.040	23.954
61.6	130	2:10	2.31	0.038	23.993
62.6	131	2:11	2.24	0.037	24.030
63.6	132	2:12	2.18	0.036	24.067
64.6	133	2:13	2.12	0.035	24.102
65.6	134	2:14	2.07	0.034	24.137
66.6	135	2:15	2.01	0.034	24.170
67.6	136	2:16	1.96	0.033	24.203
68.6	137	2:17	1.90	0.032	24.234
69.6	138	2:18	1.85	0.031	24.265
70.6	139	2:19	1.80	0.030	24.295
71.6	140	2:20	1.75	0.029	24.325
72.6	141	2:21	1.71	0.028	24.353
73.6	142	2:22	1.66	0.028	24.381
74.6	143	2:23	1.62	0.027	24.408
75.6	144	2:24	1.57	0.026	24.434
76.6	145	2:25	1.53	0.025	24.459
77.6	146	2:26	1.49	0.025	24.484
78.6	147	2:27	1.45	0.024	24.508
79.6	148	2:28	1.41	0.023	24.532
80.6	149	2:29	1.37	0.023	24.555
81.6	150	2:30	1.33	0.022	24.577
82.6	151	2:31	1.29	0.022	24.598
83.6	152	2:32	1.26	0.021	24.619
84.6	153	2:33	1.22	0.020	24.639
85.6	154	2:34	1.19	0.020	24.659
86.6	155	2:35	1.15	0.019	24.678
87.6	156	2:36	1.12	0.019	24.697
88.6	157	2:37	1.09	0.018	24.715
89.6	158	2:38	1.05	0.018	24.733
90.6	159	2:39	1.02	0.017	24.750
91.6	160	2:40	0.99	0.017	24.766
92.6	161	2:41	0.96	0.016	24.782
93.6	162	2:42	0.93	0.016	24.798
94.6	163	2:43	0.90	0.015	24.813
95.6	164	2:44	0.88	0.015	24.828
96.6	165	2:45	0.85	0.014	24.842
97.6	166	2:46	0.82	0.014	24.855
98.6	167	2:47	0.79	0.013	24.869
99.6	168	2:48	0.77	0.013	24.881
100.6	169	2:49	0.74	0.012	24.894

101.6	170	2:50	0.72	0.012	24.906
102.6	171	2:51	0.69	0.012	24.917
103.6	172	2:52	0.67	0.011	24.928
104.6	173	2:53	0.64	0.011	24.939
105.6	174	2:54	0.62	0.010	24.949
106.6	175	2:55	0.60	0.010	24.959
107.6	176	2:56	0.57	0.010	24.969
108.6	177	2:57	0.55	0.009	24.978
109.6	178	2:58	0.53	0.009	24.987
110.6	179	2:59	0.51	0.008	24.995
111.6	180	3:00	0.49	0.008	25.003

Storm Water Management

Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	**529.711**	**4.501**	**0.745**
5-Year	583.017	3.007	0.703
10-Year	670.324	3.007	0.698
25-Year	721.533	2.253	0.679
50-Year	766.038	1.898	0.668
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

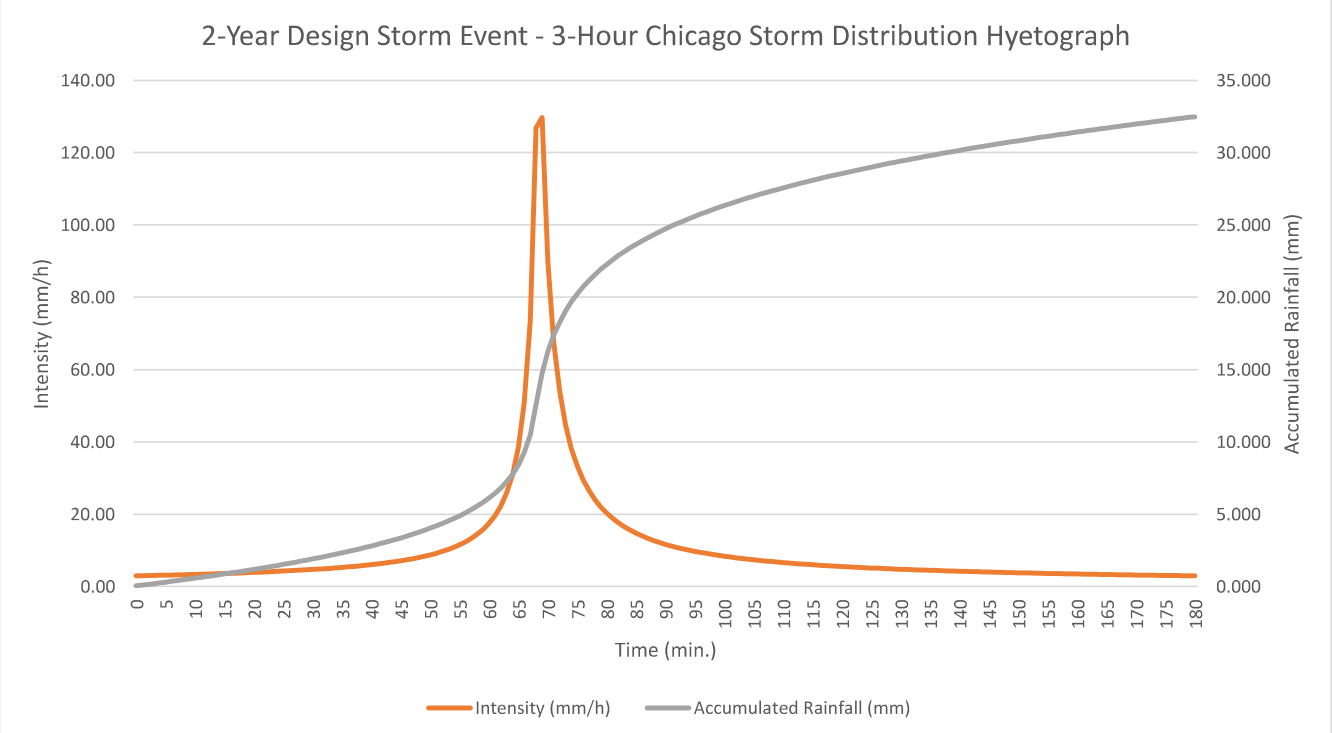
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	t_d*(1-r)=	0.62	
Starting Time=	0:00		i_p=	148.7	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	32.48	mm



2-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	2.97	0.049	0.049
67.4	1	0:01	3.00	0.050	0.099
66.4	2	0:02	3.04	0.051	0.150
65.4	3	0:03	3.07	0.051	0.201
64.4	4	0:04	3.11	0.052	0.253
63.4	5	0:05	3.15	0.053	0.306
62.4	6	0:06	3.19	0.053	0.359
61.4	7	0:07	3.23	0.054	0.413
60.4	8	0:08	3.28	0.055	0.467
59.4	9	0:09	3.32	0.055	0.523
58.4	10	0:10	3.36	0.056	0.579
57.4	11	0:11	3.41	0.057	0.636
56.4	12	0:12	3.46	0.058	0.693
55.4	13	0:13	3.51	0.058	0.752
54.4	14	0:14	3.56	0.059	0.811
53.4	15	0:15	3.61	0.060	0.871
52.4	16	0:16	3.67	0.061	0.932
51.4	17	0:17	3.73	0.062	0.995
50.4	18	0:18	3.79	0.063	1.058
49.4	19	0:19	3.85	0.064	1.122
48.4	20	0:20	3.91	0.065	1.187
47.4	21	0:21	3.98	0.066	1.253
46.4	22	0:22	4.05	0.067	1.321
45.4	23	0:23	4.12	0.069	1.389
44.4	24	0:24	4.19	0.070	1.459
43.4	25	0:25	4.27	0.071	1.531
42.4	26	0:26	4.35	0.073	1.603
41.4	27	0:27	4.44	0.074	1.677
40.4	28	0:28	4.53	0.075	1.753
39.4	29	0:29	4.62	0.077	1.830
38.4	30	0:30	4.72	0.079	1.908
37.4	31	0:31	4.82	0.080	1.989
36.4	32	0:32	4.93	0.082	2.071
35.4	33	0:33	5.05	0.084	2.155
34.4	34	0:34	5.17	0.086	2.241
33.4	35	0:35	5.30	0.088	2.330
32.4	36	0:36	5.43	0.091	2.420
31.4	37	0:37	5.57	0.093	2.513
30.4	38	0:38	5.73	0.095	2.608
29.4	39	0:39	5.89	0.098	2.707
28.4	40	0:40	6.06	0.101	2.808
27.4	41	0:41	6.25	0.104	2.912
26.4	42	0:42	6.44	0.107	3.019
25.4	43	0:43	6.66	0.111	3.130
24.4	44	0:44	6.89	0.115	3.245
23.4	45	0:45	7.14	0.119	3.364
22.4	46	0:46	7.41	0.123	3.487
21.4	47	0:47	7.70	0.128	3.615
20.4	48	0:48	8.02	0.134	3.749
19.4	49	0:49	8.38	0.140	3.889
18.4	50	0:50	8.77	0.146	4.035
17.4	51	0:51	9.20	0.153	4.188
16.4	52	0:52	9.69	0.161	4.350
15.4	53	0:53	10.23	0.171	4.520

14.4	54	0:54	10.85	0.181	4.701
13.4	55	0:55	11.56	0.193	4.894
12.4	56	0:56	12.38	0.206	5.100
11.4	57	0:57	13.34	0.222	5.323
10.4	58	0:58	14.47	0.241	5.564
9.4	59	0:59	15.84	0.264	5.828
8.4	60	1:00	17.51	0.292	6.120
7.4	61	1:01	19.61	0.327	6.447
6.4	62	1:02	22.32	0.372	6.819
5.4	63	1:03	25.94	0.432	7.251
4.4	64	1:04	31.01	0.517	7.768
3.4	65	1:05	38.54	0.642	8.410
2.4	66	1:06	50.78	0.846	9.256
1.4	67	1:07	73.53	1.225	10.482
0.4	68	1:08	126.83	2.114	12.596
0.6	69	1:09	129.69	2.162	14.757
1.6	70	1:10	89.77	1.496	16.253
2.6	71	1:11	67.75	1.129	17.383
3.6	72	1:12	54.06	0.901	18.284
4.6	73	1:13	44.83	0.747	19.031
5.6	74	1:14	38.24	0.637	19.668
6.6	75	1:15	33.32	0.555	20.224
7.6	76	1:16	29.52	0.492	20.715
8.6	77	1:17	26.50	0.442	21.157
9.6	78	1:18	24.05	0.401	21.558
10.6	79	1:19	22.03	0.367	21.925
11.6	80	1:20	20.33	0.339	22.264
12.6	81	1:21	18.88	0.315	22.579
13.6	82	1:22	17.64	0.294	22.873
14.6	83	1:23	16.55	0.276	23.148
15.6	84	1:24	15.60	0.260	23.408
16.6	85	1:25	14.76	0.246	23.654
17.6	86	1:26	14.01	0.234	23.888
18.6	87	1:27	13.34	0.222	24.110
19.6	88	1:28	12.73	0.212	24.322
20.6	89	1:29	12.19	0.203	24.526
21.6	90	1:30	11.69	0.195	24.720
22.6	91	1:31	11.23	0.187	24.907
23.6	92	1:32	10.81	0.180	25.088
24.6	93	1:33	10.42	0.174	25.261
25.6	94	1:34	10.07	0.168	25.429
26.6	95	1:35	9.74	0.162	25.591
27.6	96	1:36	9.43	0.157	25.749
28.6	97	1:37	9.14	0.152	25.901
29.6	98	1:38	8.87	0.148	26.049
30.6	99	1:39	8.62	0.144	26.193
31.6	100	1:40	8.39	0.140	26.332
32.6	101	1:41	8.17	0.136	26.469
33.6	102	1:42	7.96	0.133	26.601
34.6	103	1:43	7.76	0.129	26.731
35.6	104	1:44	7.57	0.126	26.857
36.6	105	1:45	7.40	0.123	26.980
37.6	106	1:46	7.23	0.120	27.101
38.6	107	1:47	7.07	0.118	27.218
39.6	108	1:48	6.92	0.115	27.334
40.6	109	1:49	6.77	0.113	27.447
41.6	110	1:50	6.64	0.111	27.557
42.6	111	1:51	6.50	0.108	27.666

43.6	112	1:52	6.38	0.106	27.772
44.6	113	1:53	6.26	0.104	27.876
45.6	114	1:54	6.14	0.102	27.979
46.6	115	1:55	6.03	0.101	28.079
47.6	116	1:56	5.93	0.099	28.178
48.6	117	1:57	5.82	0.097	28.275
49.6	118	1:58	5.73	0.095	28.370
50.6	119	1:59	5.63	0.094	28.464
51.6	120	2:00	5.54	0.092	28.557
52.6	121	2:01	5.45	0.091	28.647
53.6	122	2:02	5.37	0.089	28.737
54.6	123	2:03	5.29	0.088	28.825
55.6	124	2:04	5.21	0.087	28.912
56.6	125	2:05	5.13	0.086	28.997
57.6	126	2:06	5.06	0.084	29.082
58.6	127	2:07	4.99	0.083	29.165
59.6	128	2:08	4.92	0.082	29.247
60.6	129	2:09	4.85	0.081	29.328
61.6	130	2:10	4.79	0.080	29.408
62.6	131	2:11	4.72	0.079	29.486
63.6	132	2:12	4.66	0.078	29.564
64.6	133	2:13	4.60	0.077	29.641
65.6	134	2:14	4.55	0.076	29.717
66.6	135	2:15	4.49	0.075	29.791
67.6	136	2:16	4.44	0.074	29.865
68.6	137	2:17	4.38	0.073	29.938
69.6	138	2:18	4.33	0.072	30.011
70.6	139	2:19	4.28	0.071	30.082
71.6	140	2:20	4.23	0.071	30.153
72.6	141	2:21	4.19	0.070	30.222
73.6	142	2:22	4.14	0.069	30.291
74.6	143	2:23	4.10	0.068	30.360
75.6	144	2:24	4.05	0.068	30.427
76.6	145	2:25	4.01	0.067	30.494
77.6	146	2:26	3.97	0.066	30.560
78.6	147	2:27	3.93	0.065	30.626
79.6	148	2:28	3.89	0.065	30.690
80.6	149	2:29	3.85	0.064	30.755
81.6	150	2:30	3.81	0.063	30.818
82.6	151	2:31	3.77	0.063	30.881
83.6	152	2:32	3.74	0.062	30.943
84.6	153	2:33	3.70	0.062	31.005
85.6	154	2:34	3.67	0.061	31.066
86.6	155	2:35	3.63	0.061	31.126
87.6	156	2:36	3.60	0.060	31.186
88.6	157	2:37	3.57	0.059	31.246
89.6	158	2:38	3.53	0.059	31.305
90.6	159	2:39	3.50	0.058	31.363
91.6	160	2:40	3.47	0.058	31.421
92.6	161	2:41	3.44	0.057	31.478
93.6	162	2:42	3.41	0.057	31.535
94.6	163	2:43	3.38	0.056	31.592
95.6	164	2:44	3.36	0.056	31.648
96.6	165	2:45	3.33	0.055	31.703
97.6	166	2:46	3.30	0.055	31.758
98.6	167	2:47	3.27	0.055	31.813
99.6	168	2:48	3.25	0.054	31.867
100.6	169	2:49	3.22	0.054	31.920

101.6	170	2:50	3.20	0.053	31.974
102.6	171	2:51	3.17	0.053	32.027
103.6	172	2:52	3.15	0.052	32.079
104.6	173	2:53	3.12	0.052	32.131
105.6	174	2:54	3.10	0.052	32.183
106.6	175	2:55	3.08	0.051	32.234
107.6	176	2:56	3.05	0.051	32.285
108.6	177	2:57	3.03	0.051	32.335
109.6	178	2:58	3.01	0.050	32.386
110.6	179	2:59	2.99	0.050	32.435
111.6	180	3:00	2.97	0.049	32.485

Storm Water Management
Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	529.711	4.501	0.745
5-Year	**583.017**	**3.007**	**0.703**
10-Year	670.324	3.007	0.698
25-Year	721.533	2.253	0.679
50-Year	766.038	1.898	0.668
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

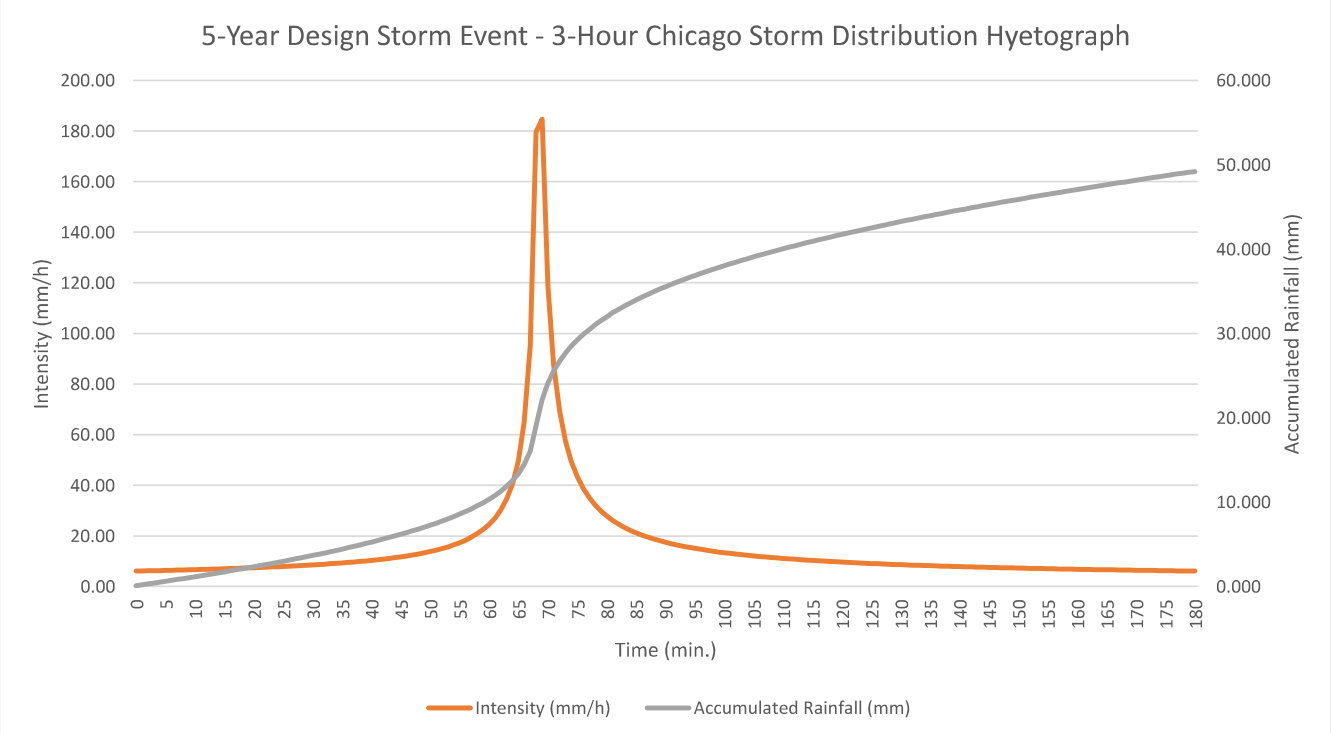
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	t_d*(1-r)=	0.62	
Starting Time=	0:00		i_p=	219.7	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	49.19	mm



5-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	6.12	0.102	0.102
67.4	1	0:01	6.17	0.103	0.205
66.4	2	0:02	6.22	0.104	0.308
65.4	3	0:03	6.27	0.105	0.413
64.4	4	0:04	6.33	0.105	0.518
63.4	5	0:05	6.38	0.106	0.625
62.4	6	0:06	6.44	0.107	0.732
61.4	7	0:07	6.50	0.108	0.840
60.4	8	0:08	6.56	0.109	0.950
59.4	9	0:09	6.62	0.110	1.060
58.4	10	0:10	6.68	0.111	1.171
57.4	11	0:11	6.75	0.112	1.284
56.4	12	0:12	6.82	0.114	1.397
55.4	13	0:13	6.89	0.115	1.512
54.4	14	0:14	6.96	0.116	1.628
53.4	15	0:15	7.04	0.117	1.745
52.4	16	0:16	7.11	0.119	1.864
51.4	17	0:17	7.19	0.120	1.984
50.4	18	0:18	7.28	0.121	2.105
49.4	19	0:19	7.36	0.123	2.228
48.4	20	0:20	7.45	0.124	2.352
47.4	21	0:21	7.54	0.126	2.478
46.4	22	0:22	7.64	0.127	2.605
45.4	23	0:23	7.74	0.129	2.734
44.4	24	0:24	7.84	0.131	2.865
43.4	25	0:25	7.95	0.132	2.997
42.4	26	0:26	8.06	0.134	3.132
41.4	27	0:27	8.18	0.136	3.268
40.4	28	0:28	8.30	0.138	3.406
39.4	29	0:29	8.43	0.140	3.547
38.4	30	0:30	8.56	0.143	3.689
37.4	31	0:31	8.70	0.145	3.835
36.4	32	0:32	8.85	0.148	3.982
35.4	33	0:33	9.01	0.150	4.132
34.4	34	0:34	9.17	0.153	4.285
33.4	35	0:35	9.34	0.156	4.441
32.4	36	0:36	9.52	0.159	4.599
31.4	37	0:37	9.71	0.162	4.761
30.4	38	0:38	9.91	0.165	4.926
29.4	39	0:39	10.13	0.169	5.095
28.4	40	0:40	10.36	0.173	5.268
27.4	41	0:41	10.60	0.177	5.445
26.4	42	0:42	10.86	0.181	5.626
25.4	43	0:43	11.14	0.186	5.811
24.4	44	0:44	11.44	0.191	6.002
23.4	45	0:45	11.76	0.196	6.198
22.4	46	0:46	12.11	0.202	6.400
21.4	47	0:47	12.49	0.208	6.608
20.4	48	0:48	12.90	0.215	6.823
19.4	49	0:49	13.36	0.223	7.046
18.4	50	0:50	13.85	0.231	7.277
17.4	51	0:51	14.40	0.240	7.517
16.4	52	0:52	15.01	0.250	7.767
15.4	53	0:53	15.69	0.262	8.028

14.4	54	0:54	16.46	0.274	8.303
13.4	55	0:55	17.34	0.289	8.592
12.4	56	0:56	18.35	0.306	8.898
11.4	57	0:57	19.52	0.325	9.223
10.4	58	0:58	20.89	0.348	9.571
9.4	59	0:59	22.54	0.376	9.947
8.4	60	1:00	24.55	0.409	10.356
7.4	61	1:01	27.06	0.451	10.807
6.4	62	1:02	30.29	0.505	11.312
5.4	63	1:03	34.60	0.577	11.888
4.4	64	1:04	40.66	0.678	12.566
3.4	65	1:05	49.78	0.830	13.396
2.4	66	1:06	65.06	1.084	14.480
1.4	67	1:07	95.42	1.590	16.071
0.4	68	1:08	179.54	2.992	19.063
0.6	69	1:09	184.66	3.078	22.141
1.6	70	1:10	118.96	1.983	24.123
2.6	71	1:11	87.45	1.457	25.581
3.6	72	1:12	69.28	1.155	26.735
4.6	73	1:13	57.56	0.959	27.695
5.6	74	1:14	49.42	0.824	28.518
6.6	75	1:15	43.44	0.724	29.242
7.6	76	1:16	38.87	0.648	29.890
8.6	77	1:17	35.26	0.588	30.478
9.6	78	1:18	32.35	0.539	31.017
10.6	79	1:19	29.94	0.499	31.516
11.6	80	1:20	27.91	0.465	31.981
12.6	81	1:21	26.19	0.436	32.418
13.6	82	1:22	24.70	0.412	32.829
14.6	83	1:23	23.40	0.390	33.219
15.6	84	1:24	22.25	0.371	33.590
16.6	85	1:25	21.24	0.354	33.944
17.6	86	1:26	20.33	0.339	34.283
18.6	87	1:27	19.52	0.325	34.608
19.6	88	1:28	18.78	0.313	34.921
20.6	89	1:29	18.11	0.302	35.223
21.6	90	1:30	17.49	0.292	35.514
22.6	91	1:31	16.93	0.282	35.797
23.6	92	1:32	16.41	0.274	36.070
24.6	93	1:33	15.93	0.266	36.336
25.6	94	1:34	15.49	0.258	36.594
26.6	95	1:35	15.07	0.251	36.845
27.6	96	1:36	14.69	0.245	37.090
28.6	97	1:37	14.33	0.239	37.329
29.6	98	1:38	13.99	0.233	37.562
30.6	99	1:39	13.67	0.228	37.790
31.6	100	1:40	13.37	0.223	38.012
32.6	101	1:41	13.09	0.218	38.231
33.6	102	1:42	12.82	0.214	38.444
34.6	103	1:43	12.57	0.209	38.654
35.6	104	1:44	12.33	0.205	38.859
36.6	105	1:45	12.10	0.202	39.061
37.6	106	1:46	11.88	0.198	39.259
38.6	107	1:47	11.68	0.195	39.454
39.6	108	1:48	11.48	0.191	39.645
40.6	109	1:49	11.29	0.188	39.833
41.6	110	1:50	11.11	0.185	40.018
42.6	111	1:51	10.94	0.182	40.201

43.6	112	1:52	10.78	0.180	40.380
44.6	113	1:53	10.62	0.177	40.557
45.6	114	1:54	10.47	0.174	40.732
46.6	115	1:55	10.32	0.172	40.904
47.6	116	1:56	10.18	0.170	41.074
48.6	117	1:57	10.04	0.167	41.241
49.6	118	1:58	9.91	0.165	41.406
50.6	119	1:59	9.79	0.163	41.569
51.6	120	2:00	9.67	0.161	41.730
52.6	121	2:01	9.55	0.159	41.890
53.6	122	2:02	9.44	0.157	42.047
54.6	123	2:03	9.33	0.155	42.202
55.6	124	2:04	9.22	0.154	42.356
56.6	125	2:05	9.12	0.152	42.508
57.6	126	2:06	9.02	0.150	42.658
58.6	127	2:07	8.92	0.149	42.807
59.6	128	2:08	8.83	0.147	42.954
60.6	129	2:09	8.74	0.146	43.100
61.6	130	2:10	8.65	0.144	43.244
62.6	131	2:11	8.57	0.143	43.387
63.6	132	2:12	8.49	0.141	43.529
64.6	133	2:13	8.40	0.140	43.669
65.6	134	2:14	8.33	0.139	43.807
66.6	135	2:15	8.25	0.137	43.945
67.6	136	2:16	8.18	0.136	44.081
68.6	137	2:17	8.10	0.135	44.216
69.6	138	2:18	8.03	0.134	44.350
70.6	139	2:19	7.96	0.133	44.483
71.6	140	2:20	7.90	0.132	44.614
72.6	141	2:21	7.83	0.131	44.745
73.6	142	2:22	7.77	0.129	44.874
74.6	143	2:23	7.71	0.128	45.003
75.6	144	2:24	7.64	0.127	45.130
76.6	145	2:25	7.59	0.126	45.257
77.6	146	2:26	7.53	0.125	45.382
78.6	147	2:27	7.47	0.125	45.507
79.6	148	2:28	7.42	0.124	45.630
80.6	149	2:29	7.36	0.123	45.753
81.6	150	2:30	7.31	0.122	45.875
82.6	151	2:31	7.26	0.121	45.996
83.6	152	2:32	7.21	0.120	46.116
84.6	153	2:33	7.16	0.119	46.235
85.6	154	2:34	7.11	0.118	46.353
86.6	155	2:35	7.06	0.118	46.471
87.6	156	2:36	7.01	0.117	46.588
88.6	157	2:37	6.97	0.116	46.704
89.6	158	2:38	6.92	0.115	46.819
90.6	159	2:39	6.88	0.115	46.934
91.6	160	2:40	6.84	0.114	47.048
92.6	161	2:41	6.79	0.113	47.161
93.6	162	2:42	6.75	0.113	47.274
94.6	163	2:43	6.71	0.112	47.386
95.6	164	2:44	6.67	0.111	47.497
96.6	165	2:45	6.63	0.111	47.607
97.6	166	2:46	6.59	0.110	47.717
98.6	167	2:47	6.56	0.109	47.826
99.6	168	2:48	6.52	0.109	47.935
100.6	169	2:49	6.48	0.108	48.043

101.6	170	2:50	6.45	0.107	48.151
102.6	171	2:51	6.41	0.107	48.257
103.6	172	2:52	6.38	0.106	48.364
104.6	173	2:53	6.34	0.106	48.469
105.6	174	2:54	6.31	0.105	48.575
106.6	175	2:55	6.28	0.105	48.679
107.6	176	2:56	6.24	0.104	48.783
108.6	177	2:57	6.21	0.104	48.887
109.6	178	2:58	6.18	0.103	48.990
110.6	179	2:59	6.15	0.102	49.092
111.6	180	3:00	6.12	0.102	49.194

Storm Water Management
Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	529.711	4.501	0.745
5-Year	583.017	3.007	0.703
10-Year	**670.324**	**3.007**	**0.698**
25-Year	721.533	2.253	0.679
50-Year	766.038	1.898	0.668
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

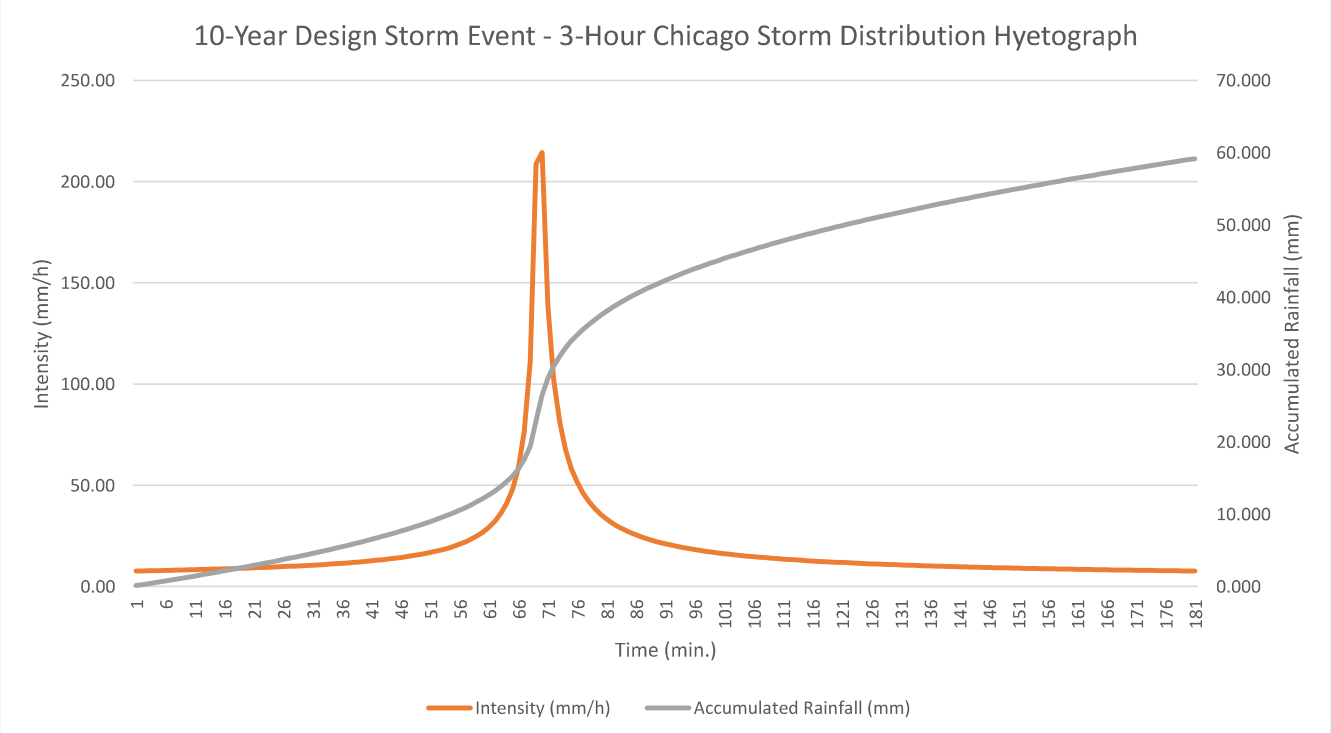
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	t_d*(1-r)=	0.62	
Starting Time=	0:00		i_p=	254.4	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	59.16	mm



10-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	7.67	0.128	0.128
67.4	1	0:01	7.73	0.129	0.257
66.4	2	0:02	7.79	0.130	0.387
65.4	3	0:03	7.85	0.131	0.517
64.4	4	0:04	7.92	0.132	0.649
63.4	5	0:05	7.98	0.133	0.782
62.4	6	0:06	8.05	0.134	0.917
61.4	7	0:07	8.12	0.135	1.052
60.4	8	0:08	8.19	0.137	1.188
59.4	9	0:09	8.27	0.138	1.326
58.4	10	0:10	8.34	0.139	1.465
57.4	11	0:11	8.42	0.140	1.606
56.4	12	0:12	8.50	0.142	1.747
55.4	13	0:13	8.58	0.143	1.890
54.4	14	0:14	8.67	0.145	2.035
53.4	15	0:15	8.76	0.146	2.181
52.4	16	0:16	8.85	0.148	2.328
51.4	17	0:17	8.95	0.149	2.477
50.4	18	0:18	9.05	0.151	2.628
49.4	19	0:19	9.15	0.152	2.781
48.4	20	0:20	9.25	0.154	2.935
47.4	21	0:21	9.36	0.156	3.091
46.4	22	0:22	9.48	0.158	3.249
45.4	23	0:23	9.59	0.160	3.409
44.4	24	0:24	9.72	0.162	3.571
43.4	25	0:25	9.85	0.164	3.735
42.4	26	0:26	9.98	0.166	3.901
41.4	27	0:27	10.12	0.169	4.070
40.4	28	0:28	10.26	0.171	4.241
39.4	29	0:29	10.41	0.174	4.414
38.4	30	0:30	10.57	0.176	4.591
37.4	31	0:31	10.74	0.179	4.770
36.4	32	0:32	10.91	0.182	4.951
35.4	33	0:33	11.10	0.185	5.136
34.4	34	0:34	11.29	0.188	5.325
33.4	35	0:35	11.49	0.192	5.516
32.4	36	0:36	11.71	0.195	5.711
31.4	37	0:37	11.93	0.199	5.910
30.4	38	0:38	12.17	0.203	6.113
29.4	39	0:39	12.43	0.207	6.320
28.4	40	0:40	12.70	0.212	6.532
27.4	41	0:41	12.98	0.216	6.748
26.4	42	0:42	13.29	0.222	6.970
25.4	43	0:43	13.62	0.227	7.197
24.4	44	0:44	13.98	0.233	7.429
23.4	45	0:45	14.36	0.239	7.669
22.4	46	0:46	14.77	0.246	7.915
21.4	47	0:47	15.22	0.254	8.169
20.4	48	0:48	15.70	0.262	8.430
19.4	49	0:49	16.24	0.271	8.701
18.4	50	0:50	16.82	0.280	8.981
17.4	51	0:51	17.47	0.291	9.272
16.4	52	0:52	18.18	0.303	9.575
15.4	53	0:53	18.99	0.316	9.892

14.4	54	0:54	19.89	0.332	10.223
13.4	55	0:55	20.92	0.349	10.572
12.4	56	0:56	22.11	0.368	10.941
11.4	57	0:57	23.48	0.391	11.332
10.4	58	0:58	25.09	0.418	11.750
9.4	59	0:59	27.02	0.450	12.200
8.4	60	1:00	29.38	0.490	12.690
7.4	61	1:01	32.31	0.539	13.229
6.4	62	1:02	36.08	0.601	13.830
5.4	63	1:03	41.11	0.685	14.515
4.4	64	1:04	48.17	0.803	15.318
3.4	65	1:05	58.78	0.980	16.298
2.4	66	1:06	76.51	1.275	17.573
1.4	67	1:07	111.64	1.861	19.434
0.4	68	1:08	208.60	3.477	22.910
0.6	69	1:09	214.49	3.575	26.485
1.6	70	1:10	138.82	2.314	28.799
2.6	71	1:11	102.42	1.707	30.506
3.6	72	1:12	81.40	1.357	31.863
4.6	73	1:13	67.82	1.130	32.993
5.6	74	1:14	58.36	0.973	33.966
6.6	75	1:15	51.41	0.857	34.822
7.6	76	1:16	46.09	0.768	35.591
8.6	77	1:17	41.89	0.698	36.289
9.6	78	1:18	38.49	0.641	36.930
10.6	79	1:19	35.67	0.595	37.525
11.6	80	1:20	33.31	0.555	38.080
12.6	81	1:21	31.29	0.521	38.601
13.6	82	1:22	29.55	0.492	39.094
14.6	83	1:23	28.03	0.467	39.561
15.6	84	1:24	26.69	0.445	40.006
16.6	85	1:25	25.50	0.425	40.431
17.6	86	1:26	24.44	0.407	40.838
18.6	87	1:27	23.48	0.391	41.229
19.6	88	1:28	22.61	0.377	41.606
20.6	89	1:29	21.82	0.364	41.970
21.6	90	1:30	21.10	0.352	42.321
22.6	91	1:31	20.44	0.341	42.662
23.6	92	1:32	19.83	0.331	42.993
24.6	93	1:33	19.27	0.321	43.314
25.6	94	1:34	18.75	0.312	43.626
26.6	95	1:35	18.26	0.304	43.931
27.6	96	1:36	17.80	0.297	44.227
28.6	97	1:37	17.38	0.290	44.517
29.6	98	1:38	16.98	0.283	44.800
30.6	99	1:39	16.61	0.277	45.077
31.6	100	1:40	16.25	0.271	45.348
32.6	101	1:41	15.92	0.265	45.613
33.6	102	1:42	15.61	0.260	45.873
34.6	103	1:43	15.31	0.255	46.128
35.6	104	1:44	15.02	0.250	46.378
36.6	105	1:45	14.76	0.246	46.624
37.6	106	1:46	14.50	0.242	46.866
38.6	107	1:47	14.26	0.238	47.104
39.6	108	1:48	14.02	0.234	47.337
40.6	109	1:49	13.80	0.230	47.567
41.6	110	1:50	13.59	0.226	47.794
42.6	111	1:51	13.39	0.223	48.017

43.6	112	1:52	13.19	0.220	48.237
44.6	113	1:53	13.00	0.217	48.454
45.6	114	1:54	12.82	0.214	48.667
46.6	115	1:55	12.65	0.211	48.878
47.6	116	1:56	12.49	0.208	49.086
48.6	117	1:57	12.33	0.205	49.292
49.6	118	1:58	12.17	0.203	49.495
50.6	119	1:59	12.02	0.200	49.695
51.6	120	2:00	11.88	0.198	49.893
52.6	121	2:01	11.74	0.196	50.089
53.6	122	2:02	11.61	0.193	50.282
54.6	123	2:03	11.48	0.191	50.473
55.6	124	2:04	11.35	0.189	50.663
56.6	125	2:05	11.23	0.187	50.850
57.6	126	2:06	11.11	0.185	51.035
58.6	127	2:07	11.00	0.183	51.218
59.6	128	2:08	10.89	0.182	51.400
60.6	129	2:09	10.78	0.180	51.580
61.6	130	2:10	10.68	0.178	51.758
62.6	131	2:11	10.58	0.176	51.934
63.6	132	2:12	10.48	0.175	52.109
64.6	133	2:13	10.38	0.173	52.282
65.6	134	2:14	10.29	0.172	52.453
66.6	135	2:15	10.20	0.170	52.623
67.6	136	2:16	10.11	0.169	52.792
68.6	137	2:17	10.03	0.167	52.959
69.6	138	2:18	9.94	0.166	53.125
70.6	139	2:19	9.86	0.164	53.289
71.6	140	2:20	9.78	0.163	53.452
72.6	141	2:21	9.71	0.162	53.614
73.6	142	2:22	9.63	0.160	53.774
74.6	143	2:23	9.56	0.159	53.933
75.6	144	2:24	9.48	0.158	54.092
76.6	145	2:25	9.41	0.157	54.248
77.6	146	2:26	9.34	0.156	54.404
78.6	147	2:27	9.28	0.155	54.559
79.6	148	2:28	9.21	0.154	54.712
80.6	149	2:29	9.15	0.152	54.865
81.6	150	2:30	9.08	0.151	55.016
82.6	151	2:31	9.02	0.150	55.166
83.6	152	2:32	8.96	0.149	55.316
84.6	153	2:33	8.90	0.148	55.464
85.6	154	2:34	8.85	0.147	55.612
86.6	155	2:35	8.79	0.146	55.758
87.6	156	2:36	8.73	0.146	55.904
88.6	157	2:37	8.68	0.145	56.048
89.6	158	2:38	8.63	0.144	56.192
90.6	159	2:39	8.57	0.143	56.335
91.6	160	2:40	8.52	0.142	56.477
92.6	161	2:41	8.47	0.141	56.618
93.6	162	2:42	8.42	0.140	56.759
94.6	163	2:43	8.37	0.140	56.898
95.6	164	2:44	8.33	0.139	57.037
96.6	165	2:45	8.28	0.138	57.175
97.6	166	2:46	8.23	0.137	57.312
98.6	167	2:47	8.19	0.136	57.449
99.6	168	2:48	8.15	0.136	57.585
100.6	169	2:49	8.10	0.135	57.720

101.6	170	2:50	8.06	0.134	57.854
102.6	171	2:51	8.02	0.134	57.988
103.6	172	2:52	7.98	0.133	58.120
104.6	173	2:53	7.94	0.132	58.253
105.6	174	2:54	7.90	0.132	58.384
106.6	175	2:55	7.86	0.131	58.515
107.6	176	2:56	7.82	0.130	58.646
108.6	177	2:57	7.78	0.130	58.775
109.6	178	2:58	7.74	0.129	58.904
110.6	179	2:59	7.71	0.128	59.033
111.6	180	3:00	7.67	0.128	59.161

GRIT ENGINEERING INC

Storm Water Management

Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	529.711	4.501	0.745
5-Year	583.017	3.007	0.703
10-Year	670.324	3.007	0.698
25-Year	**721.533**	**2.253**	**0.679**
50-Year	766.038	1.898	0.668
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

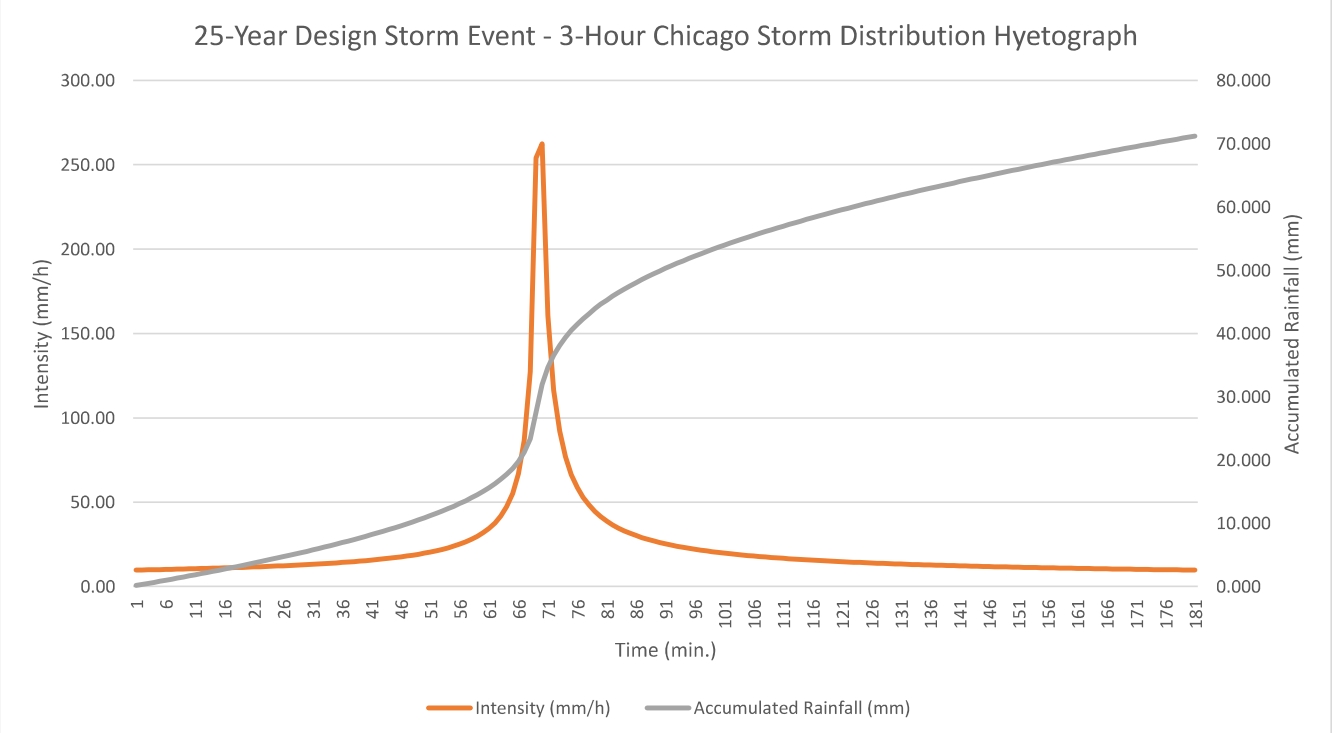
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	t_d*(1-r)=	0.62	
Starting Time=	0:00		i_p=	323.9	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	71.18	mm



25-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	9.75	0.163	0.163
67.4	1	0:01	9.83	0.164	0.326
66.4	2	0:02	9.90	0.165	0.491
65.4	3	0:03	9.97	0.166	0.658
64.4	4	0:04	10.05	0.168	0.825
63.4	5	0:05	10.13	0.169	0.994
62.4	6	0:06	10.21	0.170	1.164
61.4	7	0:07	10.30	0.172	1.336
60.4	8	0:08	10.38	0.173	1.509
59.4	9	0:09	10.47	0.175	1.683
58.4	10	0:10	10.56	0.176	1.859
57.4	11	0:11	10.66	0.178	2.037
56.4	12	0:12	10.75	0.179	2.216
55.4	13	0:13	10.85	0.181	2.397
54.4	14	0:14	10.96	0.183	2.579
53.4	15	0:15	11.06	0.184	2.764
52.4	16	0:16	11.17	0.186	2.950
51.4	17	0:17	11.28	0.188	3.138
50.4	18	0:18	11.40	0.190	3.328
49.4	19	0:19	11.52	0.192	3.520
48.4	20	0:20	11.65	0.194	3.714
47.4	21	0:21	11.78	0.196	3.911
46.4	22	0:22	11.92	0.199	4.109
45.4	23	0:23	12.06	0.201	4.310
44.4	24	0:24	12.20	0.203	4.514
43.4	25	0:25	12.35	0.206	4.719
42.4	26	0:26	12.51	0.209	4.928
41.4	27	0:27	12.68	0.211	5.139
40.4	28	0:28	12.85	0.214	5.353
39.4	29	0:29	13.03	0.217	5.570
38.4	30	0:30	13.21	0.220	5.791
37.4	31	0:31	13.41	0.223	6.014
36.4	32	0:32	13.61	0.227	6.241
35.4	33	0:33	13.83	0.230	6.472
34.4	34	0:34	14.06	0.234	6.706
33.4	35	0:35	14.29	0.238	6.944
32.4	36	0:36	14.54	0.242	7.186
31.4	37	0:37	14.81	0.247	7.433
30.4	38	0:38	15.09	0.251	7.685
29.4	39	0:39	15.39	0.256	7.941
28.4	40	0:40	15.70	0.262	8.203
27.4	41	0:41	16.04	0.267	8.470
26.4	42	0:42	16.39	0.273	8.743
25.4	43	0:43	16.78	0.280	9.023
24.4	44	0:44	17.18	0.286	9.309
23.4	45	0:45	17.63	0.294	9.603
22.4	46	0:46	18.10	0.302	9.905
21.4	47	0:47	18.61	0.310	10.215
20.4	48	0:48	19.17	0.320	10.535
19.4	49	0:49	19.78	0.330	10.864
18.4	50	0:50	20.45	0.341	11.205
17.4	51	0:51	21.19	0.353	11.558
16.4	52	0:52	22.00	0.367	11.925
15.4	53	0:53	22.91	0.382	12.307

14.4	54	0:54	23.93	0.399	12.706
13.4	55	0:55	25.09	0.418	13.124
12.4	56	0:56	26.42	0.440	13.564
11.4	57	0:57	27.96	0.466	14.030
10.4	58	0:58	29.76	0.496	14.526
9.4	59	0:59	31.90	0.532	15.058
8.4	60	1:00	34.50	0.575	15.633
7.4	61	1:01	37.74	0.629	16.262
6.4	62	1:02	41.88	0.698	16.960
5.4	63	1:03	47.40	0.790	17.750
4.4	64	1:04	55.14	0.919	18.669
3.4	65	1:05	66.84	1.114	19.783
2.4	66	1:06	86.64	1.444	21.227
1.4	67	1:07	127.39	2.123	23.350
0.4	68	1:08	253.94	4.232	27.582
0.6	69	1:09	262.39	4.373	31.956
1.6	70	1:10	160.62	2.677	34.633
2.6	71	1:11	116.48	1.941	36.574
3.6	72	1:12	92.18	1.536	38.110
4.6	73	1:13	76.88	1.281	39.392
5.6	74	1:14	66.37	1.106	40.498
6.6	75	1:15	58.70	0.978	41.476
7.6	76	1:16	52.86	0.881	42.357
8.6	77	1:17	48.25	0.804	43.161
9.6	78	1:18	44.52	0.742	43.903
10.6	79	1:19	41.43	0.691	44.594
11.6	80	1:20	38.83	0.647	45.241
12.6	81	1:21	36.61	0.610	45.851
13.6	82	1:22	34.69	0.578	46.429
14.6	83	1:23	33.01	0.550	46.979
15.6	84	1:24	31.53	0.525	47.505
16.6	85	1:25	30.21	0.503	48.008
17.6	86	1:26	29.02	0.484	48.492
18.6	87	1:27	27.96	0.466	48.958
19.6	88	1:28	26.99	0.450	49.408
20.6	89	1:29	26.10	0.435	49.843
21.6	90	1:30	25.30	0.422	50.264
22.6	91	1:31	24.55	0.409	50.674
23.6	92	1:32	23.87	0.398	51.071
24.6	93	1:33	23.23	0.387	51.459
25.6	94	1:34	22.64	0.377	51.836
26.6	95	1:35	22.09	0.368	52.204
27.6	96	1:36	21.57	0.359	52.563
28.6	97	1:37	21.09	0.351	52.915
29.6	98	1:38	20.63	0.344	53.259
30.6	99	1:39	20.21	0.337	53.596
31.6	100	1:40	19.80	0.330	53.926
32.6	101	1:41	19.42	0.324	54.249
33.6	102	1:42	19.06	0.318	54.567
34.6	103	1:43	18.72	0.312	54.879
35.6	104	1:44	18.39	0.307	55.185
36.6	105	1:45	18.08	0.301	55.487
37.6	106	1:46	17.79	0.296	55.783
38.6	107	1:47	17.51	0.292	56.075
39.6	108	1:48	17.24	0.287	56.362
40.6	109	1:49	16.98	0.283	56.646
41.6	110	1:50	16.74	0.279	56.924
42.6	111	1:51	16.50	0.275	57.200

43.6	112	1:52	16.28	0.271	57.471
44.6	113	1:53	16.06	0.268	57.738
45.6	114	1:54	15.85	0.264	58.003
46.6	115	1:55	15.65	0.261	58.263
47.6	116	1:56	15.46	0.258	58.521
48.6	117	1:57	15.27	0.254	58.775
49.6	118	1:58	15.09	0.251	59.027
50.6	119	1:59	14.92	0.249	59.276
51.6	120	2:00	14.75	0.246	59.521
52.6	121	2:01	14.59	0.243	59.764
53.6	122	2:02	14.43	0.241	60.005
54.6	123	2:03	14.28	0.238	60.243
55.6	124	2:04	14.13	0.236	60.478
56.6	125	2:05	13.99	0.233	60.712
57.6	126	2:06	13.85	0.231	60.943
58.6	127	2:07	13.72	0.229	61.171
59.6	128	2:08	13.59	0.226	61.398
60.6	129	2:09	13.46	0.224	61.622
61.6	130	2:10	13.34	0.222	61.844
62.6	131	2:11	13.22	0.220	62.065
63.6	132	2:12	13.10	0.218	62.283
64.6	133	2:13	12.99	0.217	62.499
65.6	134	2:14	12.88	0.215	62.714
66.6	135	2:15	12.77	0.213	62.927
67.6	136	2:16	12.67	0.211	63.138
68.6	137	2:17	12.57	0.209	63.348
69.6	138	2:18	12.47	0.208	63.556
70.6	139	2:19	12.37	0.206	63.762
71.6	140	2:20	12.28	0.205	63.966
72.6	141	2:21	12.19	0.203	64.170
73.6	142	2:22	12.10	0.202	64.371
74.6	143	2:23	12.01	0.200	64.571
75.6	144	2:24	11.92	0.199	64.770
76.6	145	2:25	11.84	0.197	64.967
77.6	146	2:26	11.76	0.196	65.163
78.6	147	2:27	11.68	0.195	65.358
79.6	148	2:28	11.60	0.193	65.551
80.6	149	2:29	11.52	0.192	65.743
81.6	150	2:30	11.45	0.191	65.934
82.6	151	2:31	11.38	0.190	66.124
83.6	152	2:32	11.30	0.188	66.312
84.6	153	2:33	11.23	0.187	66.499
85.6	154	2:34	11.16	0.186	66.685
86.6	155	2:35	11.10	0.185	66.870
87.6	156	2:36	11.03	0.184	67.054
88.6	157	2:37	10.97	0.183	67.237
89.6	158	2:38	10.90	0.182	67.419
90.6	159	2:39	10.84	0.181	67.599
91.6	160	2:40	10.78	0.180	67.779
92.6	161	2:41	10.72	0.179	67.958
93.6	162	2:42	10.66	0.178	68.135
94.6	163	2:43	10.60	0.177	68.312
95.6	164	2:44	10.54	0.176	68.488
96.6	165	2:45	10.49	0.175	68.662
97.6	166	2:46	10.43	0.174	68.836
98.6	167	2:47	10.38	0.173	69.009
99.6	168	2:48	10.33	0.172	69.181
100.6	169	2:49	10.27	0.171	69.353

101.6	170	2:50	10.22	0.170	69.523
102.6	171	2:51	10.17	0.170	69.693
103.6	172	2:52	10.12	0.169	69.861
104.6	173	2:53	10.07	0.168	70.029
105.6	174	2:54	10.03	0.167	70.196
106.6	175	2:55	9.98	0.166	70.363
107.6	176	2:56	9.93	0.166	70.528
108.6	177	2:57	9.89	0.165	70.693
109.6	178	2:58	9.84	0.164	70.857
110.6	179	2:59	9.80	0.163	71.020
111.6	180	3:00	9.75	0.163	71.183

Storm Water Management
Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	529.711	4.501	0.745
5-Year	583.017	3.007	0.703
10-Year	670.324	3.007	0.698
25-Year	721.533	2.253	0.679
50-Year	**766.038**	**1.898**	**0.668**
100-Year	801.041	1.501	0.657

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

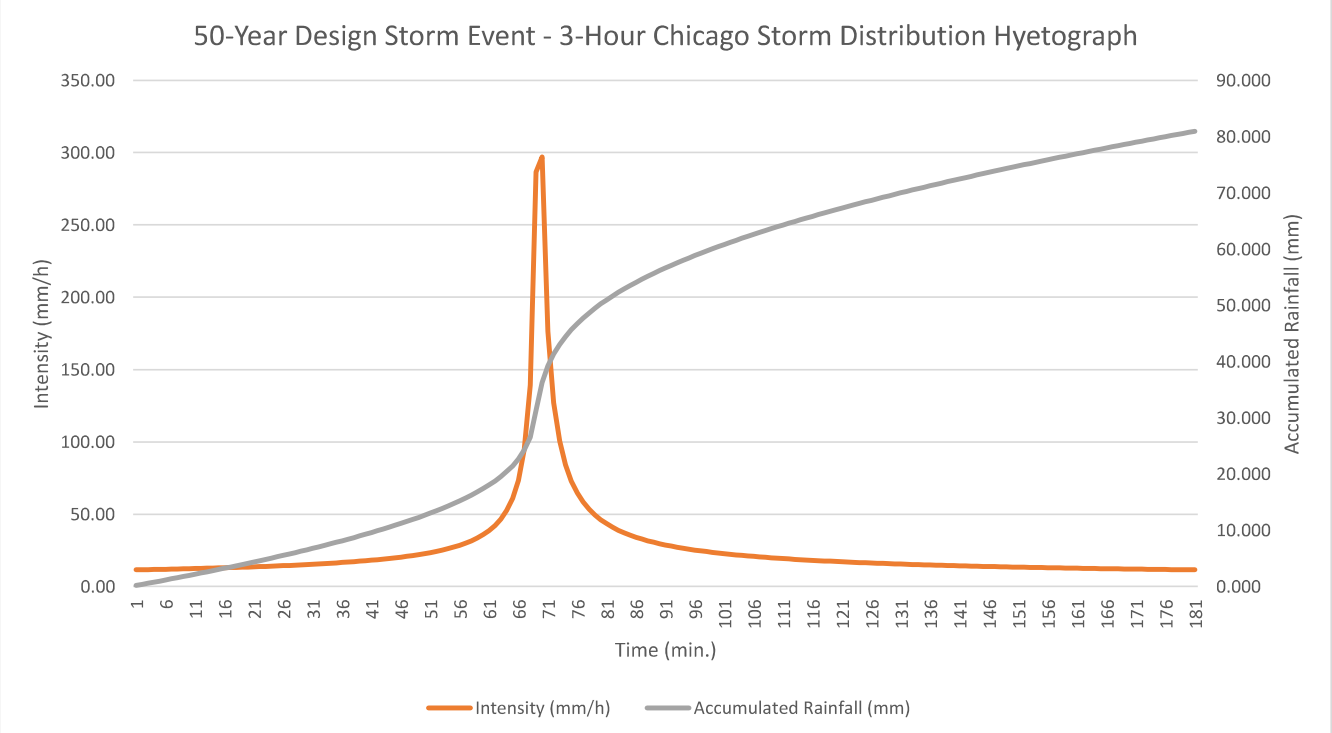
$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours	t_d*r=	0.38	
Rainfall Duration=	180	minutes	t_d*(1-r)=	0.62	
Starting Time=	0:00		i_p=	376.3	Peak Rainfall Intensity (mm/h)
Time Step=	0:01		t_b=	68.4	Time Before Peak (min.)
r=	0.38		t_a=	111.6	Time After Peak (min.)
t_d=	1		Total Rainfall Depth=	80.94	mm



50-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	11.52	0.192	0.192
67.4	1	0:01	11.60	0.193	0.385
66.4	2	0:02	11.68	0.195	0.580
65.4	3	0:03	11.77	0.196	0.776
64.4	4	0:04	11.85	0.198	0.974
63.4	5	0:05	11.94	0.199	1.173
62.4	6	0:06	12.03	0.201	1.373
61.4	7	0:07	12.13	0.202	1.575
60.4	8	0:08	12.23	0.204	1.779
59.4	9	0:09	12.33	0.205	1.985
58.4	10	0:10	12.43	0.207	2.192
57.4	11	0:11	12.54	0.209	2.401
56.4	12	0:12	12.65	0.211	2.611
55.4	13	0:13	12.76	0.213	2.824
54.4	14	0:14	12.88	0.215	3.039
53.4	15	0:15	13.00	0.217	3.255
52.4	16	0:16	13.12	0.219	3.474
51.4	17	0:17	13.25	0.221	3.695
50.4	18	0:18	13.38	0.223	3.918
49.4	19	0:19	13.52	0.225	4.143
48.4	20	0:20	13.66	0.228	4.371
47.4	21	0:21	13.81	0.230	4.601
46.4	22	0:22	13.96	0.233	4.833
45.4	23	0:23	14.12	0.235	5.069
44.4	24	0:24	14.28	0.238	5.307
43.4	25	0:25	14.45	0.241	5.548
42.4	26	0:26	14.63	0.244	5.791
41.4	27	0:27	14.81	0.247	6.038
40.4	28	0:28	15.01	0.250	6.288
39.4	29	0:29	15.21	0.253	6.542
38.4	30	0:30	15.42	0.257	6.799
37.4	31	0:31	15.64	0.261	7.059
36.4	32	0:32	15.87	0.264	7.324
35.4	33	0:33	16.11	0.268	7.592
34.4	34	0:34	16.36	0.273	7.865
33.4	35	0:35	16.63	0.277	8.142
32.4	36	0:36	16.91	0.282	8.424
31.4	37	0:37	17.20	0.287	8.711
30.4	38	0:38	17.52	0.292	9.002
29.4	39	0:39	17.85	0.297	9.300
28.4	40	0:40	18.20	0.303	9.603
27.4	41	0:41	18.57	0.309	9.913
26.4	42	0:42	18.97	0.316	10.229
25.4	43	0:43	19.39	0.323	10.552
24.4	44	0:44	19.85	0.331	10.883
23.4	45	0:45	20.33	0.339	11.222
22.4	46	0:46	20.86	0.348	11.569
21.4	47	0:47	21.43	0.357	11.926
20.4	48	0:48	22.05	0.367	12.294
19.4	49	0:49	22.72	0.379	12.672
18.4	50	0:50	23.45	0.391	13.063
17.4	51	0:51	24.26	0.404	13.468
16.4	52	0:52	25.16	0.419	13.887
15.4	53	0:53	26.16	0.436	14.323

14.4	54	0:54	27.28	0.455	14.778
13.4	55	0:55	28.55	0.476	15.254
12.4	56	0:56	29.99	0.500	15.753
11.4	57	0:57	31.67	0.528	16.281
10.4	58	0:58	33.62	0.560	16.842
9.4	59	0:59	35.95	0.599	17.441
8.4	60	1:00	38.76	0.646	18.087
7.4	61	1:01	42.25	0.704	18.791
6.4	62	1:02	46.71	0.778	19.569
5.4	63	1:03	52.63	0.877	20.446
4.4	64	1:04	60.92	1.015	21.462
3.4	65	1:05	73.45	1.224	22.686
2.4	66	1:06	94.75	1.579	24.265
1.4	67	1:07	139.28	2.321	26.586
0.4	68	1:08	286.71	4.778	31.365
0.6	69	1:09	297.11	4.952	36.316
1.6	70	1:10	176.55	2.943	39.259
2.6	71	1:11	127.24	2.121	41.380
3.6	72	1:12	100.73	1.679	43.059
4.6	73	1:13	84.22	1.404	44.462
5.6	74	1:14	72.94	1.216	45.678
6.6	75	1:15	64.73	1.079	46.757
7.6	76	1:16	58.47	0.975	47.731
8.6	77	1:17	53.54	0.892	48.624
9.6	78	1:18	49.54	0.826	49.449
10.6	79	1:19	46.22	0.770	50.220
11.6	80	1:20	43.43	0.724	50.943
12.6	81	1:21	41.04	0.684	51.627
13.6	82	1:22	38.96	0.649	52.277
14.6	83	1:23	37.15	0.619	52.896
15.6	84	1:24	35.54	0.592	53.488
16.6	85	1:25	34.11	0.569	54.057
17.6	86	1:26	32.83	0.547	54.604
18.6	87	1:27	31.67	0.528	55.131
19.6	88	1:28	30.61	0.510	55.642
20.6	89	1:29	29.65	0.494	56.136
21.6	90	1:30	28.77	0.479	56.615
22.6	91	1:31	27.95	0.466	57.081
23.6	92	1:32	27.20	0.453	57.535
24.6	93	1:33	26.51	0.442	57.976
25.6	94	1:34	25.86	0.431	58.407
26.6	95	1:35	25.25	0.421	58.828
27.6	96	1:36	24.69	0.411	59.240
28.6	97	1:37	24.16	0.403	59.642
29.6	98	1:38	23.66	0.394	60.037
30.6	99	1:39	23.19	0.386	60.423
31.6	100	1:40	22.74	0.379	60.802
32.6	101	1:41	22.32	0.372	61.174
33.6	102	1:42	21.92	0.365	61.539
34.6	103	1:43	21.54	0.359	61.898
35.6	104	1:44	21.18	0.353	62.251
36.6	105	1:45	20.84	0.347	62.599
37.6	106	1:46	20.52	0.342	62.941
38.6	107	1:47	20.20	0.337	63.278
39.6	108	1:48	19.91	0.332	63.609
40.6	109	1:49	19.62	0.327	63.936
41.6	110	1:50	19.35	0.322	64.259
42.6	111	1:51	19.09	0.318	64.577

43.6	112	1:52	18.84	0.314	64.891
44.6	113	1:53	18.59	0.310	65.201
45.6	114	1:54	18.36	0.306	65.507
46.6	115	1:55	18.14	0.302	65.809
47.6	116	1:56	17.92	0.299	66.108
48.6	117	1:57	17.72	0.295	66.403
49.6	118	1:58	17.52	0.292	66.695
50.6	119	1:59	17.32	0.289	66.984
51.6	120	2:00	17.13	0.286	67.269
52.6	121	2:01	16.95	0.283	67.552
53.6	122	2:02	16.78	0.280	67.832
54.6	123	2:03	16.61	0.277	68.108
55.6	124	2:04	16.45	0.274	68.382
56.6	125	2:05	16.29	0.271	68.654
57.6	126	2:06	16.13	0.269	68.923
58.6	127	2:07	15.98	0.266	69.189
59.6	128	2:08	15.84	0.264	69.453
60.6	129	2:09	15.69	0.262	69.715
61.6	130	2:10	15.56	0.259	69.974
62.6	131	2:11	15.42	0.257	70.231
63.6	132	2:12	15.29	0.255	70.486
64.6	133	2:13	15.17	0.253	70.739
65.6	134	2:14	15.04	0.251	70.989
66.6	135	2:15	14.92	0.249	71.238
67.6	136	2:16	14.81	0.247	71.485
68.6	137	2:17	14.69	0.245	71.730
69.6	138	2:18	14.58	0.243	71.973
70.6	139	2:19	14.47	0.241	72.214
71.6	140	2:20	14.37	0.239	72.453
72.6	141	2:21	14.26	0.238	72.691
73.6	142	2:22	14.16	0.236	72.927
74.6	143	2:23	14.06	0.234	73.162
75.6	144	2:24	13.97	0.233	73.394
76.6	145	2:25	13.87	0.231	73.626
77.6	146	2:26	13.78	0.230	73.855
78.6	147	2:27	13.69	0.228	74.084
79.6	148	2:28	13.60	0.227	74.310
80.6	149	2:29	13.52	0.225	74.536
81.6	150	2:30	13.43	0.224	74.760
82.6	151	2:31	13.35	0.222	74.982
83.6	152	2:32	13.27	0.221	75.203
84.6	153	2:33	13.19	0.220	75.423
85.6	154	2:34	13.11	0.219	75.641
86.6	155	2:35	13.04	0.217	75.859
87.6	156	2:36	12.96	0.216	76.075
88.6	157	2:37	12.89	0.215	76.290
89.6	158	2:38	12.82	0.214	76.503
90.6	159	2:39	12.74	0.212	76.716
91.6	160	2:40	12.68	0.211	76.927
92.6	161	2:41	12.61	0.210	77.137
93.6	162	2:42	12.54	0.209	77.346
94.6	163	2:43	12.47	0.208	77.554
95.6	164	2:44	12.41	0.207	77.761
96.6	165	2:45	12.35	0.206	77.966
97.6	166	2:46	12.28	0.205	78.171
98.6	167	2:47	12.22	0.204	78.375
99.6	168	2:48	12.16	0.203	78.578
100.6	169	2:49	12.10	0.202	78.779

101.6	170	2:50	12.05	0.201	78.980
102.6	171	2:51	11.99	0.200	79.180
103.6	172	2:52	11.93	0.199	79.379
104.6	173	2:53	11.88	0.198	79.577
105.6	174	2:54	11.82	0.197	79.774
106.6	175	2:55	11.77	0.196	79.970
107.6	176	2:56	11.72	0.195	80.165
108.6	177	2:57	11.67	0.194	80.360
109.6	178	2:58	11.62	0.194	80.553
110.6	179	2:59	11.57	0.193	80.746
111.6	180	3:00	11.52	0.192	80.938

GRIT ENGINEERING INC

Storm Water Management

Chicago Storm Hyetograph Creation

Project	Norwich Mini Storage
Project Number	GE-0224-2
Client	Design Logix Engineering Inc.
Address	516 Bank Street North, Simcoe
Date	Thursday, May 11, 2023

Rainfall Parameters

Norfolk County IDF			
Rainfall Event	A	B	C
2-Year	529.711	4.501	0.745
5-Year	583.017	3.007	0.703
10-Year	670.324	3.007	0.698
25-Year	721.533	2.253	0.679
50-Year	766.038	1.898	0.668
100-Year	**801.041**	**1.501**	**0.657**

Hyetograph Formulas

$$i_p = \frac{A}{(\Delta t + B)^c} = \text{peak rainfall intensity}$$

Before the peak:

$$i_b = \frac{A[((1-c)t_b/r) + B]}{[t_b/r + B]^{1+c}}$$

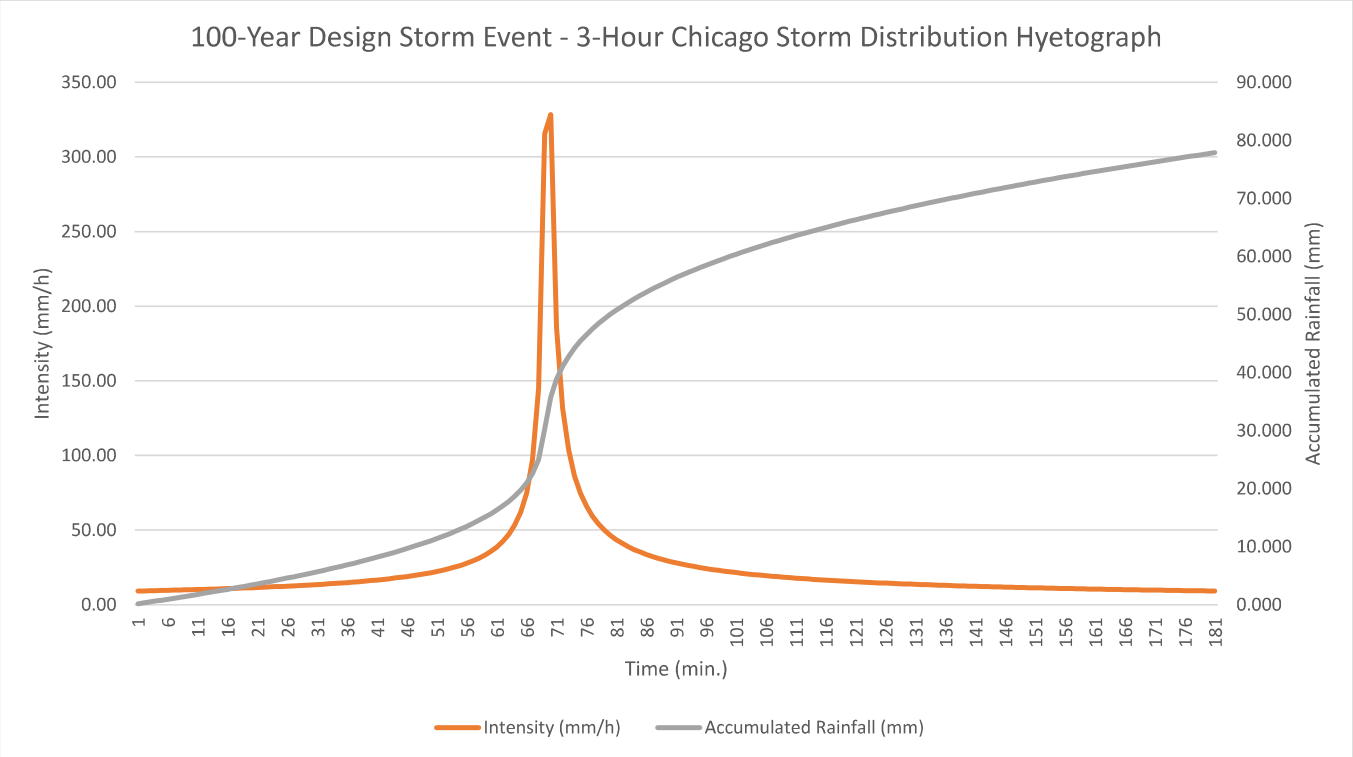
After the peak:

$$i_a = \frac{A[((1-c)t_a/(1-r)) + B]}{[t_a/(1-r) + B]^{1+c}}$$

Storm Parameters

Rainfall Duration=	3:00	hours
Rainfall Duration=	180	minutes
Starting Time=	0:00	
Time Step=	0:01	
r=	0.38	
t_d=	1.0	

t_d*r=	0.38	
t_d*(1-r)=	0.62	
i_p=	438.6	Peak Rainfall Intensity (mm/h)
t_b=	68.4	Time Before Peak (min.)
t_a=	111.6	Time After Peak (min.)
Total Rainfall Depth=	77.86	mm



100-Year Design Storm Event - 3-Hour Chicago Storm Distribution Hyetograph

t_b OR t_a	Time (min.)	Time (h:m)	Intensity (mm/h)	Rainfall Depth (mm)	Accumulated Rainfall (mm)
68.4	0	0:00	9.16	0.153	0.153
67.4	1	0:01	9.25	0.154	0.307
66.4	2	0:02	9.34	0.156	0.462
65.4	3	0:03	9.43	0.157	0.620
64.4	4	0:04	9.53	0.159	0.778
63.4	5	0:05	9.63	0.161	0.939
62.4	6	0:06	9.73	0.162	1.101
61.4	7	0:07	9.84	0.164	1.265
60.4	8	0:08	9.95	0.166	1.431
59.4	9	0:09	10.06	0.168	1.599
58.4	10	0:10	10.17	0.170	1.768
57.4	11	0:11	10.29	0.172	1.940
56.4	12	0:12	10.41	0.174	2.113
55.4	13	0:13	10.54	0.176	2.289
54.4	14	0:14	10.67	0.178	2.467
53.4	15	0:15	10.80	0.180	2.647
52.4	16	0:16	10.94	0.182	2.829
51.4	17	0:17	11.08	0.185	3.014
50.4	18	0:18	11.23	0.187	3.201
49.4	19	0:19	11.38	0.190	3.391
48.4	20	0:20	11.54	0.192	3.583
47.4	21	0:21	11.70	0.195	3.778
46.4	22	0:22	11.87	0.198	3.976
45.4	23	0:23	12.05	0.201	4.177
44.4	24	0:24	12.23	0.204	4.381
43.4	25	0:25	12.42	0.207	4.587
42.4	26	0:26	12.61	0.210	4.798
41.4	27	0:27	12.82	0.214	5.011
40.4	28	0:28	13.03	0.217	5.228
39.4	29	0:29	13.25	0.221	5.449
38.4	30	0:30	13.48	0.225	5.674
37.4	31	0:31	13.72	0.229	5.903
36.4	32	0:32	13.98	0.233	6.136
35.4	33	0:33	14.24	0.237	6.373
34.4	34	0:34	14.52	0.242	6.615
33.4	35	0:35	14.81	0.247	6.862
32.4	36	0:36	15.12	0.252	7.114
31.4	37	0:37	15.45	0.257	7.371
30.4	38	0:38	15.79	0.263	7.635
29.4	39	0:39	16.15	0.269	7.904
28.4	40	0:40	16.54	0.276	8.179
27.4	41	0:41	16.94	0.282	8.462
26.4	42	0:42	17.38	0.290	8.752
25.4	43	0:43	17.84	0.297	9.049
24.4	44	0:44	18.34	0.306	9.355
23.4	45	0:45	18.87	0.315	9.669
22.4	46	0:46	19.44	0.324	9.993
21.4	47	0:47	20.06	0.334	10.327
20.4	48	0:48	20.73	0.346	10.673
19.4	49	0:49	21.46	0.358	11.031
18.4	50	0:50	22.26	0.371	11.402
17.4	51	0:51	23.13	0.386	11.787
16.4	52	0:52	24.10	0.402	12.189

15.4	53	0:53	25.18	0.420	12.609
14.4	54	0:54	26.38	0.440	13.048
13.4	55	0:55	27.74	0.462	13.511
12.4	56	0:56	29.29	0.488	13.999
11.4	57	0:57	31.08	0.518	14.517
10.4	58	0:58	33.16	0.553	15.070
9.4	59	0:59	35.63	0.594	15.664
8.4	60	1:00	38.62	0.644	16.307
7.4	61	1:01	42.30	0.705	17.012
6.4	62	1:02	47.00	0.783	17.796
5.4	63	1:03	53.21	0.887	18.682
4.4	64	1:04	61.89	1.032	19.714
3.4	65	1:05	74.99	1.250	20.964
2.4	66	1:06	97.33	1.622	22.586
1.4	67	1:07	144.85	2.414	25.000
0.4	68	1:08	315.49	5.258	30.258
0.6	69	1:09	328.45	5.474	35.733
1.6	70	1:10	185.87	3.098	38.830
2.6	71	1:11	131.86	2.198	41.028
3.6	72	1:12	103.64	1.727	42.755
4.6	73	1:13	86.27	1.438	44.193
5.6	74	1:14	74.46	1.241	45.434
6.6	75	1:15	65.88	1.098	46.532
7.6	76	1:16	59.33	0.989	47.521
8.6	77	1:17	54.17	0.903	48.424
9.6	78	1:18	49.97	0.833	49.257
10.6	79	1:19	46.49	0.775	50.032
11.6	80	1:20	43.55	0.726	50.757
12.6	81	1:21	41.02	0.684	51.441
13.6	82	1:22	38.83	0.647	52.088
14.6	83	1:23	36.91	0.615	52.703
15.6	84	1:24	35.21	0.587	53.290
16.6	85	1:25	33.68	0.561	53.852
17.6	86	1:26	32.32	0.539	54.390
18.6	87	1:27	31.08	0.518	54.908
19.6	88	1:28	29.95	0.499	55.407
20.6	89	1:29	28.93	0.482	55.890
21.6	90	1:30	27.98	0.466	56.356
22.6	91	1:31	27.11	0.452	56.808
23.6	92	1:32	26.30	0.438	57.246
24.6	93	1:33	25.55	0.426	57.672
25.6	94	1:34	24.85	0.414	58.086
26.6	95	1:35	24.20	0.403	58.489
27.6	96	1:36	23.59	0.393	58.883
28.6	97	1:37	23.02	0.384	59.266
29.6	98	1:38	22.48	0.375	59.641
30.6	99	1:39	21.97	0.366	60.007
31.6	100	1:40	21.49	0.358	60.365
32.6	101	1:41	21.03	0.350	60.716
33.6	102	1:42	20.60	0.343	61.059
34.6	103	1:43	20.19	0.336	61.395
35.6	104	1:44	19.80	0.330	61.725
36.6	105	1:45	19.42	0.324	62.049
37.6	106	1:46	19.07	0.318	62.367
38.6	107	1:47	18.73	0.312	62.679
39.6	108	1:48	18.40	0.307	62.986
40.6	109	1:49	18.09	0.302	63.287

41.6	110	1:50	17.80	0.297	63.584
42.6	111	1:51	17.51	0.292	63.876
43.6	112	1:52	17.24	0.287	64.163
44.6	113	1:53	16.97	0.283	64.446
45.6	114	1:54	16.72	0.279	64.724
46.6	115	1:55	16.47	0.275	64.999
47.6	116	1:56	16.24	0.271	65.270
48.6	117	1:57	16.01	0.267	65.536
49.6	118	1:58	15.79	0.263	65.800
50.6	119	1:59	15.58	0.260	66.059
51.6	120	2:00	15.37	0.256	66.315
52.6	121	2:01	15.17	0.253	66.568
53.6	122	2:02	14.98	0.250	66.818
54.6	123	2:03	14.79	0.247	67.065
55.6	124	2:04	14.61	0.244	67.308
56.6	125	2:05	14.44	0.241	67.549
57.6	126	2:06	14.27	0.238	67.787
58.6	127	2:07	14.10	0.235	68.022
59.6	128	2:08	13.94	0.232	68.254
60.6	129	2:09	13.79	0.230	68.484
61.6	130	2:10	13.64	0.227	68.711
62.6	131	2:11	13.49	0.225	68.936
63.6	132	2:12	13.35	0.222	69.158
64.6	133	2:13	13.21	0.220	69.379
65.6	134	2:14	13.07	0.218	69.596
66.6	135	2:15	12.94	0.216	69.812
67.6	136	2:16	12.81	0.213	70.026
68.6	137	2:17	12.68	0.211	70.237
69.6	138	2:18	12.56	0.209	70.446
70.6	139	2:19	12.44	0.207	70.654
71.6	140	2:20	12.32	0.205	70.859
72.6	141	2:21	12.21	0.203	71.062
73.6	142	2:22	12.10	0.202	71.264
74.6	143	2:23	11.99	0.200	71.464
75.6	144	2:24	11.88	0.198	71.662
76.6	145	2:25	11.78	0.196	71.858
77.6	146	2:26	11.68	0.195	72.053
78.6	147	2:27	11.58	0.193	72.246
79.6	148	2:28	11.48	0.191	72.437
80.6	149	2:29	11.38	0.190	72.627
81.6	150	2:30	11.29	0.188	72.815
82.6	151	2:31	11.20	0.187	73.001
83.6	152	2:32	11.11	0.185	73.187
84.6	153	2:33	11.02	0.184	73.370
85.6	154	2:34	10.93	0.182	73.552
86.6	155	2:35	10.85	0.181	73.733
87.6	156	2:36	10.76	0.179	73.913
88.6	157	2:37	10.68	0.178	74.091
89.6	158	2:38	10.60	0.177	74.267
90.6	159	2:39	10.52	0.175	74.443
91.6	160	2:40	10.45	0.174	74.617
92.6	161	2:41	10.37	0.173	74.790
93.6	162	2:42	10.30	0.172	74.961
94.6	163	2:43	10.22	0.170	75.132
95.6	164	2:44	10.15	0.169	75.301
96.6	165	2:45	10.08	0.168	75.469
97.6	166	2:46	10.01	0.167	75.636

98.6	167	2:47	9.94	0.166	75.802
99.6	168	2:48	9.88	0.165	75.966
100.6	169	2:49	9.81	0.164	76.130
101.6	170	2:50	9.75	0.162	76.292
102.6	171	2:51	9.68	0.161	76.454
103.6	172	2:52	9.62	0.160	76.614
104.6	173	2:53	9.56	0.159	76.773
105.6	174	2:54	9.50	0.158	76.932
106.6	175	2:55	9.44	0.157	77.089
107.6	176	2:56	9.38	0.156	77.245
108.6	177	2:57	9.32	0.155	77.401
109.6	178	2:58	9.27	0.154	77.555
110.6	179	2:59	9.21	0.154	77.709
111.6	180	3:00	9.16	0.153	77.861

Appendix D

Infiltration Gallery Modelling Output

25mm Post Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	25mm3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.010	25.003
Evaporation Loss	0.000	0.000
Infiltration Loss	0.002	4.140
Surface Runoff	0.008	18.640
Final Surface Storage	0.001	2.243
Continuity Error (%)	-0.078	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.008	0.076
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.000	0.002
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 (%)	97.287	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	8.33439
Impervious Rainfall Intensity (mm/hr):	8.33439
Slope (%):	15.00000
Computed TOC (minutes):	15.75

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	8.33439
Impervious Rainfall Intensity (mm/hr):	8.33439
Slope (%):	2.50000
Computed TOC (minutes):	30.66

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 hh:mm:ss

201	25.00	0.00	0.00	18.28	5.30	3.17	0.212	0	00:15:44
202	25.00	0.00	0.00	2.65	20.05	77.11	0.802	0	00:30:39

****
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
ST-CBMH1	0.06	0.36	217.09	0	03:00	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.33	0.94	217.09	0	03:02	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	77.10	77.10	0	01:10	0.00		
201Out	OUTFALL	3.16	3.16	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	0.00	0	00:00	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	89.70	0	01:12	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.058	93	0	03:02	0.020	32	3.76	0.05	3:02:00	0.075
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	3.66	0.32	3.16
OrificeOut	0.00	0.00	0.00
WeirOut	0.00	0.00	0.00
System	1.22	0.32	3.16

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:12	2.38	29.22	89.70	140.32	0.64	1.00	179	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	00:00			0.00			0.00		
Weir-01	WEIR	0	00:00			0.00			0.00		

****
Flow Classification Summary
****

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.02	0.00	0.00	0.34	0.00	0.00	0.64	0.04	0.0005
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    30.00 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 13:50:58 2023
Analysis ended on:  Tue May  9 13:51:02 2023
Total elapsed time: 00:00:04
```

Appendix E

Pre-Development Stormwater Management Modelling Output

2-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

```
********************
Project Description
********************
File Name ................. GE22-0224-2-CIV-PreDevelopment.SPF


****************
Analysis Options
****************
Flow Units ................. LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ....... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date ............. NOV-15-2022 00:00:00
Ending Date ............... NOV-15-2022 03:00:00
Antecedent Dry Days ....... 0.0
Report Time Step .......... 00:01:00
Wet Time Step ............. 00:01:00
Dry Time Step ............. 01:00:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 1
Number of nodes ........... 1
Number of links ........... 0
Number of pollutants ...... 0
Number of land uses ....... 0


****************
Raingage Summary
****************
Gage                Data                Data       Recording
ID                  Source              Type        Interval
                                                          min
------------------------------------------------------------
Rain Gage-01        2yr3hr              INTENSITY       1.00


****************
Subbasin Summary
****************
Subbasin                 Total     Equiv.   Imperv.   Average    Raingage
                          Area      Width     Area      Slope
ID                     hectares         m        %          %
-------------------------------------------------------------------------
Sub-01                     0.41     30.00     54.00    2.6500    Rain Gage-01


************
Node Summary
************
Node                Element             Invert    Maximum    Ponded     External
ID                  Type             Elevation     Elev.      Area       Inflow
                                             m         m        m²
-------------------------------------------------------------------------------
Out-01              OUTFALL               0.00      0.00      0.00


*************************        Volume         Depth
```

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.013	32.484
Evaporation Loss	0.000	0.000
Infiltration Loss	0.004	10.292
Surface Runoff	0.008	18.379
Final Surface Storage	0.002	3.846
Continuity Error (%)	-0.101	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.008	0.075
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.008	0.075
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 (%)	0.000	

Composite Curve Number Computations Report

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	10.82817
Impervious Rainfall Intensity (mm/hr):	10.82817
Slope (%):	2.65000

Computed TOC (minutes): 55.49

****
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 hh:mm:ss
Sub-01	32.48	0.00	0.00	10.29	18.38	53.61	0.566	0 00:55:29

Analysis began on: Tue Nov 15 12:27:28 2022
Analysis ended on: Tue Nov 15 12:27:29 2022
Total elapsed time: 00:00:01

5-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

****
Project Description
****
File Name GE22-0224-2-CIV-PreDevelopment.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date NOV-15-2022 00:00:00
Ending Date NOV-15-2022 03:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	5yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-01	0.41	30.00	54.00	2.6500	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
Out-01	OUTFALL	0.00	0.00	0.00	

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.020	49.194
Evaporation Loss	0.000	0.000
Infiltration Loss	0.006	13.436
Surface Runoff	0.013	30.605
Final Surface Storage	0.002	5.218
Continuity Error (%)	-0.130	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.013	0.125
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.013	0.125
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 (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

****
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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	16.39811
Impervious Rainfall Intensity (mm/hr):	16.39811
Slope (%):	2.65000
Computed TOC (minutes):	47.00

****
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
Sub-01	49.19	0.00	0.00	13.44	30.60	79.54	0.622	0	00:46:59

Analysis began on: Tue Nov 22 12:49:00 2022
Analysis ended on: Tue Nov 22 12:49:01 2022
Total elapsed time: 00:00:01

10-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

****
Project Description
****
File Name GE22-0224-2-CIV-PreDevelopment.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date NOV-15-2022 00:00:00
Ending Date NOV-15-2022 03:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-01	0.41	30.00	54.00	2.6500	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
Out-01	OUTFALL	0.00	0.00	0.00	

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.024	59.161
Evaporation Loss	0.000	0.000
Infiltration Loss	0.006	14.929
Surface Runoff	0.016	38.445
Final Surface Storage	0.002	5.868
Continuity Error (%)	-0.136	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.016	0.157
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.016	0.157
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 (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

****
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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	19.72017
Impervious Rainfall Intensity (mm/hr):	19.72017
Slope (%):	2.65000
Computed TOC (minutes):	43.65

****
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
Sub-01	59.16	0.00	0.00	14.93	38.44	96.54	0.650	0	00:43:39

Analysis began on: Tue Nov 22 12:50:17 2022
Analysis ended on: Tue Nov 22 12:50:17 2022
Total elapsed time: < 1 sec

25-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

****
Project Description
****
File Name GE22-0224-2-CIV-PreDevelopment.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date NOV-15-2022 00:00:00
Ending Date NOV-15-2022 03:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	25yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-01	0.41	30.00	54.00	2.6500	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
Out-01	OUTFALL	0.00	0.00	0.00	

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.029	71.183
Evaporation Loss	0.000	0.000
Infiltration Loss	0.007	16.453
Surface Runoff	0.020	48.214
Final Surface Storage	0.003	6.621
Continuity Error (%)	-0.148	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.020	0.197
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.020	0.197
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 (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

****
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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	23.72767
Impervious Rainfall Intensity (mm/hr):	23.72767
Slope (%):	2.65000
Computed TOC (minutes):	40.54

****
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
Sub-01	71.18	0.00	0.00	16.45	48.21	121.77	0.677	0	00:40:32

Analysis began on: Tue Nov 22 12:52:26 2022
Analysis ended on: Tue Nov 22 12:52:27 2022
Total elapsed time: 00:00:01

50-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

****
Project Description
****
File Name GE22-0224-2-CIV-PreDevelopment.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date NOV-15-2022 00:00:00
Ending Date NOV-15-2022 03:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	50yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-01	0.41	30.00	54.00	2.6500	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
Out-01	OUTFALL	0.00	0.00	0.00	

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.033	80.940
Evaporation Loss	0.000	0.000
Infiltration Loss	0.007	17.514
Surface Runoff	0.023	56.352
Final Surface Storage	0.003	7.200
Continuity Error (%)	-0.155	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.023	0.230
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.023	0.230
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 (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

****
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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	26.97989
Impervious Rainfall Intensity (mm/hr):	26.97989
Slope (%):	2.65000
Computed TOC (minutes):	38.51

****
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
Sub-01	80.94	0.00	0.00	17.51	56.35	141.36	0.696	0	00:38:30

Analysis began on: Tue Nov 22 12:54:01 2022
Analysis ended on: Tue Nov 22 12:54:02 2022
Total elapsed time: 00:00:01

100-Year Pre-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.255 (Build 0)

****
Project Description
****
File Name GE22-0224-2-CIV-PreDevelopment.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Storage Node Exfiltration.. None
Starting Date NOV-15-2022 00:00:00
Ending Date NOV-15-2022 03:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00

****
Element Count
****
Number of rain gages 1
Number of subbasins 1
Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area hectares	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
Sub-01	0.41	30.00	54.00	2.6500	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
Out-01	OUTFALL	0.00	0.00	0.00	

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.032	77.860
Evaporation Loss	0.000	0.000
Infiltration Loss	0.007	17.194
Surface Runoff	0.022	54.095
Final Surface Storage	0.003	6.687
Continuity Error (%)	-0.149	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.022	0.221
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.022	0.221
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 (%)	0.000	

Composite Curve Number Computations Report

Subbasin Sub-01

Soil/Surface Description	Area (ha)	Soil Group	CN
Paved parking & roofs	0.01	B	98.00
Paved parking & roofs	0.07	B	98.00
Gravel roads	0.17	B	85.00
> 75% grass cover, Good	0.16	B	61.00
Composite Area & Weighted CN	0.41		77.94

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 Sub-01

Flow length (m):	136.67
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01800
Pervious Rainfall Intensity (mm/hr):	25.95344
Impervious Rainfall Intensity (mm/hr):	25.95344
Slope (%):	2.65000

Computed TOC (minutes): 39.11

****
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 hh:mm:ss
Sub-01	77.86	0.00	0.00	17.19	54.10	155.54	0.695	0 00:39:06

Analysis began on: Tue Nov 15 12:29:44 2022
Analysis ended on: Tue Nov 15 12:29:45 2022
Total elapsed time: 00:00:01

Appendix F

Post-Development Stormwater Management Modelling Output

2-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	2yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.013	32.485
Evaporation Loss	0.000	0.000
Infiltration Loss	0.002	4.915
Surface Runoff	0.010	25.344
Final Surface Storage	0.001	2.242
Continuity Error (%)	-0.051	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.010	0.104
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.002	0.022
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 (%)	78.910	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	10.82817
Impervious Rainfall Intensity (mm/hr):	10.82817
Slope (%):	15.00000
Computed TOC (minutes):	14.18

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	10.82817
Impervious Rainfall Intensity (mm/hr):	10.82817
Slope (%):	2.50000
Computed TOC (minutes):	27.61

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 hh:mm:ss

201	32.48	0.00	0.00	22.69	8.38	3.23	0.258	0	00:14:10
202	32.48	0.00	0.00	3.04	27.13	81.24	0.835	0	00:27:36

****
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
ST-CBMH1	0.08	0.49	217.22	0	01:52	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.37	1.07	217.22	0	01:51	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	81.24	81.24	0	01:10	0.00		
201Out	OUTFALL	3.23	3.23	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	6.31	0	01:52	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	93.18	0	01:12	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:51	0.023	37	1.30	0.06	1:53:00	0.083
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	5.50	0.34	3.23
OrificeOut	3.66	2.94	6.31
WeirOut	0.00	0.00	0.00
System	3.05	3.28	6.53

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:12	2.40	29.22	93.18	140.32	0.66	1.00	331	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	01:52			6.31			0.31		
Weir-01	WEIR	0	00:00			0.00			0.00		

****
Flow Classification Summary
****

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.01	0.00	0.00	0.39	0.00	0.00	0.60	0.04	0.0004
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    14.07 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.00


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Thu May 11 11:44:12 2023
Analysis ended on:  Thu May 11 11:44:15 2023
Total elapsed time: 00:00:03
```

5-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	5yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.020	49.194
Evaporation Loss	0.000	0.000
Infiltration Loss	0.002	6.112
Surface Runoff	0.017	40.870
Final Surface Storage	0.001	2.240
Continuity Error (%)	-0.056	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.017	0.167
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.008	0.082
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 (%)	50.819	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	16.39811
Impervious Rainfall Intensity (mm/hr):	16.39811
Slope (%):	15.00000
Computed TOC (minutes):	12.01

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	16.39811
Impervious Rainfall Intensity (mm/hr):	16.39811
Slope (%):	2.50000
Computed TOC (minutes):	23.39

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 hh:mm:ss

201	49.19	0.00	0.00	29.88	17.92	4.61	0.364	0	00:12:00
202	49.19	0.00	0.00	3.60	43.29	121.03	0.880	0	00:23:23

****
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
ST-CBMH1	0.08	0.63	217.36	0	01:22	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.38	1.22	217.37	0	01:21	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	120.98	120.98	0	01:10	0.00		
201Out	OUTFALL	4.59	4.59	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	33.95	0	01:22	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	131.04	0	01:11	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:21	0.023	37	6.91	0.07	1:20:00	0.084
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	6.09	0.66	4.59
OrificeOut	4.86	8.95	33.95
WeirOut	0.00	0.00	0.00
System	3.65	9.62	35.12

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:11	2.22	29.22	131.04	140.32	0.93	1.00	352	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	01:22			33.95			0.95		
Weir-01	WEIR	0	00:00			0.00			0.00		

****
Flow Classification Summary
****

Link	--- Fraction of Time in Flow Class ---- Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.01	0.00	0.00	0.39	0.00	0.00	0.60	0.05	0.0004
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    29.66 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 13:49:57 2023
Analysis ended on:  Tue May  9 13:50:04 2023
Total elapsed time: 00:00:07
```

10-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	10yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.024	59.161
Evaporation Loss	0.000	0.000
Infiltration Loss	0.003	6.666
Surface Runoff	0.021	50.288
Final Surface Storage	0.001	2.240
Continuity Error (%)	-0.057	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.021	0.206
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.012	0.121
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 (%)	41.322	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	19.72017
Impervious Rainfall Intensity (mm/hr):	19.72017
Slope (%):	15.00000
Computed TOC (minutes):	11.16

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	19.72017
Impervious Rainfall Intensity (mm/hr):	19.72017
Slope (%):	2.50000
Computed TOC (minutes):	21.72

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 hh:mm:ss

201	59.16	0.00	0.00	33.46	24.31	5.35	0.411	0	00:11:09
202	59.16	0.00	0.00	3.84	53.03	145.77	0.896	0	00:21:43

****
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
ST-CBMH1	0.09	0.84	217.57	0	01:17	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.38	1.44	217.59	0	01:16	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	145.70	145.70	0	01:10	0.00		
201Out	OUTFALL	5.34	5.34	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	60.60	0	01:17	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	151.15	0	01:10	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:16	0.024	38	3.78	0.07	1:16:00	0.085
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	6.27	0.89	5.34
OrificeOut	5.03	12.78	60.60
WeirOut	0.00	0.00	0.00
System	3.77	13.67	62.78

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:10	2.15	29.22	151.15	140.32	1.08	1.00	356	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	01:17			60.60			1.00		
Weir-01	WEIR	0	00:00			0.00			0.00		

****
Flow Classification Summary
****

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.01	0.00	0.00	0.39	0.00	0.00	0.60	0.05	0.0004
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    17.80 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 13:49:08 2023
Analysis ended on:  Tue May  9 13:49:13 2023
Total elapsed time: 00:00:05
```

25-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	25yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.029	71.183
Evaporation Loss	0.000	0.000
Infiltration Loss	0.003	7.235
Surface Runoff	0.025	61.757
Final Surface Storage	0.001	2.237
Continuity Error (%)	-0.064	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.025	0.253
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.017	0.172
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 (%)	31.718	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	23.72767
Impervious Rainfall Intensity (mm/hr):	23.72767
Slope (%):	15.00000
Computed TOC (minutes):	10.36

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	23.72767
Impervious Rainfall Intensity (mm/hr):	23.72767
Slope (%):	2.50000
Computed TOC (minutes):	20.17

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 hh:mm:ss

201	71.18	0.00	0.00	37.27	32.54	7.19	0.457	0	00:10:21
202	71.18	0.00	0.00	4.06	64.84	183.11	0.911	0	00:20:10

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
ST-CBMH1	0.09	1.31	218.04	0	01:13	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.39	1.93	218.08	0	01:14	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	183.10	183.10	0	01:10	0.00		
201Out	OUTFALL	7.19	7.19	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	96.09	0	01:15	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	161.98	0	01:10	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

Storage Node Summary

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:14	0.024	38	9.86	0.07	1:13:00	0.085
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

Outfall Loading Summary

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	6.39	1.15	7.19
OrificeOut	5.24	17.63	96.09
WeirOut	0.00	0.00	0.00
System	3.88	18.78	100.02

Link Flow Summary

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:10	2.29	29.22	161.98	140.32	1.15	1.00	362	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	01:15			96.09			1.00		
Weir-01	WEIR	0	00:00			0.00			0.00		

Flow Classification Summary

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.01	0.00	0.00	0.39	0.00	0.00	0.60	0.05	0.0005
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    29.49 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 13:48:23 2023
Analysis ended on:  Tue May  9 13:48:27 2023
Total elapsed time: 00:00:04
```

50-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	50yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.033	80.940
Evaporation Loss	0.000	0.000
Infiltration Loss	0.003	7.625
Surface Runoff	0.029	71.128
Final Surface Storage	0.001	2.242
Continuity Error (%)	-0.068	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.029	0.291
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.021	0.207
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 (%)	28.963	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	26.97989
Impervious Rainfall Intensity (mm/hr):	26.97989
Slope (%):	15.00000
Computed TOC (minutes):	9.84

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	26.97989
Impervious Rainfall Intensity (mm/hr):	26.97989
Slope (%):	2.50000
Computed TOC (minutes):	19.16

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 hh:mm:ss

201	80.94	0.00	0.00	39.97	39.56	9.08	0.489	0	00:09:50
202	80.94	0.00	0.00	4.21	74.46	211.75	0.920	0	00:19:09

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
ST-CBMH1	0.09	1.59	218.32	0	01:14	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.39	2.22	218.37	0	01:14	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	00:00	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
ST-CBMH1	JUNCTION	211.57	211.57	0	01:10	0.00		
201Out	OUTFALL	9.06	9.06	0	01:10	0.00		
OrificeOut	OUTFALL	0.00	112.28	0	01:14	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	148.95	0	01:10	0.00		
ParkingLotPonding	STORAGE	0.00	0.00	0	00:00	0.00		

Storage Node Summary

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:14	0.024	38	13.17	0.07	1:13:00	0.085
ParkingLotPonding	0.000	0	0	00:00	0.000	0	0.00	0.00	0:00:00	0.000

Outfall Loading Summary

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	6.49	1.38	9.06
OrificeOut	5.31	20.83	112.28
WeirOut	0.00	0.00	0.00
System	3.93	22.20	117.33

Link Flow Summary

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:10	2.11	29.22	148.95	140.32	1.06	1.00	365	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	00:00	0.00	62.92	0.00	114.39	0.00	0.00	0	Calculated
Orifice-01	ORIFICE	0	01:14			112.28			1.00		
Weir-01	WEIR	0	00:00			0.00			0.00		

Flow Classification Summary

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.00	0.00	0.00	0.39	0.00	0.00	0.60	0.05	0.0004
CBMH1-PLotPond	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000

```
**************************
Time-Step Critical Elements
**************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    30.00 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.01


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 13:46:33 2023
Analysis ended on:  Tue May  9 13:46:38 2023
Total elapsed time: 00:00:05
```

100-Year Post-Development

Autodesk® Storm and Sanitary Analysis 2016 - Version 13.5.302 (Build 0)

****
Project Description
****
File Name ..... GE22-0224-2-CIV-PostDevelopment - Infiltration 2023-05-08.SPF

****
Analysis Options
****
Flow Units ..... LPS
Subbasin Hydrograph Method. EPA SWMM
Infiltration Method ..... SCS Curve Number
Link Routing Method ..... Hydrodynamic
Storage Node Exfiltration.. Constant rate, wetted area
Starting Date NOV-10-2022 00:00:00
Ending Date NOV-12-2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 01:00:00
Routing Time Step ..... 30.00 sec

****
Element Count
****
Number of rain gages 1
Number of subbasins 2
Number of nodes 6
Number of links 4
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Recording Interval min
Rain Gage-01	100yr3hr	INTENSITY	1.00

****
Subbasin Summary
****

Subbasin ID	Total Area m²	Equiv. Width m	Imperv. Area %	Average Slope %	Raingage
201	390.50	19.53	23.00	15.0000	Rain Gage-01
202	3699.36	49.32	86.00	2.5000	Rain Gage-01

****
Node Summary
****

Node ID	Element Type	Invert Elevation m	Maximum Elev. m	Ponded Area m²	External Inflow
ST-CBMH1	JUNCTION	216.73	218.69	0.00	
201Out	OUTFALL	217.68	217.68	0.00	
OrificeOut	OUTFALL	216.41	217.05	0.00	
WeirOut	OUTFALL	217.76	217.92	0.00	
Infiltration	STORAGE	216.15	218.50	0.00	
ParkingLotPonding	STORAGE	218.39	218.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length m	Slope %	Manning's Roughness
CBMH1-Infil	ST-CBMH1	Infiltration	CONDUIT	3.8	2.1053	0.0130
CBMH1-PLotPond	ST-CBMH1	ParkingLotPonding	CHANNEL	1.0	0.0305	0.0150
Orifice-01	ST-CBMH1	OrificeOut	ORIFICE			
Weir-01	ParkingLotPonding	WeirOut	WEIR			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter m	Width m	No. of Barrels	Cross Sectional Area m²	Full Flow Hydraulic Radius m	Design Flow Capacity LPS
CBMH1-Infil	CIRCULAR	0.30	0.30	1	0.07	0.07	140.32
CBMH1-PLotPond	RECT_OPEN	0.30	1.00	1	0.30	0.19	114.39

********** Volume Depth

Runoff Quantity Continuity	hectare-m	mm
Total Precipitation	0.032	77.860
Evaporation Loss	0.000	0.000
Infiltration Loss	0.003	7.485
Surface Runoff	0.028	68.203
Final Surface Storage	0.001	2.238
Continuity Error (%)	-0.084	

Flow Routing Continuity	Volume hectare-m	Volume Mliters
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.028	0.279
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.020	0.198
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 (%)	29.055	

Composite Curve Number Computations Report

Subbasin 201

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	90.40	B	98.00
> 75% grass cover, Good	300.10	B	61.00
Composite Area & Weighted CN	390.50		69.57

Subbasin 202

Soil/Surface Description	Area (m²)	Soil Group	CN
Paved parking & roofs	1012.72	B	98.00
Gravel roads	2519.38	B	85.00
> 75% grass cover, Good	167.26	B	61.00
Composite Area & Weighted CN	3699.36		87.47

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 201

Flow length (m):	19.99
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01500
Pervious Rainfall Intensity (mm/hr):	25.95344
Impervious Rainfall Intensity (mm/hr):	25.95344
Slope (%):	15.00000
Computed TOC (minutes):	10.00

Subbasin 202

Flow length (m):	75.01
Pervious Manning's Roughness:	0.40000
Impervious Manning's Roughness:	0.01600
Pervious Rainfall Intensity (mm/hr):	25.95344
Impervious Rainfall Intensity (mm/hr):	25.95344
Slope (%):	2.50000
Computed TOC (minutes):	19.46

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 hh:mm:ss

201	77.86	0.00	0.00	39.07	37.42	9.72	0.481	0	00:09:59
202	77.86	0.00	0.00	4.15	71.45	233.43	0.918	0	00:19:27

****
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
ST-CBMH1	0.09	1.66	218.39	0	01:14	0	0	0:00:00
201Out	0.00	0.00	217.68	0	00:00	0	0	0:00:00
OrificeOut	0.00	0.00	216.41	0	00:00	0	0	0:00:00
WeirOut	0.00	0.00	217.76	0	00:00	0	0	0:00:00
Infiltration	0.39	2.30	218.45	0	01:13	0	0	0:00:00
ParkingLotPonding	0.00	0.00	218.39	0	01:18	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
ST-CBMH1	JUNCTION	232.77	232.77	0	01:09	0.00		
201Out	OUTFALL	9.70	9.70	0	01:09	0.00		
OrificeOut	OUTFALL	0.00	116.15	0	01:14	0.00		
WeirOut	OUTFALL	0.00	0.00	0	00:00	0.00		
Infiltration	STORAGE	0.00	165.89	0	01:09	0.00		
ParkingLotPonding	STORAGE	0.00	0.06	0	01:14	0.00		

****
Storage Node Summary
****

Storage Node ID	Maximum Ponded Volume 1000 m³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume 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
Infiltration	0.063	100	0	01:13	0.024	38	14.83	0.07	1:12:00	0.085
ParkingLotPonding	0.000	0	0	01:18	0.000	0	0.00	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow LPS	Peak Inflow LPS
201Out	6.44	1.31	9.70
OrificeOut	5.26	20.16	116.15
WeirOut	0.00	0.00	0.00
System	3.90	21.48	121.43

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence 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 Time Surcharged minutes	Reported Condition
CBMH1-Infil	CONDUIT	0	01:09	2.35	29.22	165.89	140.32	1.18	1.00	363	SURCHARGED
CBMH1-PLotPond	CHANNEL	0	01:14	0.00	62.92	0.06	114.39	0.00	0.01	0	Calculated
Orifice-01	ORIFICE	0	01:14			116.15			1.00		
Weir-01	WEIR	0	00:00			0.00			0.00		

****
Flow Classification Summary
****

Link	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Avg. Froude Number	Avg. Flow Change
CBMH1-Infil	0.01	0.00	0.00	0.39	0.00	0.00	0.60	0.05	0.0005
CBMH1-PLotPond	0.03	0.00	0.00	0.00	0.00	0.97	0.00	0.03	0.0000

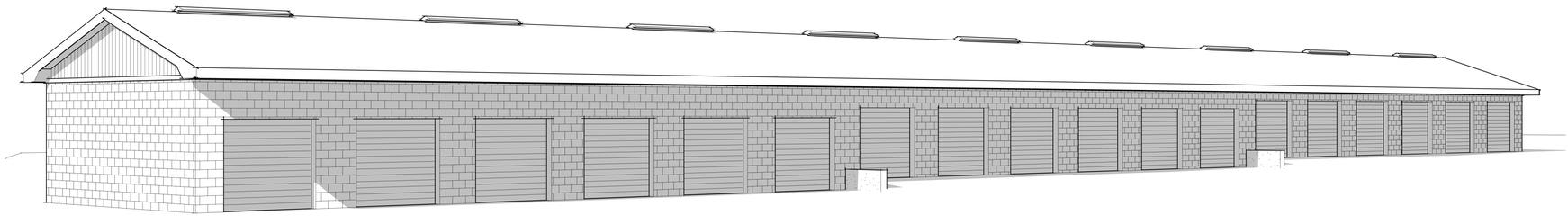
```
************************
Highest Continuity Errors
************************
Node ParkingLotPonding (-2.45%)


**************************
Time-Step Critical Elements
**************************
None


******************************
Highest Flow Instability Indexes
******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :    28.86 sec
Average Time Step           :    29.99 sec
Maximum Time Step           :    30.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     2.02


WARNING 117 : Conduit outlet invert elevation defined for Conduit CBMH1-PLotPond is below downstream node invert elevation.
              Assumed conduit outlet invert elevation equal to downstream node invert elevation.
WARNING 004 : Minimum elevation drop used for Conduit CBMH1-PLotPond.
WARNING 002 : Max/rim elevation (depth) increased to account for connecting conduit height dimensions for Node ST-CBMH1.

Analysis began on:  Tue May  9 10:00:56 2023
Analysis ended on:  Tue May  9 10:01:00 2023
Total elapsed time: 00:00:04
```

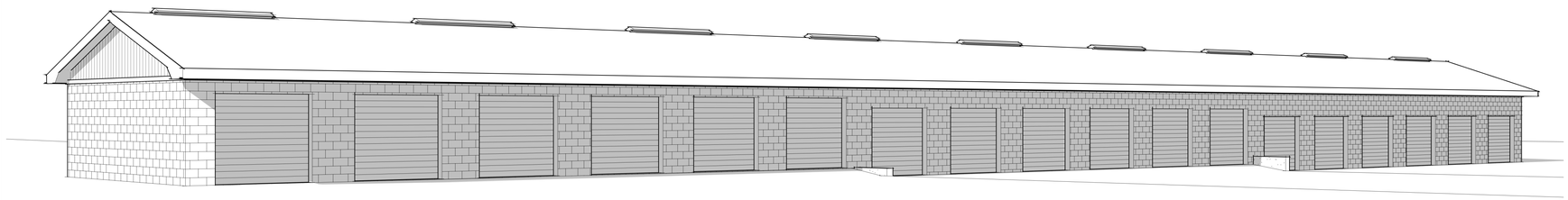
DRAWINGS PROVIDED FOR

J.C.M. CUSTOM HOMES

BANK STREET STORAGE UNITS

561 BANK STREET, SIMCOE ONTARIO





DESIGNLOGIX ENGINEERING

677 DUNDAS STREET
WOODSTOCK, ONTARIO, N4S 1E5

Name of Project:
BANK STREET STORAGE UNITS

Location:
561 BANK STREET, SIMCOE ONTARIO

ITEM	ONTARIO BUILDING CODE DATA MATRIX PARTS 3 or 9 STORAGE UNITS					Building Code Reference: References are to Division B unless noted [A] for Division A or [C] for Division C	
1.	PROJECT DESCRIPTION:	■ NEW □ ADDITION □ ALTERATION □ CHANGE OF USE		□ PART 11 11.1 to 11.4	■ PART 3 1.1.2. [A]	□ PART 9 1.1.2.[A] & 9.10.1.3.	
2.	MAJOR OCCUPANCY(S):	GROUP F-2			3.1.2.1.(1)	9.10.2	
3.	BUILDING AREA (m²)	EXISTING: -	NEW: 487.7	TOTAL: 487.7	1.4.1.2. [A]	1.4.1.2. [A]	
4.	GROSS AREA	EXISTING: -	NEW: 487.7	TOTAL: 487.7	1.4.1.2. [A]	1.4.1.2. [A]	
5.	NUMBER OF STOREYS	ABOVE GRADE: 1		BELOW GRADE: 0	1.4.1.2. [A] & 3.2.1.1.	1.4.1.2. [A] & 9.10.4.	
6.	NUMBER OF STREETS/FIRE FIGHTER ACCESS 2				3.2.2.10. & 3.2.5	9.10.20.	
7.	BUILDING CLASSIFICATION: 3.2.2.71.				3.2.2.71.	9.10.2.	
8.	SPRINKLER SYSTEM PROPOSED	□ ENTIRE BUILDING □ SELECTED COMPARTMENTS □ SELECTED FLOOR AREAS □ BASEMENT □ IN LIEU OF ROOF RATING ■ NOT REQUIRED			3.2.2.71. INDEX	9.10.8.2. INDEX	
9.	STANDPIPE REQUIRED	□ YES ■ NO			3.2.9	N/A	
10.	FIRE ALARM REQUIRED	□ YES ■ NO			3.2.4.	9.10.18.	
11.	WATER SERVICE/SUPPLY IS ADEQUATE	■ YES □ NO			3.2.5.7	N/A	
12.	HIGH BUILDING	□ YES ■ NO			3.2.6.	N/A	
13.	CONSTRUCTION RESTRICTIONS ACTUAL CONSTRUCTION	□ COMBUSTIBLE PERMITTED □ NON-COMBUSTIBLE REQUIRED ■ BOTH □ COMBUSTIBLE □ NON-COMBUSTIBLE ■ BOTH			3.2.2.71.	9.10.6	
14.	MEZZANINE(S) AREA m²	-			3.2.1.1.(3)-(8)	9.10.4.1	
15.	OCCUPANT LOAD BASED ON:	□ m²/PERSON ■ DESIGN OF BUILDING			3.1.17.	9.9.1.3	
	SELF-SERVICE STORAGE BUILDING	OCCUPANCY: -		LOAD: - PERSONS			
		OCCUPANCY: -		LOAD: - PERSONS			
		OCCUPANCY: -		LOAD: - PERSONS			
		OCCUPANCY: -		LOAD: - PERSONS			
16.	BARRIER FREE DESIGN	■ YES □ NO (EXPLAIN)			3.8	9.5.2	
17.	HAZARDOUS SUBSTANCES	□ YES ■ NO			3.3.1.2. & 3.3.1.19.	9.10.1.3 (4)	
18.	REQUIRED FIRE RESISTANCE RATING (F.R.R.)	HORIZONTAL ASSEMBLIES F.R.R. (HOURS)		LISTED DESIGN No. or DESCRIPTION (SB-2)	3.2.2.71.	9.10.8 9.10.9	
		FLOORS ¾ HOURS OR N.C.		-			
		ROOF - HOURS		-			
		MEZZANINE - HOURS		-			
		F.R.R. OF SUPPORTING MEMBERS		LISTED DESIGN No. or DESCRIPTION (SB-2)			
		FLOORS ¾ HOURS OR N.C.		-			
		ROOF - HOURS		-			
		MEZZANINE - HOURS		-			
19.	SPATIAL SEPARATION - CONSTRUCTION OF EXTERIOR WALLS				3.2.3. & 3.10.4.3.	9.10.14.	

WALL	AREA OF EBF (m2)	L.D. (m)	L/H or H/L	PERMITTED MAX. % OF OPENINGS	PROPOSED % OF OPENINGS	F.R.R. (HOURS)	LISTED DESIGN or DESCRIPTION	COMB. CONST.	COMB. CONSTR. NONC. CLADDING	NON-COMB. CONSTRUCTION
NORTH-1	65.03	6.46	10:1	36.40	32.00	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X
NORTH-2	57.79	6.46	10:1	39.13	36.01	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X
NORTH-3	52.19	6.46	10:1	41.62	39.87	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X
SOUTH-1	65.03	7.0	10:1	40.98	32.00	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X
SOUTH-2	57.79	7.0	10:1	44.10	36.01	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X
SOUTH-3	52.19	7.0	10:1	46.90	39.87	1HR.	8" 75% SOLID C.M.U. BLOCK		X	X

20. PLUMBING FIXTURE REQUIREMENTS - 3.10.2.7. FIXTURES PROVIDED IN OFFICE BUILDING

MALE/FEMALE COUNT @ 50% / 50%, EXCEPT AS NOTED OTHERWISE

	OCCUPANT LOAD	BC TABLE NUMBER	FIXTURES REQUIRED	FIXTURES PROVIDED	Building Code Reference ■ PART 3	□ PART 9
SELF-SERVICE OCCUPANCY	-	-				
STORAGE BLG.: OCCUPANCY	-	-	-	-	3.10.2.7.(2)	
	-	-			3.10.2.7.(2)	

21. NOTES: PORTABLE FIRE EXTINGUISHERS - (2012 OBC PART 3, DIV. B - 3.2.5.17.) PORTABLE FIRE EXTINGUISHERS MUST BE INSTALLED AS REQUIRED BY THE ONTARIO FIRE CODE/ONTARIO BUILDING CODE

SHEET SCHEDULE

DESIGNLOGIX ENGINEERING INC.
AGRICULTURE - COMMERCIAL - CIVIL
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E: office@dlxengineering.com

DO NOT SCALE DRAWINGS

ALL DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR AND ANY DISCREPENCIES REPORTED TO THE ENGINEER

PROJECT STATUS:

NO:	DATE:	STATUS:
2	NOV. 22, 2022	FOR APPROVAL
3	DEC. 7, 2022	FOR SITE PLAN APPROVAL
4	MAY 9, 2023	FOR SITE PLAN APPROVAL
5	MAY 31, 2023	FOR SITE PLAN APPROVAL

CONTRACTOR NAME & ADDRESS:
J.C.M. CUSTOM HOMES 1354 WINDHAM E QUARTER LINE RD., ST. WILLIAMS ONTARIO

PROJECT NAME & ADDRESS:
BANK STREET STORAGE UNITS
561 BANK STREET,
SIMCOE ONTARIO

Date: NOV. 14, 2022
Scale: 12" = 1'-0"

PROJECT NORTH: | TRUE NORTH:

Project #: DLX22-284
Drawn by: M.L.
Checked by: N.H.

DRAWING TITLE:
COVER SHEET

Sheet No.
S-0

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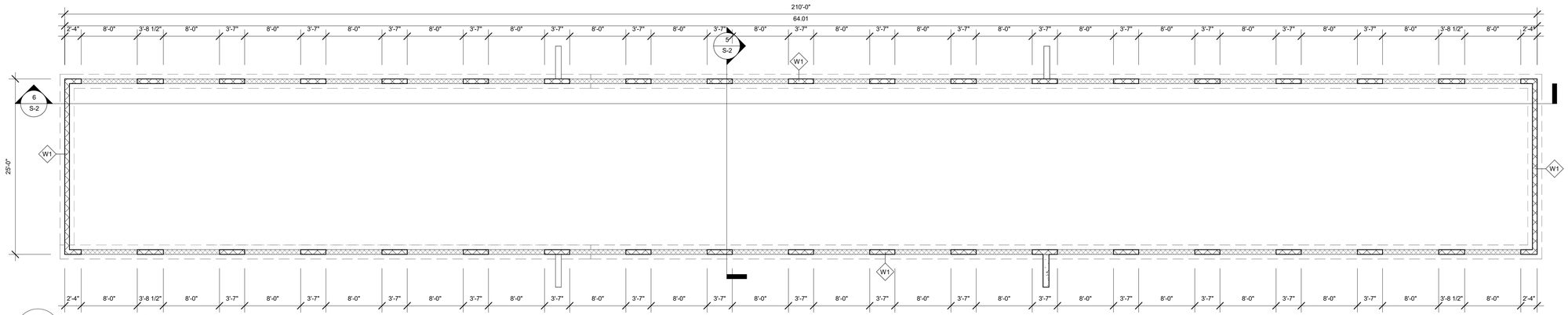
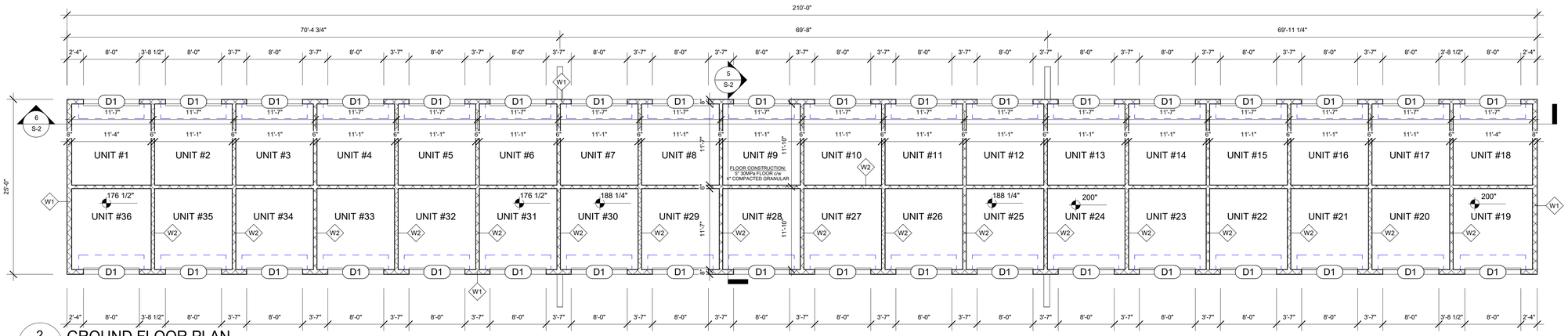
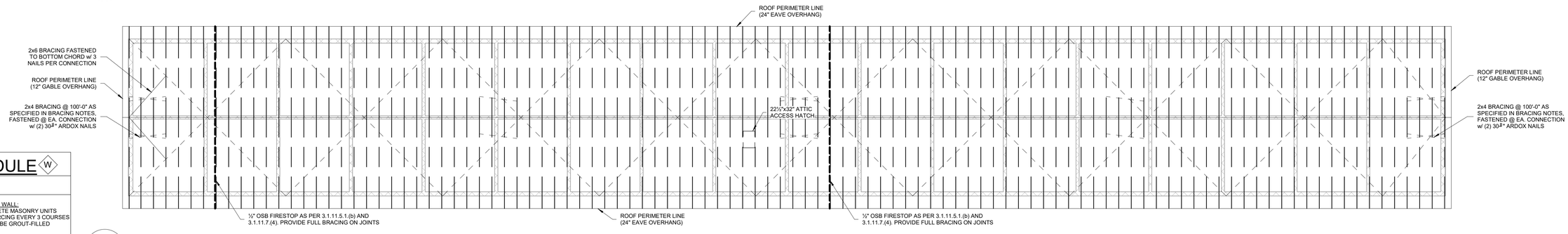


1 S-1 FOUNDATION PLAN
1/8" = 1'-0"



2 S-1 GROUND FLOOR PLAN
1/8" = 1'-0"



3 S-1 ROOF FRAMING PLAN
1/8" = 1'-0"

NOTE: ADDITIONAL STRUCTURAL PROVISIONS TO BE MADE FOR SOLAR PANELS LOADS ON TRUSSES

WALL SCHEDULE W

EXTERIOR WALLS:

W1 — 2HR. RATED 8" BLOCK WALL:
8" 78% SOLID CONCRETE MASONRY UNITS
c/w LATERAL REINFORCING EVERY 3 COURSES
EVERY 3RD CORE TO BE GROUT-FILLED

INTERIOR WALLS:

W2 — 1HR. RATED 6" CMU WALL:
6" CONCRETE MASONRY UNITS
c/w LATERAL REINFORCING EVERY 3 COURSES
EVERY 3RD CORE TO BE GROUT-FILLED

DOOR SCHEDULE

NO.	DESCRIPTION	WIDTH	HEIGHT	HEADER	POST	QTY
D1	1.5HR. RATED ROLL-UP SECURITY DOOR	8' - 0"	7' - 0"			36

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ABBREVIATIONS

@	AT	O.H.	OVERHEAD
c/w	COMPLETE WITH	PF.	PAD FOOTING
Ø	DIAMETER	P.T.	PRESSURE TREATED
FDN	FOUNDATION	T.D.	TRAVEL DISTANCE
E.W.	EACH WAY	T&G	TONGUE & GROOVE
EX.	EXISTING	T/O	TOP OF
HORIZ.	HORIZONTAL	TYP.	TYPICAL
LVL	LAMINATED VENEER LUMBER	U/S	UNDERSIDE
MAX.	MAXIMUM	VERT.	VERTICAL
MIN.	MINIMUM	w/	WITH
OBC	ONTARIO BUILDING CODE	WWM	WELDED WIRE MESH
c/c	CENTRE TO CENTRE		

LEGEND

- W — WALL TAG
- WN — WINDOW TAG
- D — DOOR TAG
- 0.0" / 200" — ELEVATION MARKER - PLAN / SECTION
- TRAVEL DISTANCE

PROJECT STATUS:

NO:	DATE:	STATUS:
2	NOV. 22, 2022	FOR APPROVAL
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CONTRACTOR NAME & ADDRESS:
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ST. WILLIAMS ONTARIO

PROJECT NAME & ADDRESS:
BANK STREET STORAGE UNITS
561 BANK STREET,
SIMCOE ONTARIO

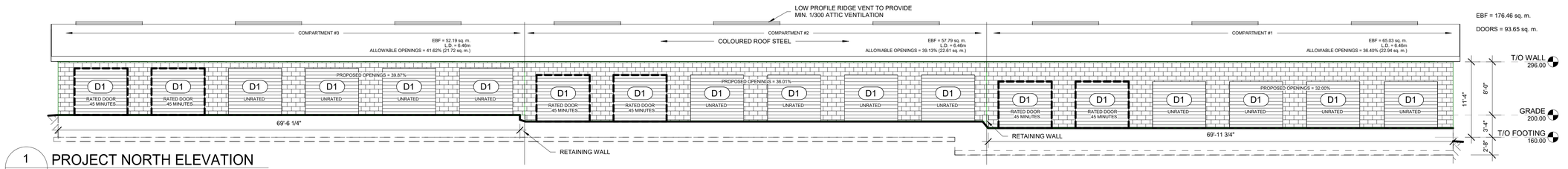
PROJECT NORTH: | TRUE NORTH:

Project #: DLX22-284
Drawn by: M.L.
Checked by N.H.

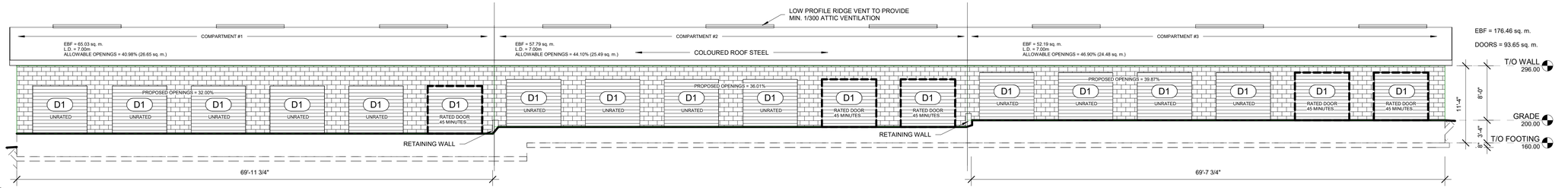
DRAWING TITLE:
FOUNDATION/ GROUND FLOOR/ ROOF FRAMING PLANS

Date: NOV. 14, 2022
Scale: As indicated
Sheet No.: S-1

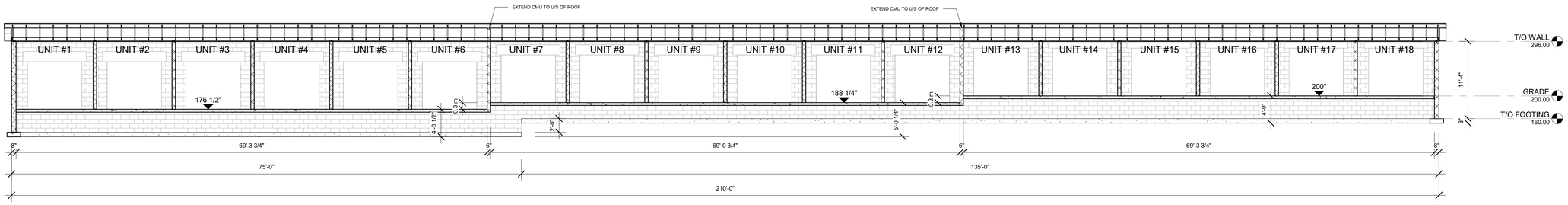
2023-05-31 1:01:32 PM



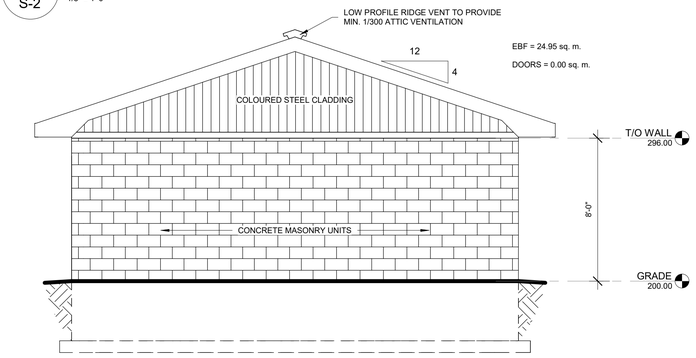
1 PROJECT NORTH ELEVATION
S-2 — 1/8" = 1'-0"



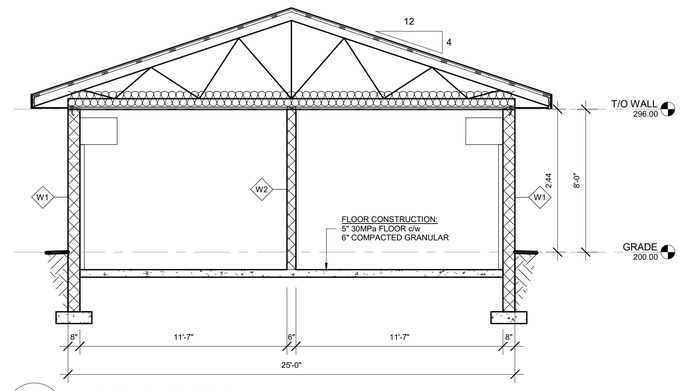
2 PROJECT SOUTH ELEVATION
S-2 — 1/8" = 1'-0"



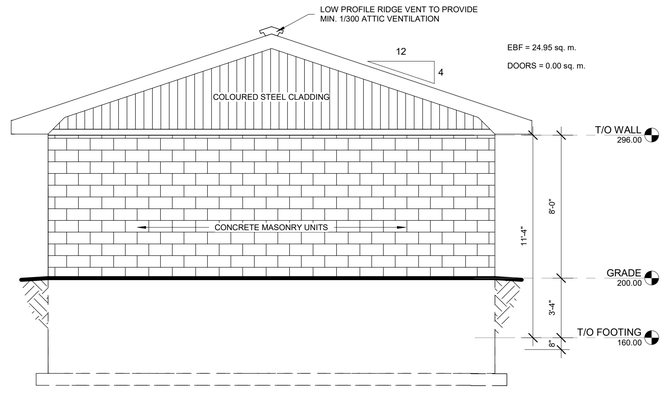
6 BUILDING CROSS SECTION
S-2 — 1/8" = 1'-0"



3 PROJECT EAST ELEVATION
S-2 — 1/4" = 1'-0"



5 BUILDING SECTION
S-2 — 1/4" = 1'-0"



4 PROJECT WEST ELEVATION
S-2 — 1/4" = 1'-0"

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ABBREVIATIONS

@	AT	O.H.	OVERHEAD
c/w	COMPLETE WITH	PF.	PAD FOOTING
Ø	DIAMETER	P.T.	PRESSURE TREATED
FDN	FOUNDATION	T.D.	TRAVEL DISTANCE
E.W.	EACH WAY	T&G	TONGUE & GROOVE
EX.	EXISTING	T/O	TOP OF
HORIZ.	HORIZONTAL	TYP.	TYPICAL
LVL	LAMINATED VENEER LUMBER	U/S	UNDERSIDE
MAX.	MAXIMUM	VERT.	VERTICAL
MIN.	MINIMUM	w/	WITH
OBC	ONTARIO BUILDING CODE	WWM	WELDED WIRE MESH
c/c	CENTRE TO CENTRE		

LEGEND

- W — WALL TAG
- WN — WINDOW TAG
- D — DOOR TAG
- 0.0" — ELEVATION MARKER - PLAN
- 200" — ELEVATION MARKER - SECTION
- TRAVEL DISTANCE

PROJECT STATUS:

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BANK STREET STORAGE UNITS
561 BANK STREET,
SIMCOE ONTARIO

PROJECT NORTH: | TRUE NORTH:

Project #: DLX22-284
Drawn by: M.L.
Checked by N.H.

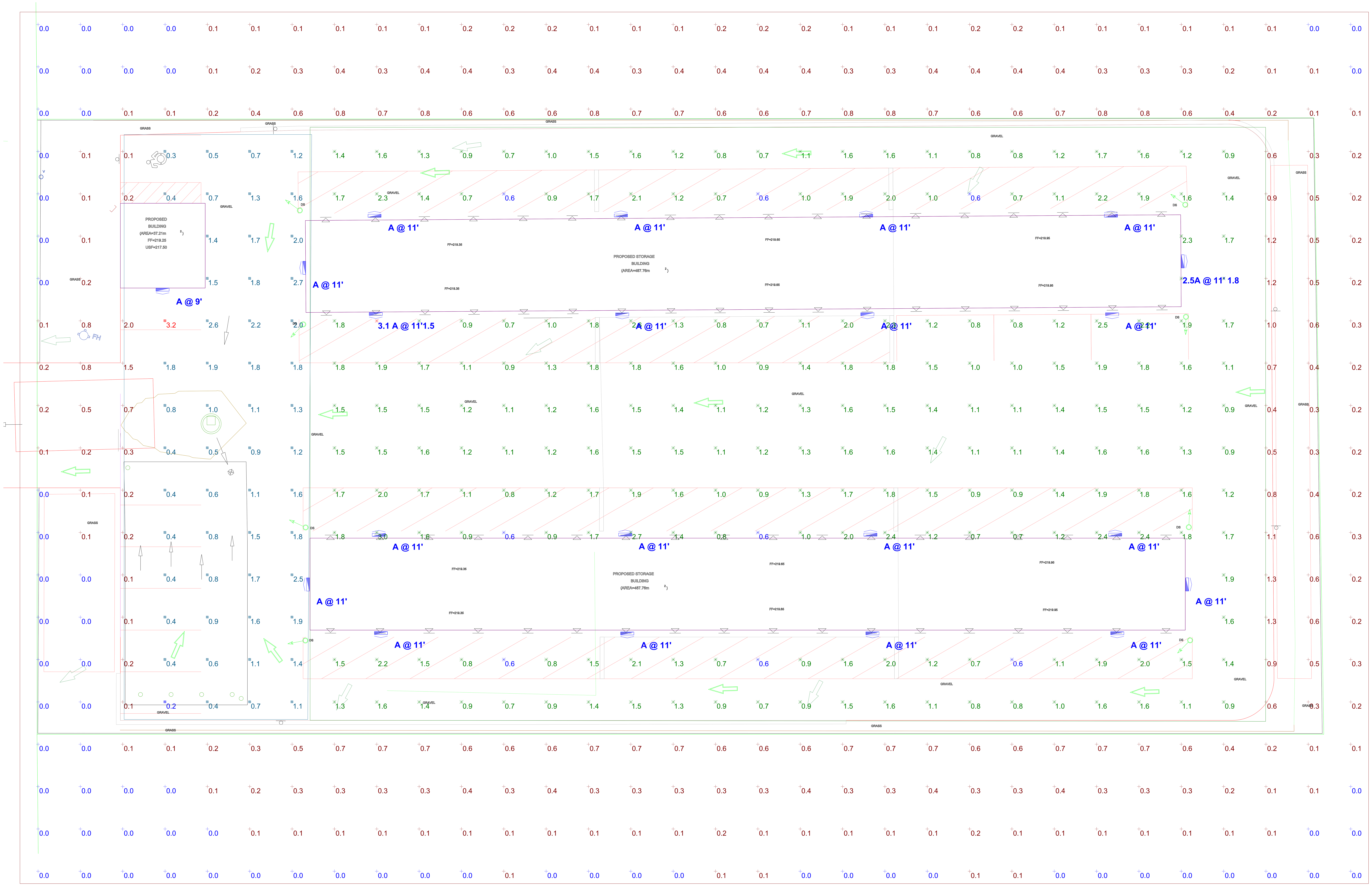
DRAWING TITLE:
ELEVATIONS/BUILDING SECTIONS

Date: NOV. 14, 2022
Scale: As indicated
Sheet No. S-2

2023-05-31 1:01:33 PM

GENERAL NOTES:

1. REFER TO ARCHITECTURAL AND SITE PLAN DRAWINGS FOR ALL DIMENSIONS AND RELEVANT LAYOUTS. SCALING MAY NOT BE EXACT DUE TO THE SOFTWARE EXPORTING FILES.
2. LIGHTING PHOTOMETRY IS MODELED UTILIZING LITHONIA'S VISUAL SOFTWARE, VERSION 2022.
3. INSTALLATION SPECIFICATION, DETAILS AND CONTROLS SCHEMATIC INCLUDING 24 HOUR TIMER AND PHOTOCELL CONTROL ARE INCLUDED AS PART OF THE BUILDING DESIGN DRAWINGS.



1 SITE LIGHTING - PHOTOMETRY PLAN
SCALE: 3/32"=1'-0"

LUMINAIRE SCHEDULE

TYPE	QTY	MANUFACTURER / DETAILS	MOUNTING TYPE	HEIGHT (MH)	VOLTAGE	WATTS/FIXTURE	NOTES
A	21	DSXW1 LED WITH (1) 10 LED LIGHT ENGINES, TYPE TFTM OPTIC, 4000K, @700mA CAT #DSXW1 LED 10C 700 40K TFTM MVOLT	SURFACE / WALL	9' - 11' afg (REFER TO PLAN)	120V	26.2 w	TYPE IV, SHORT, BUG RATING: B1 - U0 - G1 PROVIDE ALL SWITCHING AND ACCESSORIES REQUIRED

CALCULATION ZONES

DESCRIPTION	SYMBOL	MAX	MIN	MAX/MIN	AVG	AVG/MIN
PARKING AREA	■	2.7 FC	0.2 FC	13.5:1	1.0 FC	5.0:1
STORAGE UNIT AREA	×	3.1 FC	0.6 FC	5.2:1	1.4 FC	2.3:1
SPILL LIGHT SUMMARY	+	3.1 FC	0.6 FC	N/A	0.8 FC	N/A

McLELLAN VITELLA ENGINEERING LTD.
Exeter, ON. - P: 519-878-2586
Brights Grove, On. - P: 226-932-1422
office@mvengineering.ca

PROFESSIONAL SEAL:

DATE	REV.	ISSUED FOR	DSN	ENG
MAY 26/23	1	SITE PLAN APPROVAL	HV	GPV

PROJECT:
BANK ST. STORAGE UNITS
SIMCOE, ONTARIO

DATE: MAY 26/2023	DRAWN BY: HV
	APPROVED BY: GPV
SCALE: AS NOTED	PROJECT No: MV23-022

DRAWING TITLE:
ELECTRICAL SITE LIGHTING PHOTOMETRY PLAN

DRAWING NUMBER: SPA-E01
REVISION: 1

5A-150 Pinebush Road
Cambridge ON N1R 8J8
p: 519.896.3163
905.381.2229
416.479.9684

www.ptsl.com

2023-05-02
Project: (230226)

Nick Hiemstra, P.Eng.
Project Engineer
DesignLogix Engineering
557 Alberta Avenue
Woodstock, ON N4V 0A3

Dear Mr. Hiemstra:

RE: PROPOSED MINI STORAGE DEVELOPMENT, 561 BANK STREET NORTH, SIMCOE, TRAFFIC IMPACT BRIEF

DesignLogix Engineering retained Paradigm Transportation Solutions Limited (Paradigm) to prepare a Traffic Impact Brief for a proposed mini storage development at 561 Bank Street North in the community of Simcoe, Norfolk County.

The purpose of this letter is to address the requirements set out in the *Refusal of Site Plan Application* from Norfolk County dated 10 March 2023. Paradigm confirmed the scope of work of this Traffic Impact Brief with Norfolk County development engineering staff via e-mail in April 2023. This letter includes a description of the road network near the site, a description of the proposed development, an estimate of the trip generation of the site, and a sight distance assessment for the proposed driveway connection.

This Traffic Impact Brief has been prepared in accordance with the Norfolk County *TIS Guidelines*[1] and direction provided by County staff during pre-study consultation. **Appendix A** contains the pre-study correspondence and comments provided by Norfolk County staff during pre-study consultation.

Existing Conditions

Bank Street North is a north-south, two-lane, local road with an urban cross-section, and one travel lane per direction. The speed limit is not posted and is assumed to be 50 km/h. Active transportation facilities, such as sidewalks and bicycle lanes, are not provided on either side of the road. Immediately north of the subject site, Bank Street North intersects Second Avenue East, an east-west, two-lane local road connecting to Norfolk Street North (County Road 24).

[1] Norfolk County, *Integrated Sustainable Master Plan – Appendix J TIS Guidelines*, (Simcoe: Norfolk County, 2016).

South of the site, Bank Street North terminates. Parking is not permitted on either side of Bank Street North, south of Second Avenue East. North of Second Avenue East, parking is prohibited on the east side of the road (between the first and 15th days of the month), and on the west side (between the 16th day and the end of the month).

Figure 1 (attached) illustrates the location of the subject site and the general road network near the site.

Site Description and Development Concept

The subject site is located on the east side of Bank Street North, immediately south of Second Avenue East and is vacant.

The property owner is proposing to redevelop the site into a mini storage development with two buildings, each with a gross floor area of approximately 490 m^2 (5,275 sq. ft.). An ancillary building with a GFA of approximately 40 m^2 (430 sq. ft) is proposed in the northwest corner of the site. Vehicle access is proposed via an all-moves driveway to Bank Street North, approximately centred on the site's west frontage. **Figure 2** (attached) illustrates the conceptual site plan.

Estimated Trip Generation

The site trip generation reflects information in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*[2] for land use code (LUC) 151 (Mini-Warehouse). LUC 151 is described as "a building in which a number of storage units or vaults are rented for the storage of goods; they are typically referred to as 'self-storage facilities'."

Table 1 summarizes the estimated trip generation of the site based on the gross floor area (GFA) of the proposed development. The site is forecast to generate one trip in the weekday AM peak hour and two trips in the weekday PM peak hour. **Appendix B** contains the applicable data sheets, as extracted from the *Trip Generation Manual*.

TABLE 1: ESTIMATED TRIP GENERATION

LUC	GFA[1] (sq. ft.)	AM Peak Hour				PM Peak Hour			
		Rate[2]	In	Out	Total	Rate[3]	In	Out	Total
151 (Mini-Warehouse)	10,990	0.09	1	0	1	0.15	1	1	2

Notes:

1. The average rate is equal to the number of trips per 1,000 sq. ft. GFA
2. LUC 151 (AM): 59% entering, 41% exiting
3. LUC 151 (PM): 47% entering, 53% exiting

[2] Institute of Transportation Engineers, *Trip Generation Manual*, 11th ed., (Washington, DC: ITE, 2021).

Sight Distance Assessment

The available sight distance at the proposed driveway location has been assessed based on the methodology outlined in the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[3] (the "TAC Guide"). The following parameters are referenced in the assessment:

- Object Height (Vehicle tail or brake light) – 0.60 metres;
- Driver Eye Height – 1.08 metres; and
- Top of Car – 1.30 metres.

Table 2 summarizes the minimum recommended sight distances at a design speed of 60 km/h; 10 km/h above the assumed 50 km/h speed limit on Bank Street North.

TABLE 2: RECOMMENDED SIGHT DISTANCES

Sight Distance Measurement	Recommended Sight Distance (60 km/h)
Minimum Stopping Sight Distance	85 metres
Decision Sight Distance (Left Turn from Stop)	130 metres
Decision Sight Distance (Right Turn from Stop)	110 metres

Paradigm staff conducted a site visit in April 2023 to estimate the available sight distance at the proposed driveway to Bank Street North. **Table 3** summarizes the measurements.

TABLE 3: MEASURED (OBSERVED SIGHT DISTANCES)

Sight Distance Measurement	Measurement in Field	Meets Recommended Distance
Minimum Stopping Sight Distance (Northbound)	70 metres	Yes[1]
Minimum Stopping Sight Distance (Southbound)	134 metres	Yes
Intersection Sight Distance (Left Turn from Stop)	145 metres	Yes
Intersection Sight Distance (Right Turn from Stop)	70 metres	Yes[1]

Notes:

1. Minimum stopping sight distance and intersection sight distance is only limited by the available road between the site driveway and the southern terminus of Bank Street North.

[3] TAC, "Intersections," Chap. 9 in *Geometric Design Guide for Canadian Roads,* (Ottawa: TAC, 2017).

The measurements for outbound traffic exiting the proposed site driveway were taken five metres from the existing edge of pavement, representing the position of a driver performing a turning movement from the site. The measurements for inbound traffic were taken from the centre of the respective northbound and southbound travel lanes on Bank Street North. **Figure 3** (attached) illustrates general photographs of the sight distance assessment and site visit.

The sight distance assessment summarized in **Table 3** indicates the driveway location meets the minimum recommended sight distances defined by the Transportation Association of Canada (TAC).

Findings, Conclusions and Recommendations

The findings of this Traffic Impact Brief are as follows:

- The site is vacant, and the property owner is proposing to redevelop the site into a mini storage development with two buildings, each with a gross floor area of approximately 490 m^2 (5,275 sq. ft.), and an ancillary building with a gross floor area of approximately 40 m^2 (430 sq. ft) in the northwest corner of the site.

  Vehicle access is proposed via an all-moves driveway to Bank Street North, near the centre of the west frontage of the site;
- The site is estimated to generate one trip in the weekday AM peak hour and two trips in the weekday PM peak hour; and
- The proposed driveway location meets the minimum recommended sight distances defined by the Transportation Association of Canada (TAC).

Redevelopment of the site is forecast to have a negligible impact on the surrounding road network, and the proposed driveway location provides sufficient sight distance consistent with industry guidelines and recommendations.

It is recommended that the redevelopment be considered for approval with no requirements for off-site transportation network improvements.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

<< Original Signed By >>

Andrew Steinsky
P.Eng., PTP
Project Manager, Associate

<< Original Signed By >>

Jim Mallett
M.A.Sc., P.Eng., PTOE
President and CEO, Principal

Attachments

Not to Scale
Image Source: Norfolk County Interactive Community Web Map
(https://www.norfolkcounty.ca/visiting/norfolk-maps/online-interactive-maps/)

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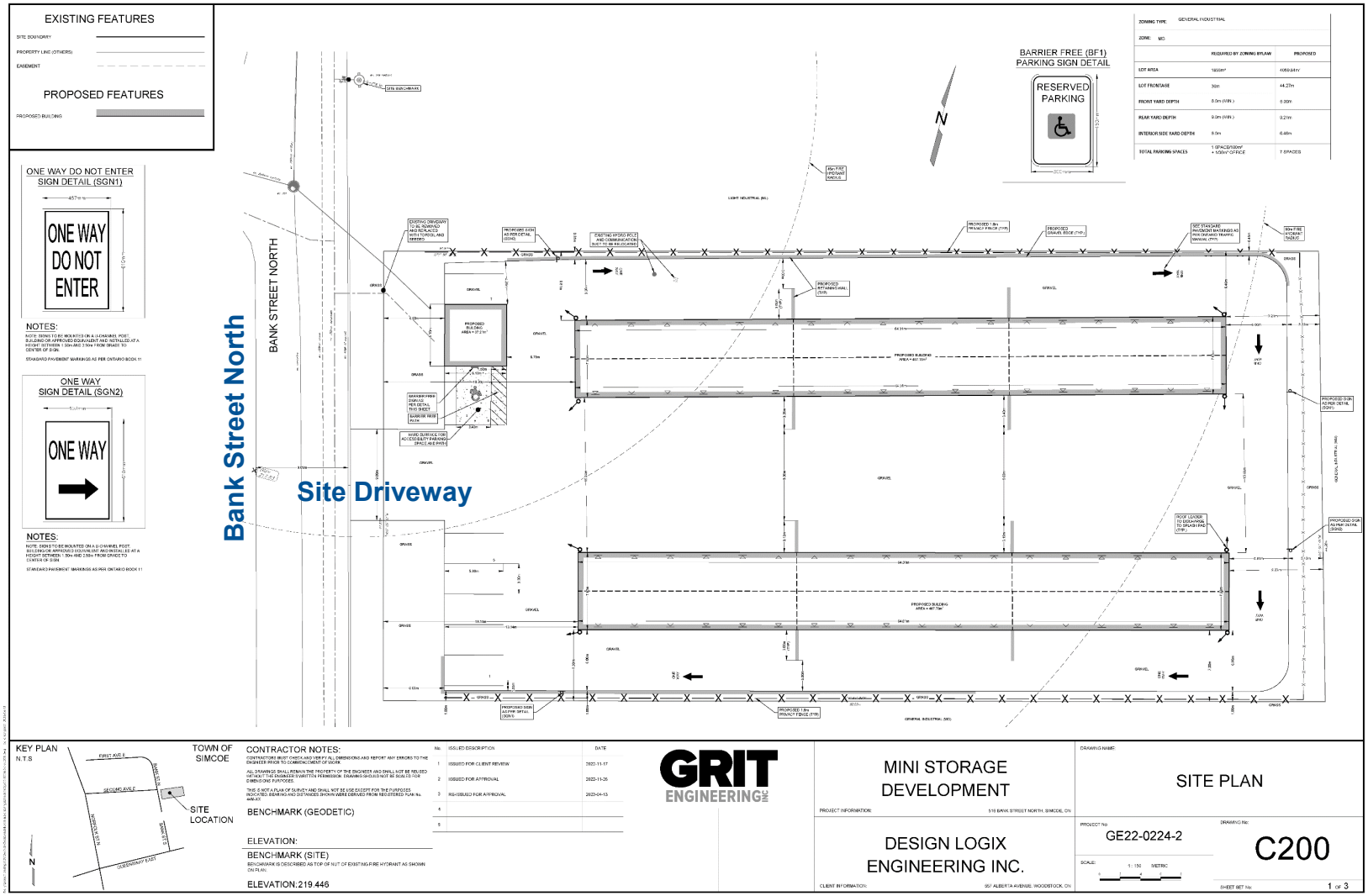
Location of Subject Site



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Conceptual Site Plan

At Site Driveway facing south

At Site Driveway facing north

On Bank Street facing south from First Avenue

On Bank Street facing north at road terminus

paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Observations (Photos A to D)

Appendix A

Pre-Study Consultation Correspondence

Andrew Steinsky

From: Mike King <Mike.King@norfolkcounty.ca>
Sent: April 20, 2023 10:29 AM
To: Andrew Steinsky; Stephen Gradish
Cc: Tim Dickhout
Subject: RE: (230226) - 561 Bank Street North Traffic Impact Brief - Terms of Reference

Andrew, please provide an estimate trip generation as well as sight distances.

Thank

Mike King, CET
Director, Engineering
Robinson Administration Building
Engineering
Environmental and Infrastructure Services Division
185 Robinson Street Suite 200, Simcoe, Ontario, N3Y 5L6
519-426-5870 x. 8012

Working together with our community

From: Andrew Steinsky <asteinsky@ptsl.com>
Sent: Thursday, April 20, 2023 10:24 AM
To: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>
Cc: Tim Dickhout <Tim.Dickhout@norfolkcounty.ca>; Mike King <Mike.King@norfolkcounty.ca>
Subject: RE: (230226) - 561 Bank Street North Traffic Impact Brief - Terms of Reference

Hi Stephen,

Following up on my e-mail from April 11. Is our scope of work appropriate for the County's needs. Do you require an estimate of daily trip generation, or is the sight distance assessment sufficient?

Please let us know as we would like to get this project wrapped up for our client.

Thanks,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

Paradigm Transportation Solutions Limited
p: 416.479.9684 x507
m: 416.316.0654

From: Andrew Steinsky
Sent: Tuesday, April 11, 2023 9:57 AM
To: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>
Cc: Tim Dickhout <Tim.Dickhout@norfolkcounty.ca>; Mike King <Mike.King@norfolkcounty.ca>
Subject: RE: (230226) - 561 Bank Street North Traffic Impact Brief - Terms of Reference

Hi Stephen,

Have you had a chance to review our scope of work below? Is it to the satisfaction of the County. Do you require an estimate of daily site trips as suggested by Mike?

Please let us know.

Thanks,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

Paradigm Transportation Solutions Limited
p: 416.479.9684 x507
m: 416.316.0654

From: Mike King <Mike.King@norfolkcounty.ca>
Sent: Wednesday, March 29, 2023 10:46 AM
To: Andrew Steinsky <asteinsky@ptsl.com>
Cc: Stephen Gradish <Stephen.Gradish@norfolkcounty.ca>; Tim Dickhout <Tim.Dickhout@norfolkcounty.ca>
Subject: RE: (230226) - 561 Bank Street North Traffic Impact Brief - Terms of Reference

Andrew: I will ask Stephen to confirm requirements, however this looks adequate for our requirements.

May also require anticipated daily trips as well

Mike King, CET
Director, Engineering
Robinson Administration Building
Engineering
Environmental and Infrastructure Services Division
185 Robinson Street Suite 200, Simcoe, Ontario, N3Y 5L6
519-426-5870 x. 8012

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From: Andrew Steinsky <asteinsky@ptsl.com>
Sent: Wednesday, March 29, 2023 10:34 AM
To: Mike King <Mike.King@norfolkcounty.ca>
Subject: (230226) - 561 Bank Street North Traffic Impact Brief - Terms of Reference

Hi Mike,

We've been retained to conduct a Traffic Impact Brief for another site in Simcoe; this one is at 561 Bank Street North. The property owner is planning to develop the site into a mini storage facility with two buildings, each with a gross floor area of approximately 490 m^2 (5,275 sq. ft.). An ancillary building with a GFA of approximately 40 m^2 (430 sq. ft) is proposed in the northwest corner of the site. Vehicle access is proposed via an all-moves driveway to Bank Street North, near the northwest corner of the site.

Based on the *Refusal of Site Plan Application* letter from the County dated 10 March 2023, we understand the County requires a Traffic Impact Brief addressing the following sections of the County's *TIS Guidelines*:

a. Section A1.3: Existing Conditions;
b. Section A1.5: Development Land Use Type and Site Plan
c. Conclusions and Recommendations:
    i. Confirm sightlines from access/egress have sufficient sight distance.

Based on the above, we propose the following work plan to address each point above:

1. Section A1.3: We will provide a description of Bank Street North consistent with that specified in Section A1.3 of the County's *TIS Guidelines;*
2. Section A1.5: We will provide a description of the proposed development, including the development size (e.g., gross floor area), and the location of the driveway access. We will include a figure illustrating the site plan; and
3. We will conduct a sight distance assessment at the site driveway based on the methodology contained in the Transportation Association of Canada *Geometric Design Guide for Canadian Roads*.

Please let us know if you have any questions or comments on the above work plan.

Regards,

Andrew Steinsky, P.Eng., PTP
Project Manager, Associate
(he/him)

Paradigm Transportation Solutions Limited
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p: 416.479.9684 x507
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Appendix B

ITE Trip Generation Manual Data Sheet Excerpts

Land Use: 151
Mini-Warehouse

Description

A mini-warehouse is a building in which a number of storage units or vaults are rented for the storage of goods. They are typically referred to as “self-storage” facilities. Each unit is physically separated from other units, and access is usually provided through an overhead door or other common access point.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Colorado, Massachusetts, Minnesota, Nevada, New Jersey, Texas, and Utah.

Source Numbers

212, 403, 551, 568, 642, 708, 724, 850, 868, 876, 1024, 1035

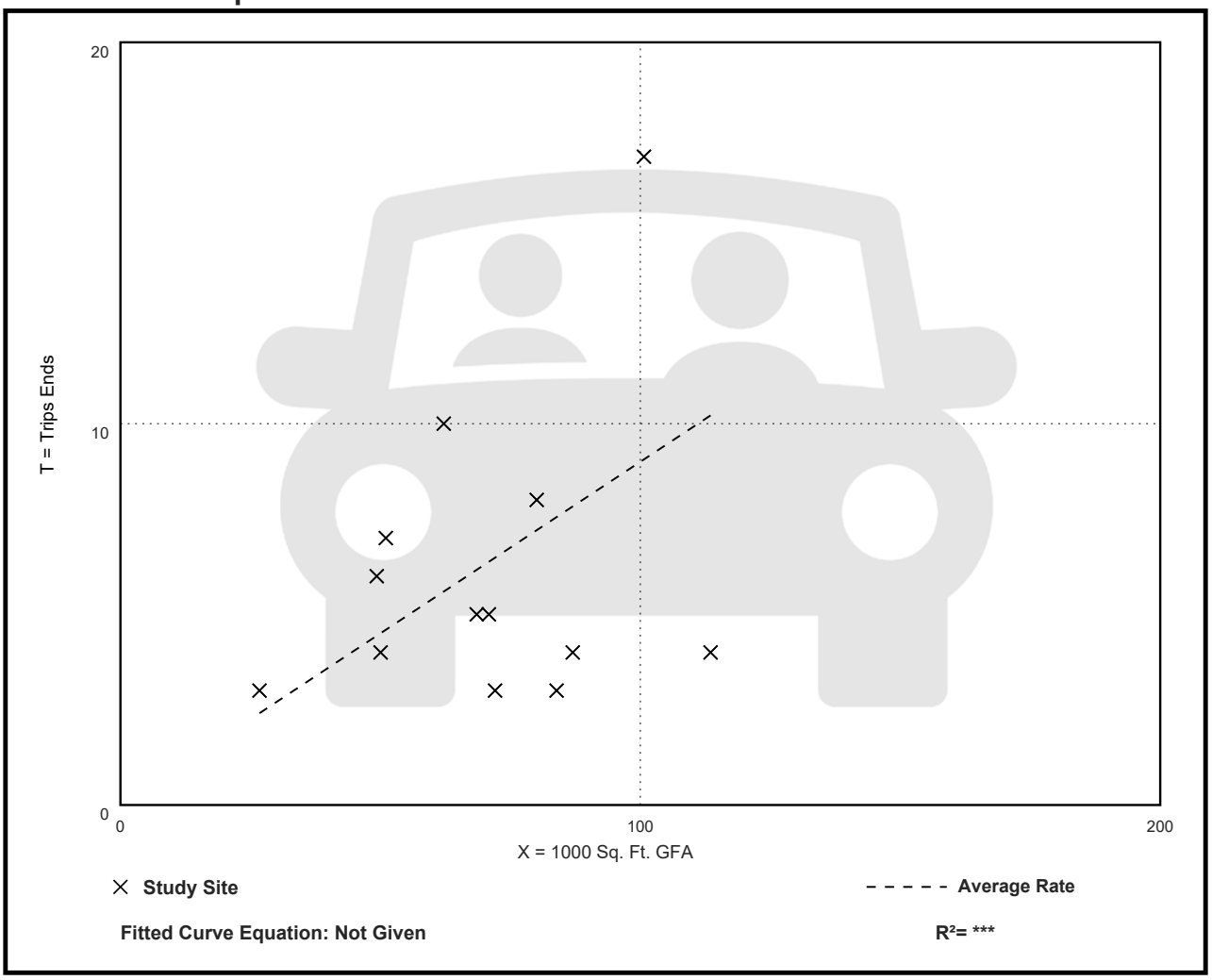
Mini-Warehouse
(151)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 70
Directional Distribution: 59% entering, 41% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.09	0.04 - 0.17	0.05

Data Plot and Equation



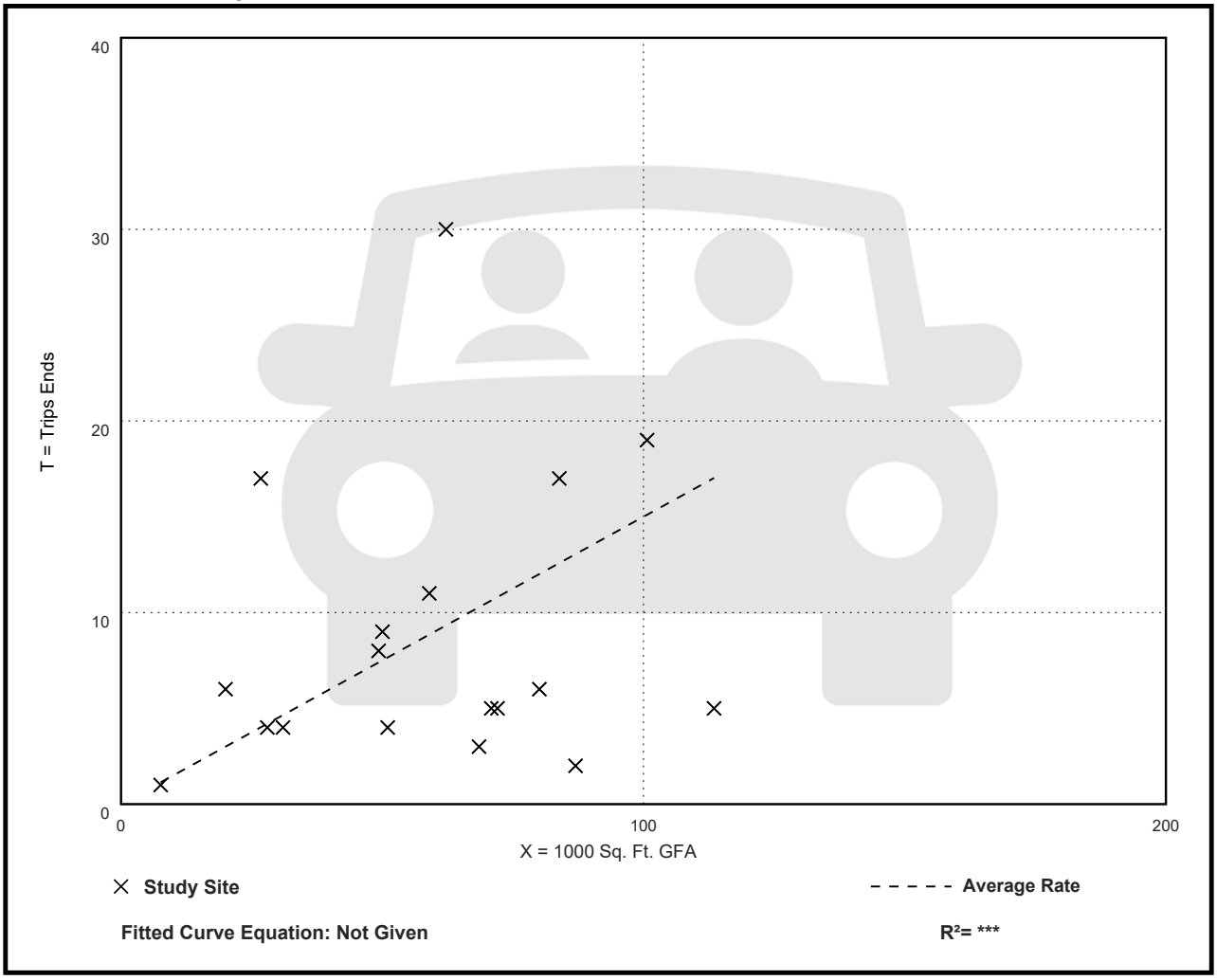
Mini-Warehouse
(151)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: General Urban/Suburban
Number of Studies: 18
Avg. 1000 Sq. Ft. GFA: 59
Directional Distribution: 47% entering, 53% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.15	0.02 - 0.64	0.14

Data Plot and Equation

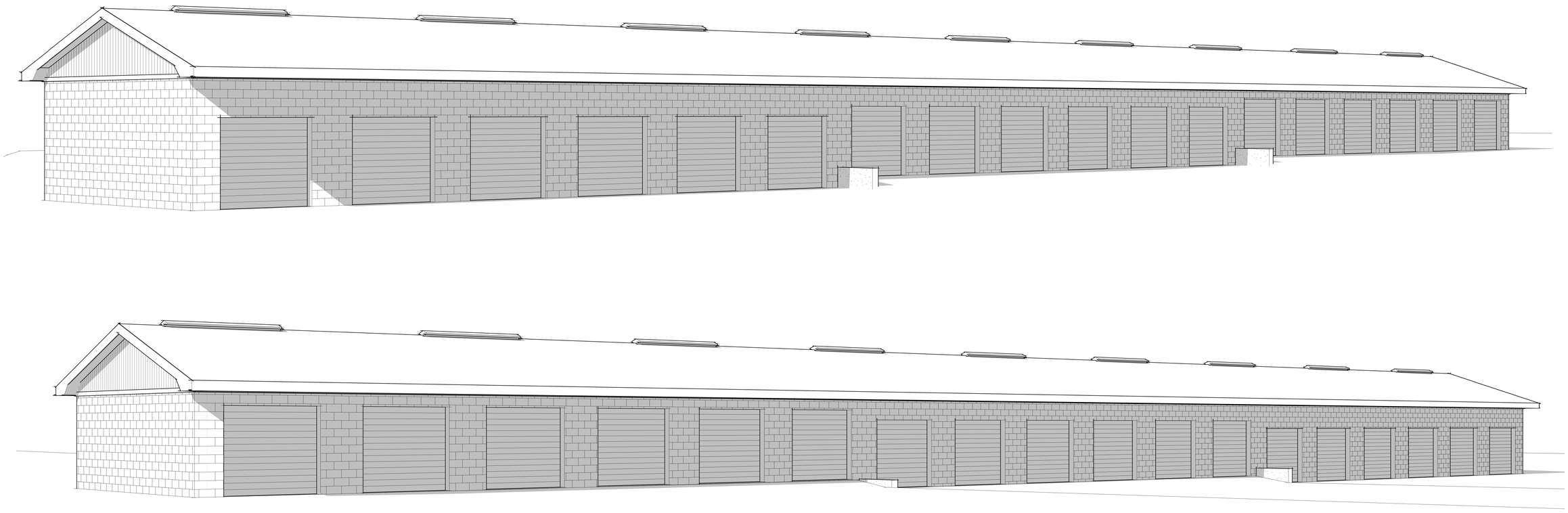


DRAWINGS PROVIDED FOR

J.C.M. CUSTOM HOMES

BANK STREET STORAGE UNITS

561 BANK STREET, SIMCOE ONTARIO



SHEET SCHEDULE	
SHEET NO.	SHEET NAME
S-0	COVER SHEET
S-1	FOUNDATION/ GROUND FLOOR/ ROOF FRAMING PLANS
S-2	ELEVATIONS/BUILDING SECTIONS

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PROJECT STATUS:

NO:	DATE:	STATUS:
1	NOV. 15, 2022	FOR APPROVAL
2	NOV. 22, 2022	FOR APPROVAL
3	DEC. 7, 2022	FOR SITE PLAN APPROVAL
4	MAY 9, 2023	FOR SITE PLAN APPROVAL

CONTRACTOR NAME & ADDRESS:
J.C.M. CUSTOM HOMES 1354 WINDHAM E QUARTER LINE RD., ST. WILLIAMS ONTARIO

PROJECT NAME & ADDRESS:
BANK STREET STORAGE UNITS
561 BANK STREET,
SIMCOE ONTARIO

Date: NOV. 14, 2022

Scale:

PROJECT NORTH: | TRUE NORTH:

Project #: DLX22-284

Drawn by: M.L.

Checked by: N.H.

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COVER SHEET

Sheet No.
S-0

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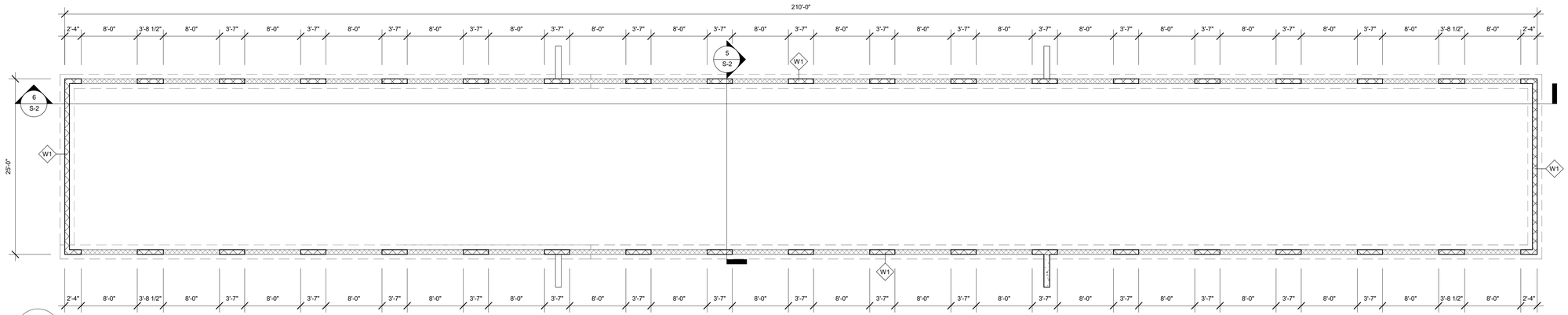
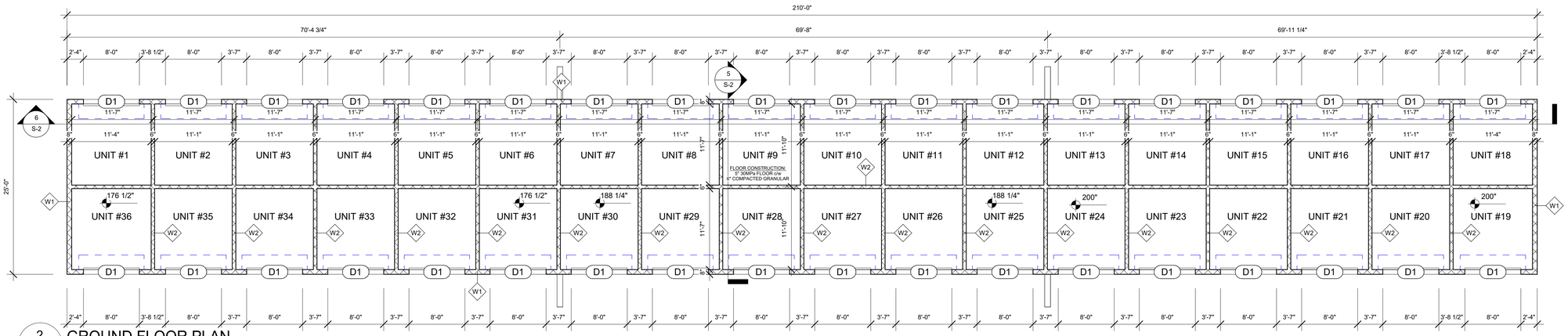
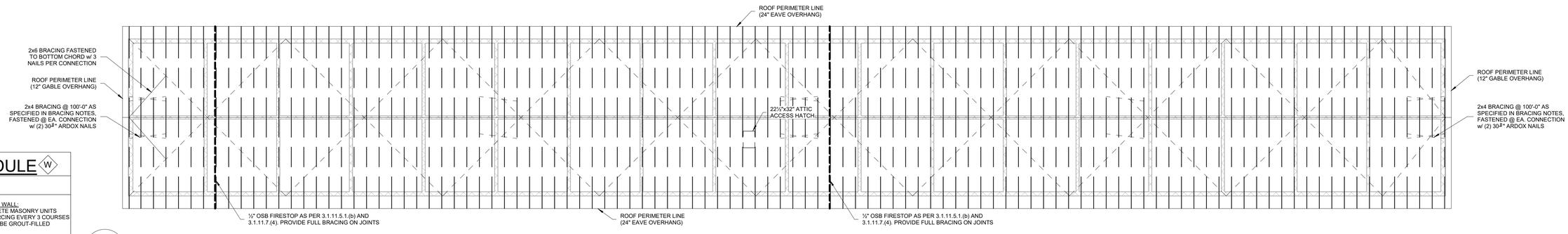


1 S-1 **FOUNDATION PLAN**
1/8" = 1'-0"



2 S-1 **GROUND FLOOR PLAN**
1/8" = 1'-0"



3 S-1 **ROOF FRAMING PLAN**
1/8" = 1'-0"

NOTE: ADDITIONAL STRUCTURAL PROVISIONS TO BE MADE FOR SOLAR PANELS LOADS ON TRUSSES

WALL SCHEDULE (W)

EXTERIOR WALLS:

W1 — 2HR. RATED 8" BLOCK WALL:
8" 78% SOLID CONCRETE MASONRY UNITS c/w LATERAL REINFORCING EVERY 3 COURSES EVERY 3RD CORE TO BE GROUT-FILLED

INTERIOR WALLS:

W2 — 1HR. RATED 6" CMU WALL:
6" CONCRETE MASONRY UNITS c/w LATERAL REINFORCING EVERY 3 COURSES EVERY 3RD CORE TO BE GROUT-FILLED

DOOR SCHEDULE

NO.	DESCRIPTION	WIDTH	HEIGHT	HEADER	POST	QTY
D1	1.5HR. RATED ROLL-UP SECURITY DOOR	8' - 0"	7' - 0"			36

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ABBREVIATIONS

@	AT	O.H.	OVERHEAD
c/w	COMPLETE WITH	PF.	PAD FOOTING
Ø	DIAMETER	P.T.	PRESSURE TREATED
FDN	FOUNDATION	T.D.	TRAVEL DISTANCE
E.W.	EACH WAY	T&G	TONGUE & GROOVE
EX.	EXISTING	T/O	TOP OF
HORIZ.	HORIZONTAL	TYP.	TYPICAL
LVL	LAMINATED VENEER LUMBER	U/S	UNDERSIDE
MAX.	MAXIMUM	VERT.	VERTICAL
MIN.	MINIMUM	w/	WITH
OBC	ONTARIO BUILDING CODE	WWM	WELDED WIRE MESH
c/c	CENTRE TO CENTRE		

LEGEND

- W — WALL TAG
- WN — WINDOW TAG
- D — DOOR TAG
- 0.0" / 200" — ELEVATION MARKER - PLAN / SECTION
- TRAVEL DISTANCE

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PROJECT NORTH: NORTH | TRUE NORTH:

Project #: DLX22-284
Drawn by: M.L.
Checked by N.H.

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Date: NOV. 14, 2022
Scale: As indicated
Sheet No. **S-1**

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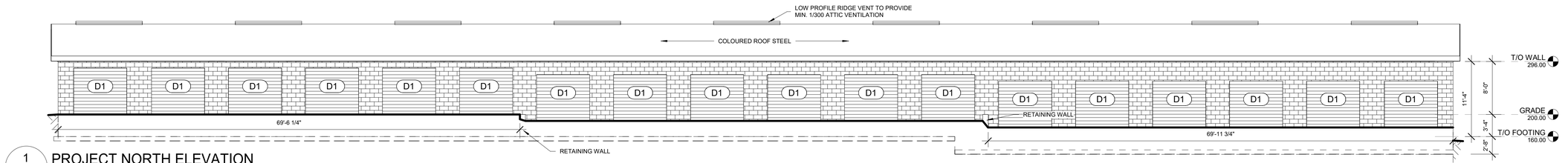
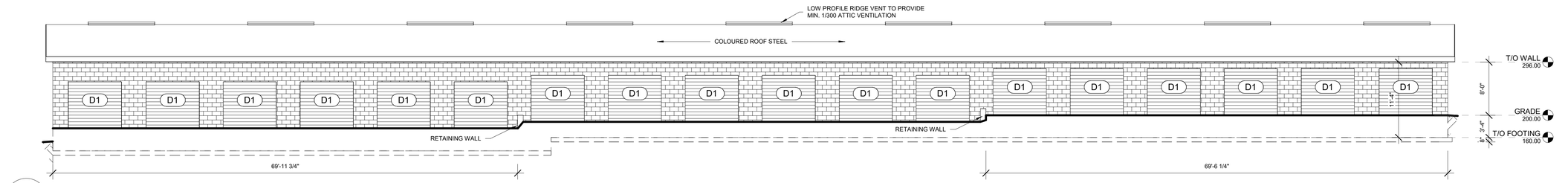


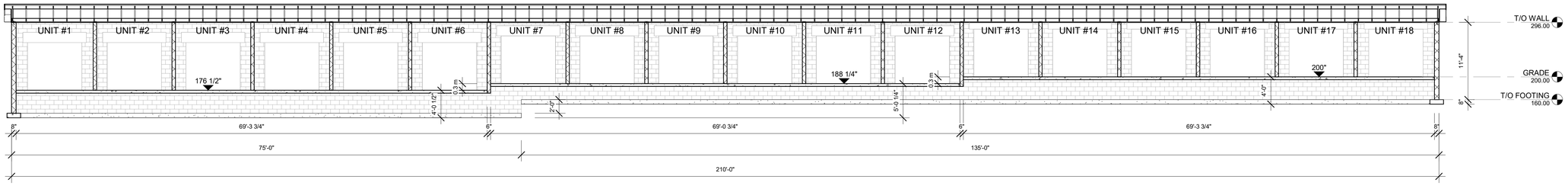
1 S-2 PROJECT NORTH ELEVATION

1/8" = 1'-0"



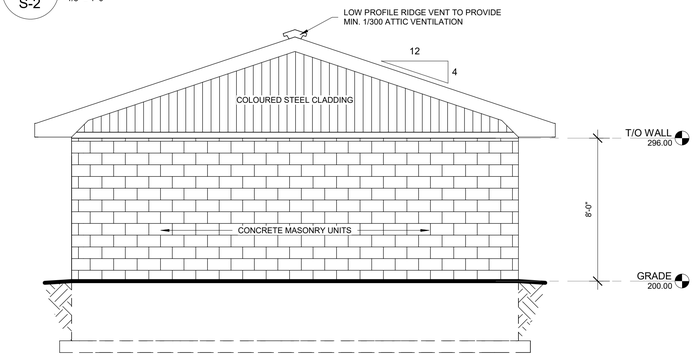
2 S-2 PROJECT SOUTH ELEVATION

1/8" = 1'-0"



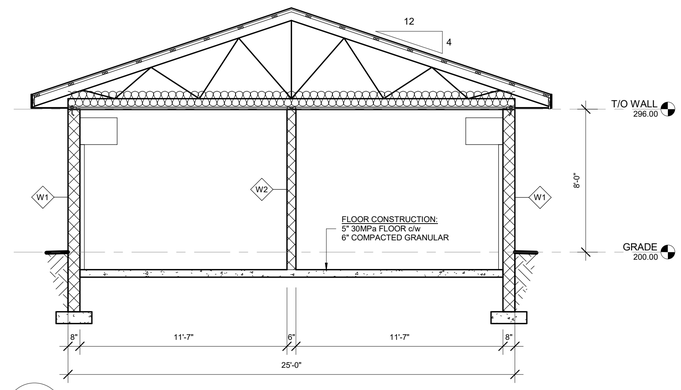
6 S-2 BUILDING CROSS SECTION

1/8" = 1'-0"



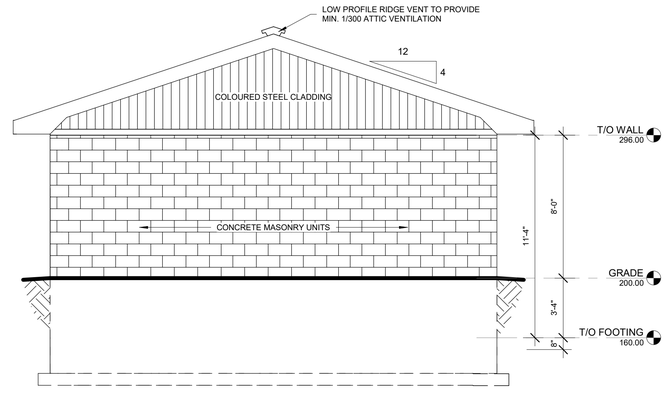
3 S-2 PROJECT EAST ELEVATION

1/4" = 1'-0"



5 S-2 BUILDING SECTION

1/4" = 1'-0"



4 S-2 PROJECT WEST ELEVATION

1/4" = 1'-0"

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FDN	FOUNDATION	T.D.	TRAVEL DISTANCE
E.W.	EACH WAY	T&G	TONGUE & GROOVE
EX.	EXISTING	T/O	TOP OF
HORIZ.	HORIZONTAL	TYP.	TYPICAL
LVL	LAMINATED VENEER LUMBER	U/S	UNDERSIDE
MAX.	MAXIMUM	VERT.	VERTICAL
MIN.	MINIMUM	w/	WITH
OBC	ONTARIO BUILDING CODE	WWM	WELDED WIRE MESH
c/c	CENTRE TO CENTRE		

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Date: NOV. 14, 2022
Scale: As indicated
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